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

RP-010022

Title: **Agreed CRs (Release '99) to TS 25.304**

Source: **TSG-RAN WG2**

Agenda item: 5.2.3

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-010215	agreed	25.304	055	1	R99	Usage of HCS Parameters in Cell Reselection	F	3.5.0	3.6.0
R2-010115	agreed	25.304	056		R99	Clarification of usage of "Initial UE-Id" for SCCPCH selection	F	3.5.0	3.6.0
R2-010212	agreed	25.304	058		R99	Clarification of paging occasion	F	3.5.0	3.6.0
R2-010530	agreed	25.304	059	1	R99	Correction in Any Cell Selection State	F	3.5.0	3.6.0
R2-010439	agreed	25.304	061		R99	Correction to the definition of a suitable cell	F	3.5.0	3.6.0
R2-010450	agreed	25.304	062		R99	Correction to discontinuous reception in TDD	F	3.5.0	3.6.0
R2-010561	agreed	25.304	063	1	R99	Correction of PI calculation for Paging DRX	F	3.5.0	3.6.0
R2-010680	agreed	25.304	064	2	R99	Equivalent PLMN codes	F	3.5.0	3.6.0
R2-010656	agreed	25.304	065		R99	High quality cell in PLMN selection	F	3.5.0	3.6.0
R2-010677	agreed	25.304	066		R99	Clean-up	F	3.5.0	3.6.0

CR-Form-v3

CHANGE REQUEST

⌘ **25.304** CR **055** ⌘ rev **r1** ⌘ Current version: **3.5.0** ⌘

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

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

Title: ⌘	Usage of HCS Parameters in Cell Reselection	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘		***Date:*** ⌘ 15.1.2001
Category: ⌘ **F**		***Release:*** ⌘ R99

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

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

Reason for change: ⌘	Cell reselection criteria are described in a way that HCS is assumed to be used. Some clarifications are therefore required how to apply the criteria in case no HCS is used. Further minor clarifications and editorial modifications related to the use of cell reselection criteria and parameters have been made as well.
Summary of change: ⌘	- The titles of sections 5.2.6.1.1 and 5.2.6.1.2 have been modified to be more precise. - RAT "n" has been replaced by RAT "m" for reasons of consistency. - The usage of cell reselection criteria H and R in section 5.2.6.1.4 has been clarified for the case that HCS is not used. - Conditions for applying timer Tn during cell re-selection have been re-written for better readability. It is clarified that offset TOn is set to zero if Tn has stopped. - References to RRC IEs have been removed. - Parameters in the table in section 5.2.1.6.4 that are again explained in section 5.2.6.1.5 have been removed from the table. - Since all parameters in section 5.2.6.1.5 are read in serving cell, this information need not be given for each parameter separately. - It is indicated that some thresholds in section 5.2.6.1.5 are only used in HCS measurement rules. - Some minor editorial modifications have been made.
Consequences if not approved: ⌘	The application of HCS related parameters in the cell reselection criteria would be ambiguous.

Clauses affected: ⌘	5.2.6.1, 5.2.6.1.1, 5.2.6.1.2, 5.2.6.1.3, 5.2.6.1.4, 5.2.6.1.5
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications

	O&M Specifications	
Other comments: ⌘		

How to create CRs using this form:

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

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

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

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

5.2.6 Cell Reselection Evaluation Process

5.2.6.1 UTRA case

The cell reselection process is ~~described~~ specified by ~~in~~ the following sub-clauses:

5.2.6.1.1 Measurement rules for cell re-selection when HCS is not used

If the system information broadcast in ~~When~~ the serving cell indicates that HCS is not used, then ~~does not belong to a hierarchical cell structure, UE shall follow these rules~~ for intra-frequency and inter-frequency measurements and inter-RAT measurements, the UE shall:

~~The UE shall~~ - use Squal for FDD cells and Srxlev for TDD ~~as~~ for Sx and apply ~~in~~ the following rules.

1. If S_x > $S_{intrasearch}$, UE need not perform intra-frequency measurements.
   If S_x <= $S_{intrasearch}$, ~~UE shall~~ perform intra-frequency measurements.
   If $S_{intrasearch}$, is not sent for serving cell, ~~UE shall~~ perform intra-frequency measurements.

2. If S_x > $S_{intersearch}$, UE need not perform inter-frequency measurements
   If S_x <= $S_{intersearch}$, ~~UE shall~~ perform inter-frequency measurements.
   If $S_{intersearch}$, is not sent for serving cell, ~~UE shall~~ perform inter-frequency measurements.

3. If S_x > $Ssearch_{RAT~~n~~m}$, UE need not perform measurements on cells of RAT "~~n~~m".
   If S_x <= $Ssearch_{RAT~~m~~n}$, ~~UE shall~~ perform measurements on cells of RAT "~~n~~m".
   If $Ssearch_{RAT\ m}$, is not sent for serving cell, ~~UE shall~~ perform measurements on cells of RAT "m".

5.2.6.1.2 Measurement rules for cell re-selection when HCS is used

If the system information broadcast in the serving cell indicates that HCS is used, then for intra-frequency and inter-frequency measurements, the UE shall:~~When serving cell belongs to a hierarchical cell structure, the UE shall follow these rules for intra- and inter-frequency measurements:~~

1. For Intra-frequency and inter-frequency threshold-based measurement rules

   ~~The UE shall~~ use Squal for FDD cells and Srxlev for TDD cells ~~as~~ for Sx and apply ~~in~~ the following rules.

   IF ($Srxlev_s$ <= $Ssearch_{HCS}$) or (if FDD and S_x <= $S_{intersearch}$~~(FDD only)~~) THEN

   <~~UE shall~~ measure on all intra- and inter-frequency cells>

   ELSE

   IF (S_x > $S_{intrasearch}$) THEN

   <~~UE shall~~ measure on all intra-frequency and inter-frequency cells, which have higher HCS priority level than the serving cell unless measurement rules for fast-moving UEs are triggered >

   ELSE

   <~~UE shall~~ measure on all intra-frequency and inter-frequency cells, which have equal or higher HCS priority level than the serving cell unless measurement rules for fast-moving UEs are triggered >

   ENDIF

   ENDIF

2. For Intra-frequency and inter-frequency measurement rules for fast-moving U~~E~~es:

   If the number of cell reselections during time period T_{CRmax} exceeds N_{CR}, high-mobility has been detected. In this high-mobility state, UE shall

   - measure intra-frequency and inter-frequency neighbouring cells, which have equal or lower HCS priority than serving cell. ~~Furthermore, UE shall~~

- prioritise re-selection of intra- and inter-frequency neighbouring cells on lower HCS priority level before neighbouring cells on same HCS priority level.

When the number of cell reselections during time period T_{CRmax} no longer exceeds N_{CR}, UE shall

- continue these measurements during time period $T_{CrmaxHyst}$. ~~Then, UE shall~~, and

– revert to measurements according to the threshold based measurement rules.

When serving cell belongs to a hierarchical cell structure, the UE shall follow these rules for Inter-RAT measurements:

1. Inter-RAT threshold-based measurement rules

    ~~The UE shall~~ use Squal for FDD cells and Srxlev for TDD cells ~~as~~ for Sx ~~in~~ and apply the following rules.

    IF (Srxlev$_s$ <= $S_{HCS,RATm}$) or (if FDD and S_{qual} <= $S_{SearchRATm}$ ~~(FDD only)~~) THEN

        <UE shall measure on all inter-RATm cells>

    ELSE

        IF (S_x > $S_{limit,SearchRATm}$) THEN

            <UE need not measure ~~inter-RATm~~ neighbouring cells in RAT "m">

        ELSE

            <UE shall measure on all ~~inter-RATm~~ neighboring cells in RAT "m", which have equal or higher HCS priority level than the serving cell unless measurement rules for fast-moving UEs are triggered >

        ENDIF

    ENDIF

2. Inter-RAT measurement rules for fast-moving UEs

    - If the number of cell reselections during time period T_{CRmax} exceeds N_{CR}, high-mobility has been detected. In this high-mobility state, UE shall

        - measure ~~RATm~~ the neighbouring cells in RAT "m", which have an equal or lower HCS priority than the serving cell. ~~Furthermore, UE shall~~

        - prioritise re-selection of ~~RATm~~ neighbouring cells in RAT "m" on lower HCS priority level before ~~RATm~~ neighbouring cells in RAT "m" on same HCS priority level.

    When the number of cell reselections during time interval T_{CRmax} no longer exceeds N_{CR}, UE shall

    - continue these measurements during time period $T_{CrmaxHyst}$. ~~Then, UE shall~~,and

    - revert to measure according to the threshold-based measurement rules.

5.2.6.1.3   Non-suitable cells (Squal > 0 or Srxlev > 0)

If the best cell according to cell reselection criteria specified in subclause 5.2.6.1.4, does not fulfil all requirements for a suitable cell, that cell, together with all cells on that frequency shall be removed as candidate for cell re-selection (see also subclause 5.3~~2.6~~).

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:

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

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

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:

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

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

where:

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

$$L_n = 0 \quad\quad\quad \text{if } HCS\_PRIO_n = HCS\_PRIO_s$$
$$L_n = 1 \quad\quad\quad \text{if } HCS\_PRIO_n <> HCS\_PRIO_s$$

$$W(x) = 0 \quad\quad\quad \text{for } x < 0$$
$$W(x) = 1 \quad\quad\quad \text{for } x >= 0$$

$TEMP\_OFFSET_n$ 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 ~~a timer~~ 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

$$Q_{meas\_LEV,n} > Qhcs_n \quad\quad\quad\quad \text{~~if } HCS\_PRIO_n <> HCS\_PRIO_s~~$$

Or

- if $HCS\_PRIO_n = HCS\_PRIO_s$ and

   - ~~fFor serving and neighbour cells that are of different radio access modes or technologies, and~~ for serving FDD and neighbour FDD cells ~~when~~if the quality measure for cell ~~_~~selection ~~_~~and ~~_~~reselection ~~quality_measure IE is~~ sets the quality value to ~~be~~ CPICH RSCP in the serving cell, and:

$$Q_{map,n} > Q_{map,s} + Qoffset1_{s,n} \quad\quad\quad \text{~~if } HCS\_PRIO_n = HCS\_PRIO_s~~$$

~~or~~

   - ~~fF~~or serving FDD and neighbour FDD cells ~~when~~if ~~_~~the quality measure for cell ~~_~~selection ~~_~~and ~~_~~reselection ~~quality_measure IE is~~ sets the quality value to ~~be~~ CPICH Ec/No in the serving cell, and:

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

-    for all other serving and neighbour cells:

$$Q_{map,n} > Q_{map,s} + Qoffset1_{s,n} \qquad\qquad \text{if HCS\_PRIO}_n = \text{HCS\_PRIO}_s$$

T_n for the associated neighbour cell shall be stopped as soon as any of the abovethese 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 criterion 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 neighbors of the new serving cell.

TEMP_OFFSET$_n$ applies an offset to H and R criteria for the duration of PENALTY_TIME$_n$ after the timer T_n has started for that cell. TEMP_OFFSET$_n$ and PENALTY_TIME$_n$ are only applicable when HCS is applied, that is when serving cell belongs to a hierarchical cell structure.

S_n	Cell Selection value of the neighbouring cell, (dB)
Cell_selection_and_reselection_quality_measure (FDD only)	Choice of measurement (CPICH Ec/N0 or CPICH RSCP) that is used to derive quality measures $Q_{map,n}$ and $Q_{map,s}$, (read in system information).
$Q_{map,n}$	Quality of the neighbouring cell, after mapping function is applied, derived from CPICH E_c/N_0 or CPICH RSCP for FDD cells, from P-CCPCH RSCP for TDD cells and from RXLEV for GSM cells. 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.
$Q_{map,s}$	Quality of the serving cell, after mapping function is applied, derived from CPICH E_c/N_0 or CPICH RSCP for FDD cells and from P-CCPCH RSCP for TDD cells. 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.
Q_{meas_LEV}	Quality value. The quality value of the received signal expressed in CPICH_Ec/No or CPICH_RSCP_LEV for FDD cells as set by the Cell_selection_and_reselection_quality_measure information element, P-CCPCH_RSCP_LEV for TDD cells and RXLEV for GSM cells.
$Qoffset1_{s,n}$	Offset value 1between the two cells considered in the evaluation (read in system information).
$Qoffset2_{s,n,}$	Offset value 2 between the two cells considered in the evaluation (read in system information).
$Qhyst1_s$	Hysteresis value of the serving cell.
$Qhyst2_s$	Hysteresis value of the serving cell.
HCS_PRIO$_s$, HCS_PRIO$_n$	HCS priority level (0-7) for serving cell and neighbouring cells
PENALTY_TIME$_n$	Duration for applying TEMP_OFFSET$_n$ to H and R criteria (s)
$Qhcs_s$, $Qhcs_n$	Quality threshold level for applying prioritised hierarchical cell re-selection
TEMP_OFFSET1$_n$	Offset to H and R criteria for the duration of PENALTY_TIME$_n$
TEMP_OFFSET2$_n$	Offset to H and R criteria for the duration of PENALTY_TIME$_n$
T_{Crmax}	Duration for evaluating allowed amount of cell reselections (s).
N_{CR}	Maximum number of cell reselections
$T_{CrmaxHyst}$	Additional time period before UE reverts to low-mobility measurements (s)
Treselection$_s$	Time-to-trigger for cell reselection, (s)

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

The quality values $Q_{map,n}$ and $Q_{map,s}$ are determined by mapping functions. The parameters for these mapping functions are broadcast in system information. The mapping function maps a certain range of measurement values to a representing quality value. $Q_{map,n}$ and $Q_{map,s}$ can have values between 0 and 99 (step size 1).

The UE shall perform ranking of all cells that fulfil the S criterion (see subclause 5.2.3.1.2) 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 ~~applied~~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 $Q_{map,n}$ and $Q_{map,s}$ and calculating the R values using CPICH RSCP, P-CCPCH RSCP and RXLEV for ~~deriving $Q_{map,n}$ and $Q_{map,s}$ and calculating the R values of the~~ 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. ~~and~~

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

If a FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection ~~IE cell_selection_and_reselection_quality_measure~~ 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 ~~as given in cell_selection_and_reselection_quality_measure~~ for deriving the $Q_{map,n}$ and $Q_{map,s}$ and calculating the R values of the FDD cells. In this case, the mapping function $Q_{map} = Q_{meas\_LEV}$ is used and 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. ~~and~~ If the usage of HCS is indicated in system infomation, $TEMP\_OFFSET2_n$ 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. ~~Then~~ Following this second ranking, the UE shall perform cell re-selection to the best ranked FDD cell.

In all cases, ~~The~~ the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval Treselection.

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 ~~The~~ offset between the two cells ~~is read in system information of the serving cell~~. It is used for TDD and GSM cells and for FDD cells in case ~~IE cell_selection_and_re-selection_quality_measure~~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 ~~is read in system information of the serving cell~~. It is used for FDD cells in case ~~IE cell_selection_and_re-selection_quality_measure~~ the quality measure for cell selection and re-selection is set to CPICH Ec/No.

$Qhyst1_s$

This specifies the ~~T~~hysteresis value (Qhyst) ~~is read in system information of the serving cell~~. It is used for TDD and GSM cells and for FDD cells in case ~~IE cell_selection_and_re-selection_quality_measure~~ the quality measure for cell selection and re-selection is set to CPICH RSCP.

$Qhyst2_s$

This specifies the ~~The~~ hysteresis value (Qhyst) ~~is read in system information of the serving cell~~. It is used for FDD cells ~~in~~ if ~~case IE cell_selection_and_re-selection_quality_measure~~ the quality measure for cell selection and re-selection is set to CPICH Ec/No.

HCS_PRIO_s, HCS_PRIO_n

This specifies the HCS priority level (0-7) for serving cell and neighbouring cells ~~are read in system information of serving cell~~.

$Qhcs_s$, $Qhcs_n$

This specifies the ~~q~~Quality threshold levels for applying prioritised hierarchical cell re-selection ~~are read in system information of serving cell~~.

Qqualmin

This specifies the Minimum required quality level in the cell~~, (dB).~~ in dB. It is not ~~Not~~ applicable for TDD cells or GSM cells.

Qrxlevmin

~~Minimum~~ This specifies the minimum required RX level in the cell~~.~~ ~~(~~ in dBm~~)~~.

$PENALTY\_TIME_n$

This specifies the time~~Time~~ duration for which the $TEMPORARY\_OFFSET_n$ is applied for a neighbouring cell ~~is read in system information of serving cell~~.

$TEMPORARY\_OFFSET1_n$

This specifies the offset applied to ~~Applies an offset to~~ the H and R criteria for a neighbouring cell for the duration of $PENALTY\_TIME_n$. ~~The parameter is read in system information of serving cell.~~ It is used for TDD and GSM cells and for FDD cells in case ~~IE cell_selection_and_re-selection_quality_measure~~ the quality measure for cell selection and re-selection is set to CPICH RSCP.

$TEMPORARY\_OFFSET2_n$

This specifies the offset applied to ~~Applies an offset to~~ the H and R criteria for a neighbouring cell for the duration of $PENALTY\_TIME_n$. ~~The parameter is read in system information of serving cell.~~ It is used for FDD cells in case ~~IE cell_selection_and_re-selection_quality_measure~~ the quality measure for cell selection and re-selection is set to CPICH Ec/No.

T_{CRmax}

This specifies the ~~Duration~~ duration for evaluating allowed amount of cell reselection(s). ~~is read in system information of serving cell.~~

N_{CR}

This specifies the ~~Maximum~~ maximum number of cell reselections ~~is read in system information of serving cell~~.

$T_{CRmaxHyst}$

This specifies the ~~Additional~~ additional time period before the UE can revert~~s~~ to low-mobility measurements ~~is read in system information of serving cell~~.

$Treselection_s$

This specifies the ~~The~~ cell reselection timer value ~~is read in system information of the serving cell~~.

$Ssearch_{HCS}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the ~~Below this~~ limit for Srxlev in the serving cell below which~~,~~ the UE shall initiate measurements of all neighbouring cells of the serving cell. ~~The value is read in system information of the serving cell.~~

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

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

~~The values are read in system information of the serving cell.~~

$S_{HCS,RATm}$

This threshold is used in the measurement rules for cell re-selection when HCS is used. It specifies the ~~This~~ RAT specific threshold in the serving cell ~~is~~ used in the inter-RAT measurement rules. ~~The values are read in system information of the serving cell.~~

S$_{intrasearch}$

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

S$_{intersearch}$

This specifies the ~~Threshold~~ threshold (in dB) for intra frequency measurements ~~(in dB)~~ 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 ~~Above this~~ RAT specific threshold (in dB) in the serving UTRA cell above which~~,~~ the UE need not perform any inter-RAT~~m~~ measurements in RAT "m". ~~(dB)~~

Mapping Info

This specifies ~~Mapping Info contains all~~ the information ~~that is~~ necessary to define the mapping function ~~that is~~ used for mapping a certain range of measurement values to a representing quality value (0..99, step size 1).

5.2.6.2   GSM case

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

CR-Form-v3

CHANGE REQUEST

⌘ **25.304** CR **056** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

Title: ⌘	Clarification of usage of "Initial UE-Id" for SCCPCH selection
Source: ⌘	TSG-RAN WG2
Work item code: ⌘	***Date:*** ⌘ 2001-01-15
Category: ⌘ **F**	***Release:*** ⌘ R99

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

Reason for change: ⌘	Clarify the usage of "Initial UE-Id" in the SCCPCH algorithm, when entering connected mode from idle mode
Summary of change: ⌘	- Correction of a typo in Sec. 8.2. - Addition of an explanation how to interpret the parameter "Initial UE identifier" in the SCCPCH selection algorithm depending on its actual choice and associated data type (i.e. sequence of integers, bitstring, octet string, etc.)
Consequences if not approved: ⌘	Misinterpretation of the SCCPCH selection algorithm may make RRC connection establishment impossible

Clauses affected: ⌘	8.1, 8.2

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

Other comments: ⌘	

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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 Paging and SCCPCH selection in Idle mode

8.1 Paging Channel selection

System information block type 5 (SIB 5) defines common channels to be employed in Idle mode [4]. In a cell, a single or several PCHs may be established. Each Secondary Common Control Physical Channel (SCCPCH) indicated to the UE in system information may carry up to one PCH. Thus, for each defined PCH there is one uniquely associated PICH is also indicated.

In case that more than a single PCH and associated PICH are defined in SIB 5, the UE shall perform a selection according to the following rule:

- The UE shall select a SCCPCH from the ones listed in SIB 5 based on IMSI as follows:

    "Index of selected SCCPCH" = IMSI mod K,

    where K is equal to the number of listed SCCPCHs which carry a PCH (i.e. SCCPCHs carrying FACH only shall not be counted). These SCCPCHs shall be indexed in the order of their occurrence in SIB 5 from 0 to K-1.

"Index of selected SCCPCH" identifies the selected SCCPCH with the PCH and the uniquely associated PICH to be used by the UE.

8.2 SCCPCH selection when entering Connected mode

When entering Connected mode from Idle mode by sending an RRC CONNECTION REQUEST message, the UE shall select the S-CCPCH which carries an FACH to be used for reception of the RRC CONNECTION SETUP message according to the following rule:

- the UE shall select an SCCPCH from the SCCPCHs listed in System Information Block type 5 (SIB 5) based on "Initial UE Identity" as follows:

    "Index of selected SCCPCH" = "Initial UE Identity" mod K,

    where K is equal to the number of listed SCCPCHs which carry a FACH (i.e. SCCPCHs carrying PCH only shall not be counted). These SCCPCHs shall be indexed from 0 to K-1 in the order of their occurrence in SIB 5, and "Index of selected SCCPCH" identifies the selected SCCPCH. "Initial UE Identity" refers to the Information Element included by the UE into the RRC CONNECTION REQUEST message. In the above formula, the parameter "Initial UE Identity" shall be interpreted as follows, depending on the choice of UE-Id type of the respective IE:

    For UE-Id type "IMSI (GSM-MAP)", i.e. the IE is given as sequence of digits of type Integer(0..9), "Initial UE Identity" shall be interpreted as an integer number, where the first digit given in the sequence represents the highest order digit.

    For UE-Id types "TMSI and LAI (GSM-MAP)" or "P-TMSI and RAI (GSM-MAP)", only the TMSI or P-TMSI parts given as Bitstring(32) shall be used, and "Initial UE Identity" shall be interpreted as a binary representation of an integer number, where the first bit in the Bitstring represents the highest order bit.

    For UE-Id type "IMEI", i.e. the IE is given as sequence of hexadecimal digits of type Integer(0..15), "Initial UE Identity" shall be interpreted as a hexadecimal representation of an integer number, where the first digit given in the sequence represents the highest order digit.

    For UE-Id type "IMSI (DS-41)", i.e. the IE is given as octet string, "Initial UE Identity" shall correspond to the decoded decimal representation of the IMSI-S part included in the octet string (see TIA/EIA/IS-2000-5).

    For UE-Id types "ESN (DS-41)" or "TMSI (DS-41)", i.e. the IE is given as Bitstring(32), "Initial UE Identity" shall be interpreted as a binary representation of an integer number, where the first bit in the Bitstring represents the highest order bit.

For UE-Id type "IMSI and ESN (DS-41)" only the ESN part shall be used as "Initial UE Identity", as defined above.

CR-Form-v3

CHANGE REQUEST

⌘ **25.304** CR **058** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

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

Title: ⌘	Clarification of paging occasion	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘		**Date:** ⌘ 12/01/2001
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: ⌘	The specification does not clearly define to which frame the paging occasion refers.
Summary of change: ⌘	It is proposed to add text to clearly state that, for FDD, the paging occasion refers to the SFN of the PICH frame in the UE shall receive its paging indicator Further minor textual changes are made to make it clear which parts of the specification apply for FDD and which parts apply for TDD.
Consequences if not approved: ⌘	There is potential for misinterpretation of paging occasion and paging message receiving occasion in the specification

Clauses affected: ⌘	3.1, 8.3
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

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

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

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

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions and the definitions in [12] apply.

Acceptable Cell: a cell that satisfies certain conditions as specified in 4.3. A UE can always attempt emergency calls on an acceptable cell.

Allowable PLMN: a PLMN, which is not in the list of forbidden PLMNs in the UE.

Available PLMN: a PLMN for which the UE has found at least one acceptable cell.

Barred Cell: A cell is barred if it is so indicated in the system information.

Camped on a cell: UE is in idle mode and has completed the cell selection/reselection process and has chosen a cell. The UE monitors system information and (in most cases) paging information.

Camped on any cell: UE is in idle mode and has completed the cell selection/reselection process and has chosen a cell irrespective of PLMN identity.

DRX cycle: individual time interval between monitoring Paging Occasion for a specific UE.

Home PLMN: a PLMN where the Mobile Country Code (MCC) and Mobile Network Code (MNC) of the PLMN identity are the same as the MCC and MNC of the IMSI.

Location Registration (LR): UE registers its presence in a registration area, for instance regularly or when entering a new registration area.

LSA: Localised Service Area. A LSA is an operator-defined group of cells for which specific access conditions applies. This may correspond to an area in which the Core Network offers specific services. A LSA may be defined within a PLMN or globally. Therefore, a LSA may offer non-contiguous radio coverage.

LSA exclusive access cell: UE may only camp on this cell if the cell belongs to the LSAs to which the user has subscribed. Nevertheless, if no other cells are available, the UE of non-LSA users may originate emergency calls from this cell.

LSA ID: Localised Service Area Identity.

LSA only access: when LSA only access applies to the user, the UE can only access cells that belong to the LSAs to which the user has subscribed. Outside the coverage area of the subscribed LSAs, the UE may camp on other cells and limited services apply.

LSA preferential access cell: LSA preferential access cell is a cell, which is part of the LSA. UEs of users that have subscribed to a LSA of an LSA-preferential-access cell have higher priority to resources than non-LSA users in the same cell. The availability of LSA preferential access cells impacts the radio resource allocation (controlled by UTRAN-Access Stratum). This function is out of the scope of the standards.

Maximum DRX cycle: time interval for the longest possible DRX cycle in a cell.

Paging Block Periodicity (PBP): period of the occurrence of Paging Blocks. (For FDD, PBP = 1).

Paging Message Receiving Occasion: (TDD only) the frame where the UE receives actual paging message.

Paging occasion:
(FDD) The SFN of the PICH frame where the UE monitors its paging indicator the PICH (i.e. the SFN of the PCCPCH frame in which the PICH frame begins).
(TDD) The paging block, which consists of several frames. The value of Paging Occasion is equal to the first frame of the Paging Block.

Process: a local action in the UE invoked by a RRC procedure or an Idle Mode procedure.

Radio Access Mode: radio access mode of the cell, FDD or TDD.

Radio Access Technology: type of technology used for radio access, for instance UTRA or GSM.

Registered PLMN (RPLMN): this is the PLMN on which the UE has performed a location registration successfully.

Registration Area: (NAS) registration area is an area in which the UE may roam without a need to perform location registration, which is a NAS procedure.

Selected PLMN: this is the PLMN that has been selected by the non-access stratum, either manually or automatically.

Suitable Cell: a cell on which an UE may camp. It shall satisfy certain conditions, see subclause 4.3.

Visited PLMN of home country: a PLMN, different from the home PLMN, where the MCC part of the PLMN identity is the same as the MCC of the IMSI.

3.2   Abbreviations

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

AS	Access Stratum
BCCH	Broadcast Control Channel
CN	Core Network
DRX	Discontinuous Reception
DSCH	Downlink Shared Channel
FDD	Frequency Division Duplex
GC	General Control (SAP)
GPRS	General Packet Radio System
GSM	Global System for Mobile
IMSI	International Mobile Subscriber Identity
MCC	Mobile Country Code
MM	Mobility Management
MNC	Mobile Network Code
NAS	Non-Access Stratum
PCH	Paging Channel
PI	Page Indicator
PICH	Page Indication Channel
PLMN	Public Land Mobile Network
RAT	Radio Access Technology
RRC	Radio Resource Control
SAP	Service Access Point
TDD	Time Division Duplex
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network

8.3　Discontinuous Reception

The UE may use Discontinuous Reception (DRX) in idle mode in order to reduce power consumption. When DRX is used the UE needs only to monitor one Page Indicator, PI, (see definition in [7] and [8]) in one Paging Occasion per DRX cycle.

The DRX cycle length shall be 2^k *PBP frames, where k is an integer and PBP is the Paging Block Periodicity. PBP is only applicable for TDD and is equal to the PICH repetition period that is broadcast in system information. For FDD, PBP=1.

The UE may be attached to different CN domains with different CN domain specific DRX cycle lengths. The UE shall store each CN domain specific DRX cycle length for each CN domain the UE is attached to and use the shortest of those DRX cycle lengths. The CS CN specific DRX cycle length coefficient shall be updated locally in the UE using information given in system information. On the other hand, the PS CN specific DRX cycle length coefficient shall be updated after the negotiation between the UE and PS CN by NAS procedure. If no specific value "k" is negotiated in NAS procedure, the UE and PS CN shall use the DRX cycle length given for PS CN domain in system information.

The DRX cycle lengths to use for UTRAN connected mode is the shortest of the following:

-　UTRAN DRX cycle length;

-　any of the stored CN domain specific DRX cycle length for the CN domains the UE is only attached to with no signalling connection established.

The UE shall use the IMSI, the number of available SCCPCH which carry a PCH (K) as derived according to subclause 8.1,the Cell System Frame Number (SFN), Np, (for FDD, Np is the number of page indicators within a frame; for TDD, Np is the number of page indicators within a paging block), Frame offset (For FDD, Frame offset = 0; for TDD, PICH frame offset values are given in system information), PBP and the DRX cycle length to determine the Paging Occasions.

In FDD the UE shall monitor its paging indicator in the PICH frame with SFN given by the Paging Occasion

In TDD the UE shall monitor its paging indicator in the paging block given by the Paging Occasion. The Paging Occasion gives the SFN of the first frame of the paging block.

The value of the Paging Occasion (i.e. the SFN of the first frame of the Paging Block) is determined as follows:

Paging Occasion=　　{(IMSI div K) mod (DRX cycle length div PBP)} * PBP + n * DRX cycle length + Frame Offset

Where n = 0,1,2… as long as SFN is below its maximum value.

The actual Page Indicator within a Paging Occasion that the UE shall read is similarly determined based on IMSI.

The Page Indicator to use is calculated by using the following formula:

PI =　　　　　　DRX Index mod Np

where DRX Index = {(IMSI div K) div (DRX cycle length div PBP)}

In FDD mode, Np = (18,36,72,144) is the number of Page Indicators per frame, and is given in IE "Number of PI per frame", part of system information in FDD mode. In TDD mode, Np is the number of Page Indicators per paging block and is calculated by the Paging Indicator Length $L_{PI,}$ the Burst Type (long or short midamble) and the PICH repetition length, which are given in system information..

If the UE has no IMSI, for instance when making an emergency call without USIM, the UE shall use a default number, IMSI = 0, in the formulas above.

For FDD, see [7] for details about the timing between a PICH frame and when the paging message is transmitted on the PCH in the associated S-CCPCH frame.

In TDD mode, the Paging Message Receiving Occasion is calculated using the following formula:

Paging Message Receiving Occasion = Paging Occasion + N_{PICH} + N_{GAP} + {(DRX Index div Np) mod N_{PCH} } *2

The value N_{PICH} is the number of frames for PICH transmission and is equal to the PICH repetition length given in system information. The value N_{GAP} is the number of frames between the last frame carrying PICH for this Paging Occasion and the first frame carrying paging messages for this Paging Occasion. The value N_{PCH} is the number of Paging Groups. N_{PCH} and N_{GAP} are given in system information.

CR-Form-v3

CHANGE REQUEST

| ⌘ | **25.304** CR **059** | ⌘ | rev **r1** | ⌘ | Current version: | **3.5.0** | ⌘ |

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

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

Title:	⌘	Correction in Any Cell Selection State
Source:	⌘	TSG-RAN WG2
Work item code: ⌘		***Date:*** ⌘ 12/02/2001
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:	⌘	As pointed out during Idle Mode joint meeting (Feb 2001), the UE, in Any Cell Selection state, shall search for an acceptable cell, in all RATs it is capable of. Furthermore, as no comparison between UTRA and GSM cells can be made, the UE shall select "high quality signal" cells in priority. The requirement for High Quality Signal cells should be in NAS specs
Summary of change: ⌘		Distinction between GSM and UTRA case is removed in 5.2.8 It is stated that the UE shall select "high quality signal" cells in priority. (with a reference to 23.122 [5])
Consequences if not approved:	⌘	-The UE would search for acceptable cells only in GSM frequencies when coming from GSM. -No preference is given to "high quality signal" cells.

Clauses affected:	⌘	5.2.8
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:

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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.

5.2.8 Any Cell Selection state

5.2.8.1 UTRA case

In this state, the UE shall attempt to find an acceptable cell to camp on, trying all radio access technologies that are supported by the UE. Preference shall be given to " high quality signal" cells, as defined in [5].

The UE shall stay in this state until an acceptable cell is found.

If no acceptable cell is found, the UE shall continue to search for an acceptable cell in this state.

5.2.8.2 GSM case

The *any cell selection* state in GSM is specified in [1].

CR-Form-v3

CHANGE REQUEST

⌘ **25.304** CR **061** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

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

Title: ⌘	Correction to the definition of a suitable cell	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘		**Date:** ⌘ 12/02/2001
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: ⌘	As pointed out during Idle Mode joint meeting (Feb 2001), the definition of a "suitable cell" is not correct according to 02.11 and 22.011 and does not meet the service requirement.
Summary of change: ⌘	Correction to the definition of a suitable cell
Consequences if not approved: ⌘	If this change is not agreed then there will be a missalignment between the stage 1, stage 2 and stage 3 specifications. In particular, it will not be possible for an operator to offer subscriptions for 'limited geographic areas'. Additionally important MM/GMM tools for the control of mobiles will be lost.

Clauses affected: ⌘	4.3		
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications		
Other comments: ⌘			

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

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

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

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

4.3　Service type in Idle mode

This chapter defines the level of service that may be provided by the network to a UE in Idle mode.

The action of camping on a cell is necessary to get access to some services. Three levels of services are defined for UE in idle mode:

- Limited service (emergency calls on an acceptable cell)

- Normal service (for public use on a suitable cell)

- Operator service (for operators only on a reserved cell)

Furthermore, the cells are categorised according to which services they offer:

acceptable cell:

An "acceptable cell" is a cell on which the UE may camp to obtain limited service (originate emergency calls). Such a cell shall fulfil the following requirements, which is the minimum set of requirements to initiate an emergency call in a UTRAN network:

- The cell is not barred, see subclause 5.3.4.1

- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2;

suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell is part of the selected PLMN.

- The cell is not barred, see subclause 5.3.4.1.

- The cell is not part of ~~a forbidden registration area.~~the list of "forbidden LAs for regional provision of service"[9].

- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

- The SoLSA criteria are fulfilled [SoLSA support is not in the current release].

barred cell:

A cell is barred if it is so indicated in the system information [4].

CR-Form-v3

CHANGE REQUEST

⌘   **25.304** CR **062**   ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

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

Title: ⌘	Correction to discontinuous reception in TDD
Source: ⌘	TSG-RAN WG2
Work item code: ⌘	**Date:** ⌘ 12.02.2001
Category: ⌘ **F**	**Release:** ⌘ R99

<table>
<tr><td colspan="2"><i>Use <u>one</u> of the following categories:</i></td><td colspan="2"><i>Use <u>one</u> of the following releases:</i></td></tr>
<tr><td><i>F</i></td><td><i>(essential correction)</i></td><td><i>2</i></td><td><i>(GSM Phase 2)</i></td></tr>
<tr><td><i>A</i></td><td><i>(corresponds to a correction in an earlier release)</i></td><td><i>R96</i></td><td><i>(Release 1996)</i></td></tr>
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<tr><td><i>D</i></td><td><i>(Editorial modification)</i></td><td><i>R99</i></td><td><i>(Release 1999)</i></td></tr>
<tr><td colspan="2"><i>Detailed explanations of the above categories can</i></td><td><i>REL-4</i></td><td><i>(Release 4)</i></td></tr>
<tr><td colspan="2"><i>be found in 3GPP TR 21.900.</i></td><td><i>REL-5</i></td><td><i>(Release 5)</i></td></tr>
</table>

Reason for change: ⌘	The current standard suggests DRX cycle lengths for TDD which are much bigger than in FDD. In order to provide similar functionality in both modes the DRX cycle lengths are reduced. The change assures compatibility of Repetition period for PICH and DRX cycle lengths used by the UEs
Summary of change: ⌘	Formula for calculation of DRX cycle length has been changed
Consequences if not approved: ⌘	Too big DRX cycle lengths in TDD

Clauses affected: ⌘	8.3
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

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.

8.3 Discontinuous Reception

The UE may use Discontinuous Reception (DRX) in idle mode in order to reduce power consumption. When DRX is used the UE needs only to monitor one Page Indicator, PI, (see definition in [7] and [8]) in one Paging Occasion per DRX cycle.

The DRX cycle length shall be MAX(2^k, $*$PBP) frames, where k is an integer and PBP is the Paging Block Periodicity. PBP is only applicable for TDD and is equal to the PICH repetition period that is broadcast in system information. For FDD, PBP=1.

The UE may be attached to different CN domains with different CN domain specific DRX cycle lengths. The UE shall store each CN domain specific DRX cycle length for each CN domain the UE is attached to and use the shortest of those DRX cycle lengths. The CS CN specific DRX cycle length coefficient shall be updated locally in the UE using information given in system information. On the other hand, the PS CN specific DRX cycle length coefficient shall be updated after the negotiation between the UE and PS CN by NAS procedure. If no specific value "k" is negotiated in NAS procedure, the UE and PS CN shall use the DRX cycle length given for PS CN domain in system information.

The DRX cycle lengths to use for UTRAN connected mode is the shortest of the following:

- UTRAN DRX cycle length;

- any of the stored CN domain specific DRX cycle length for the CN domains the UE is only attached to with no signalling connection established.

The UE shall use the IMSI, the number of available SCCPCH which carry a PCH (K) as derived according to subclause 8.1,the Cell System Frame Number (SFN), Np (for FDD, Np is the number of page indicators within a frame; for TDD, Np is the number of page indicators within a paging block), Frame offset (For FDD, Frame offset = 0; for TDD, PICH frame offset values are given in system information), PBP and the DRX cycle length to determine the Paging Occasions.

The value of the Paging Occasion (i.e. the SFN of the first frame of the Paging Block) is determined as follows:

Paging Occasion=   {(IMSI div K) mod (DRX cycle length div PBP)} * PBP + n * DRX cycle length + Frame Offset

Where n = 0,1,2… as long as SFN is below its maximum value.

The actual Page Indicator within a Paging Occasion that the UE shall read is similarly determined based on IMSI.

The Page Indicator to use is calculated by using the following formula:

PI =   DRX Index mod Np

where DRX Index = {(IMSI div K) div (DRX cycle length div PBP)}

In FDD mode, Np = (18,36,72,144) is the number of Page Indicators per frame, and is given in IE "Number of PI per frame", part of system information in FDD mode. In TDD mode, Np is the number of Page Indicators per paging block and is calculated by the Paging Indicator Length $L_{PI,}$ the Burst Type (long or short midamble) and the PICH repetition length, which are given in system information..

If the UE has no IMSI, for instance when making an emergency call without USIM, the UE shall use a default number, IMSI = 0, in the formulas above.

For FDD, see [7] for details about the timing between a PICH frame and when the paging message is transmitted on the PCH in the associated S-CCPCH frame. In TDD mode, the Paging Message Receiving Occasion is calculated using the following formula:

Paging Message Receiving Occasion =Paging Occasion + N_{PICH} + N_{GAP} + {(DRX Index div Np) mod N_{PCH} } *2

The value N_{PICH} is the number of frames for PICH transmission and is equal to the PICH repetition length given in system information. The value N_{GAP} is the number of frames between the last frame carrying PICH for this Paging Occasion and the first frame carrying paging messages for this Paging Occasion. The value N_{PCH} is the number of Paging Groups. N_{PCH} and N_{GAP} are given in system information.

CR-Form-v3

CHANGE REQUEST

| ⌘ | **25.304** CR **063** | ⌘ | rev | **r1** | ⌘ | Current version: | **3.5.0** | ⌘ |

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

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

Title: ⌘	Correction of PI calculation for Paging DRX	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘		**Date:** ⌘ 2001-02-21
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: ⌘	Correction of Paging DRX formulas
Summary of change: ⌘	In the present paging DRX scheme, the UE shall store each CN domain specific DRX cycle length for each CN domain the UE is attached to and use the shortest of those DRX cycle lengths. The CS CN specific DRX cycle length coefficient shall be updated locally in the UE using information given in system information. However, the PS CN specific DRX cycle length coefficient shall be updated after the negotiation between the UE and PS CN domain by NAS procedure.
	In the presently specified formulas used for calculation of paging DRX parameters, the Page Indicator (PI) depends on the DRX cycle length mentioned above. Therefore the RNC would need to know which DRX cycle length the UE is using in order to derive the same Page Indicator as the UE. However, this information is not available in the RNC in case of CS CN domain initiated paging when the UE is in IDLE mode, since PAGING REQUEST RANAP message only has the DRX cycle length coefficient for the CN domain which the RANAP message was sent from. The present formulas therefore may lead to a mismatch between the PIs calculated in the UE and the network.
	For having the least impact on the implementation based on the current specification but anyway still not create problems with uneven distributions of PIs in between paging occasions, this CR proposes to change the PI calculation only.
	This CR proposes to always use the largest number of K possible and the largest value for the DRX cycle $(16*512 = 8192)$.
Consequences if not approved: ⌘	Paging does not work properly when DRX cycle length is dependent on the CN domain the UE is attached to.

Clauses affected:	⌘	8.3		
Other specs Affected:	⌘	Other core specifications	⌘	
		Test specifications		
		O&M Specifications		
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.

8.3 Discontinuous Reception

The UE may use Discontinuous Reception (DRX) in idle mode in order to reduce power consumption. When DRX is used the UE needs only to monitor one Page Indicator, PI, (see definition in [7] and [8]) in one Paging Occasion per DRX cycle.

The DRX cycle length shall be 2^k *PBP frames, where k is an integer and PBP is the Paging Block Periodicity. PBP is only applicable for TDD and is equal to the PICH repetition period that is broadcast in system information. For FDD, PBP=1.

The UE may be attached to different CN domains with different CN domain specific DRX cycle lengths. The UE shall store each CN domain specific DRX cycle length for each CN domain the UE is attached to and use the shortest of those DRX cycle lengths. The CS CN specific DRX cycle length coefficient shall be updated locally in the UE using information given in system information. On the other hand, the PS CN specific DRX cycle length coefficient shall be updated after the negotiation between the UE and PS CN by NAS procedure. If no specific value "k" is negotiated in NAS procedure, the UE and PS CN shall use the DRX cycle length given for PS CN domain in system information.

The DRX cycle lengths to use for UTRAN connected mode is the shortest of the following:

- UTRAN DRX cycle length;

- any of the stored CN domain specific DRX cycle length for the CN domains the UE is only attached to with no signalling connection established.

The UE shall use the IMSI, the number of available SCCPCH which carry a PCH (K) as derived according to subclause 8.1, the Cell System Frame Number (SFN), Np (for FDD, Np is the number of page indicators within a frame; for TDD, Np is the number of page indicators within a paging block), Frame offset (For FDD, Frame offset = 0; for TDD, PICH frame offset values are given in system information), PBP and the DRX cycle length to determine the Paging Occasions.

The value of the Paging Occasion (i.e. the SFN of the first frame of the Paging Block) is determined as follows:

Paging Occasion = {(IMSI div K) mod (DRX cycle length div PBP)} * PBP + n * DRX cycle length + Frame Offset

Where n = 0,1,2… as long as SFN is below its maximum value.

The actual Page Indicator within a Paging Occasion that the UE shall read is similarly determined based on IMSI.

The Page Indicator to use is calculated by using the following formula:

PI = DRX Index mod Np

where DRX Index = IMSI div 8192 {(IMSI div K) div (DRX cycle length div PBP)}

In FDD mode, Np = (18,36,72,144) is the number of Page Indicators per frame, and is given in IE "Number of PI per frame", part of system information in FDD mode. In TDD mode, Np is the number of Page Indicators per paging block and is calculated by the Paging Indicator Length L_{PI} the Burst Type (long or short midamble) and the PICH repetition length, which are given in system information..

If the UE has no IMSI, for instance when making an emergency call without USIM, the UE shall use a default number, IMSI = 0, in the formulas above.

For FDD, see [7] for details about the timing between a PICH frame and when the paging message is transmitted on the PCH in the associated S-CCPCH frame. In TDD mode, the Paging Message Receiving Occasion is calculated using the following formula:

Paging Message Receiving Occasion = Paging Occasion + N_{PICH} + N_{GAP} + {(DRX Index div Np) mod N_{PCH} } *2

The value N_{PICH} is the number of frames for PICH transmission and is equal to the PICH repetition length given in system information. The value N_{GAP} is the number of frames between the last frame carrying PICH for this Paging Occasion and the first frame carrying paging messages for this Paging Occasion. The value N_{PCH} is the number of Paging Groups. N_{PCH} and N_{GAP} are given in system information.

CR-Form-v3

CHANGE REQUEST

| ⌘ | **25.304** CR **064** | ⌘ rev **r2** ⌘ | Current version: | **3.5.0** | ⌘ |

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

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

Title: ⌘	Equivalent PLMN codes

Source: ⌘	TSG-RAN WG2

Work item code: ⌘	GSM-UMTS interworking	***Date:*** ⌘	Febr. 22th, 2001

Category: ⌘	**F**	***Release:*** ⌘	R99

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

Reason for change: ⌘	During the recent 3GPP TSG SA workshop on UE in idle mode, it was agreed to propose the multiple MCC+MNC codes for a single operator as an essential correction for Release 99. This would e.g. allow UEs to reselect a cell in the appropriate PLMN when roaming between 3G and 2G RATs.
Summary of change: ⌘	NAS shall maintain a list of equivalent PLMN codes in the UE. The definition of suitable cells for cell reselection is updated.
Consequences if not approved: ⌘	Some operator scenarios are not supported for multi-PLMN case, e.g. one operator with two PLMN Ids, or two 2G operators sharing the same 3G network.

Clauses affected: ⌘	4.1, 4.2, 4.3

Other specs Affected:	⌘ **X**	Other core specifications ⌘	23.122, 24.008, 25.331
	X	Test specifications	
	☐	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://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.

4.1 Overview

When a UE is switched on, a public land mobile network (PLMN) is selected and the UE searches for a suitable cell of this PLMN to camp on. Criteria for cell selection and cell re-selection between radio access technologies (RATs) described in this document only consider radio criteria. In addition to radio access technology, the PLMN type may differ as well. In this specification, the term PLMN is used as a generic term covering both GSM MAP and ANSI-41 type of PLMNs. According to the type of PLMN, the way to identify it can be different. If the PLMN type is GSM, the PLMN is identified by 'PLMN identity' and if the PLMN type is ANSI-41, the PLMN is identified by 'SID'

The UE searches for a suitable cell of the chosen PLMN and chooses that cell to provide available services, and tunes to its control channel. This choosing is known as "camping on the cell". The UE will then register its presence, by means of a NAS registration procedure, in the registration area of the chosen cell, if necessary.

If the UE finds a more suitable cell ~~of the selected PLMN~~, it reselects onto that cell and camps on it. If the new cell is in a different registration area, location registration is performed.

If necessary, the UE will look for more suitable cells on other PLMNs at regular time intervals, which is referred to as PLMN-reselection. This is described in [9].

If the UE loses coverage of the registered PLMN, either a new PLMN is selected automatically (automatic mode), or an indication of which PLMNs are available is given to the user, so that a manual selection can be made (manual mode).

Registration is not performed by UEs only capable of services that need no registration.

The purpose of camping on a cell in idle mode is fourfold:

a) It enables the UE to receive system information from the PLMN.

b) When registered and if the UE wishes to establish an RRC connection, it can do this by initially accessing the network on the control channel of the cell on which it is camped.

c) If the PLMN receives a call for the registered UE, it knows (in most cases) the registration area of the cell in which the UE is camped. It can then send a "paging" message for the UE on control channels of all the cells in the registration area. The UE will then receive the paging message because it is tuned to the control channel of a cell in that registration area and the UE can respond on that control channel.

d) It enables the UE to receive cell broadcast services.

If the UE is unable to find a suitable cell to camp on, or the USIM is not inserted, or if the location registration failed, it attempts to camp on a cell irrespective of the PLMN identity, and enters a "limited service" state in which it can only attempt to make emergency calls.

The idle mode tasks can be subdivided into three processes:

- PLMN selection and reselection;

- Cell selection and reselection;

- Location registration.

The relationship between these processes is illustrated in Figure 1.
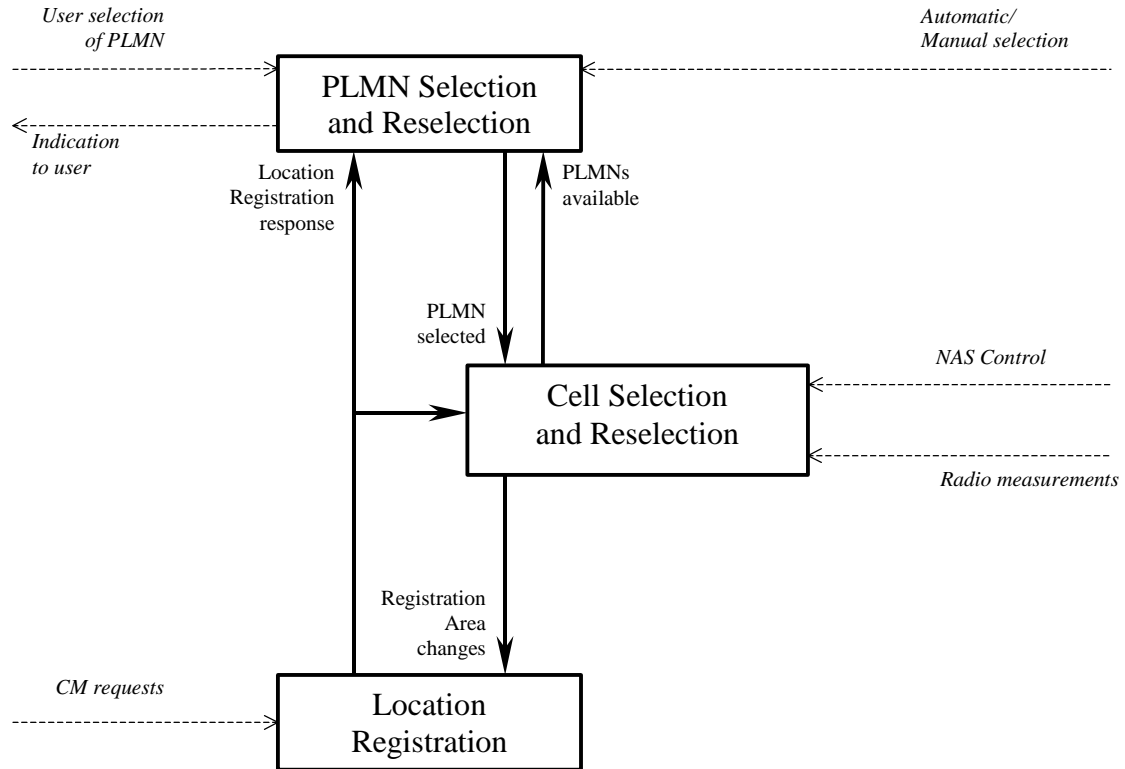
Figure 1: Overall Idle Mode process

NOTE: The impact of NAS defined service areas is FFS.

4.2   Functional division between AS and NAS in Idle mode

Table 1 presents the functional division between UE non-access stratum (NAS) and UE access stratum (AS) in idle mode. The non-access stratum part is specified in [5] and the access stratum part in the present document. Examples of different idle mode procedures are presented in Clause 10.

Table 1: Functional division between AS and NAS in idle mode

Idle Mode Process	UE Non-Access Stratum	UE Access Stratum
PLMN Selection and Reselection	Maintain the list of allowed PLMN types. It can be GSM-MAP only, ANSI-41 only or both. Maintain a list of PLMNs in priority order according to [5]. Select a PLMN using automatic or manual mode as specified in [5] and request AS to select a cell belonging to this PLMN. For each PLMN, associated radio access technology(ies) may be set. –Evaluate reports of available PLMNs from AS for PLMN selection.	Search for a suitable cell belonging to the PLMN requested by NAS. Perform cell selection process as described below. If associated radio access technology(ies) is (are) set for the PLMN, search in this (these) radio access technology(ies) and other radio access technologies for that PLMN as specified in [5]. Report available PLMNs with associated PLMN type and radio access technology to NAS on request from NAS or autonomously. It must respect allowed PLMN types indications from NAS.
Cell Selection	Control cell selection for example by indicating radio access technology(ies) associated with the selected PLMN to be used initially in the search of a cell in the cell selection. NAS is also maintaining lists of forbidden registration areas and a list of NAS defined service areas in priority order.	Perform measurements needed to support cell selection. Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS. Search for a suitable cell belonging to the PLMN requested by NAS. The cells broadcast their 'PLMN identity' (GSM-MAP) or 'SID' in the system information. Respond to NAS whether such cell is found or not. If associated radio access technology(ies) is (are) set for the PLMN, perform the search in this (these) radio access technology(ies) and other radio access technologies for that PLMN as specified in [5]. If such a cell is found, the cell is selected to camp on.
Cell Reselection	Control cell reselection by for example, maintaining lists of forbidden registration areas and a list of NAS defined service areas in priority order. Maintain a list of equivalent PLMN codes.	Perform measurements needed to support cell reselection. Detect and synchronise to a broadcast channel. Receive and handle broadcast information. Forward NAS system information to NAS. Change cell if a more suitable cell is found.
Location registration	Register the UE as active after power on. Register the UE's presence in a registration area, for instance regularly or when entering a new registration area. Deregister UE when shutting down.	Report registration area information to NAS.

4.3   Service type in Idle mode

This chapter defines the level of service that may be provided by the network to a UE in Idle mode.

The action of camping on a cell is necessary to get access to some services. Three levels of services are defined for UE in idle mode:

- Limited service (emergency calls on an acceptable cell)

- Normal service (for public use on a suitable cell)

- Operator service (for operators only on a reserved cell)

Furthermore, the cells are categorised according to which services they offer:

acceptable cell:

An "acceptable cell" is a cell on which the UE may camp to obtain limited service (originate emergency calls). Such a cell shall fulfil the following requirements, which is the minimum set of requirements to initiate an emergency call in a UTRAN network:

- The cell is not barred, see subclause 5.3.4.1

- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2;

suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell is part of the selected PLMN or, for cell reselection only, of a PLMN considered as equivalent by the UE according to the information provided by the NAS.–

- The cell is not barred, see subclause 5.3.4.1.

- The cell is not part of a forbidden registration area.

- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

- The SoLSA criteria are fulfilled [SoLSA support is not in the current release].

barred cell:

A cell is barred if it is so indicated in the system information [4].

CR-Form-v3

CHANGE REQUEST

⌘ **25.304 CR 065** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

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

Title: ⌘	High quality cell in PLMN selection	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘		**Date:** ⌘ 22 Feb 2001
Category: ⌘ **F**		**Release:** ⌘ R99

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

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

Reason for change: ⌘	To finalise the PLMN selectionprocedure
Summary of change: ⌘	- Based on the agreement in RAN WG4 only the CPICH RSCP measurement quantity is considered for UTRA FDD cells. - High quality threshold for UTRA FDD cells is defined to be CPICH RSCP = -95 dBm - High quality threshold for UTRA TDD cells is defined to be P-CCPCH RSCP = -85 dBm
Consequences if not approved: ⌘	The PLMN selection is not finalised.

Clauses affected: ⌘	5.1.2.2
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
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.

5.1.2 Support for Network Selection

5.1.2.1 General

PLMN selection for GSM-MAP is described in [5].

PLMN Selection for ANSI-41 is described in TIA/EIA/IS-2000.5 and TIA/EIA/IS-707.

On request of the non-access stratum the access stratum should perform a search for available PLMNs and report them to the non-access stratum.

5.1.2.2 UTRA case

The UE shall scan all RF channels in the UTRA band according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the "strongest" cell (according to the cell search procedures for FDD, see [TS 25.214], and TDD, see [TS 25.224]) and read its system information, in order to find out which PLMN the cell belongs to. If UE can read the PLMN identity, the found PLMN is reported to the non-access stratum as a high quality PLMN, provided that the following high quality criterionconditions are is fulfilled:

1. For an FDD cell, the measured primary CPICH E_c/I_0 value shall be greater than or equal to [tbd] dB, and the measured primary CPICH RSCP value shall be greater than or equal to -95[tdb] dBm.

2. For a TDD cell, the measured P-CCPCH RSCP shall be greater than or equal to -84[tbd] dBm.

The found PLMNs, which do not fulfill the high quality criterion but the UE has been able to read their PLMN identities, are reported to the non-access stratum as other PLMNs in decreasing CPICH RSCP order for UTRA FDD cells and in decreasing P-CCPCH RSCP order for UTRA TDD cell.

The search for PLMNs on the rest of the carriers may be stopped on request of the non-access stratum. UE may optimise this search by using stored information of carrier frequencies and optionally also information on cell parameters, e.g. scrambling codes, from previously received measurement control information elements.

Once the UE has selected a PLMN, the cell selection procedure is performed in order to select a suitable cell of that PLMN to camp on.

CR-Form-v3

CHANGE REQUEST

| ⌘ | **25.304** CR | **066** | ⌘ | rev | **-** | ⌘ | Current version: | **3.5.0** | ⌘ |

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

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

Title:	⌘	Clean-up
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	***Date:*** ⌘ 22 Feb 2001
Category:	⌘	**F** ***Release:*** ⌘ R99

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

Reason for change:	⌘	Transferring 25.304 to REL-4
Summary of change:	⌘	All comments which are irrelevant in REL-4 were removed or modified.
Consequences if not approved:	⌘	

Clauses affected:	⌘	5.3.1.1, 7.1

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

Other comments:	⌘	

How to create CRs using this form:

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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.

5.3   Cell Access Restrictions

5.3.1   UTRA cells

There are two mechanisms which allow an operator to impose cell access restrictions. The first mechanism uses indication of cell status and special reservations for control of cell selection and re-selection procedures. The second mechanism, referred to as Access Control, shall allow to prevent selected classes of users from sending initial access messages for load control reasons. At subscription, one or more Access Classes are allocated to the subscriber and stored in the USIM [9], which are employed for this purpose.

5.3.1.1   Cell status and cell reservations

Cell status and cell reservations are indicated with the *Cell Access Restriction* Information Element in the System Information Message [4] by means of three Information Elements:

-   Cell barred (IE type: "barred" or "not barred"),

-   Cell Reserved for operator use (IE type: "reserved" or "not reserved"),

-   Cell Reserved for SoLSA exclusive use (IE type: "reserved" or "not reserved").

When cell status is indicated as "not barred", "not reserved" for operator use, and "not reserved" for SoLSA,

-   the UE may select/re-select this cell during the cell selection and cell re-selection procedures in Idle mode and in Connected mode.

When cell status is indicated as "not barred", "not reserved" for operator use, and "reserved" for SoLSA,

-   UEs not supporting SoLSA ~~(i.e. all UEs for Release '99)~~ shall behave as if cell status "barred" is indicated (see below).

When cell status is indicated as "not barred", "reserved" for operator use,

-   UEs assigned to an Access Class in the range 11 to 15 may select/re-select this cell if in the home PLMN.

-   UEs assigned to an Access Class in the range 0 to 9 shall behave as if cell status "barred" is indicated (see below).

When cell status "barred" is indicated,

-   the UE is not permitted to select/re-select this cell, except for emergency call, when no other acceptable cell can be found, and the cell is not barred for emergency call by means of the "Access Class 10 bit", see clause 5.3.1.3.

-   The UE shall ignore the "Cell Reserved for SoLSA exclusive use" IE.

-   The UE shall select another cell according to the following rule:

    -   If the "Intra-frequency cell re-selection indicator" IE in Cell Access Restriction IE is set to value "allowed", the UE may select another cell on the same frequency if selection/re-selection criteria are fulfilled.

        -   If the UE is camping on another cell, the UE shall exclude the barred cell from the neighbouring cell list until the expiry of a time interval T_{barred}. The time interval T_{barred} is sent via system information in a barred cell together with Cell status information in the Cell Access Restriction IE.

        -   If the UE does not select another cell, and the barred cell remains to be the "best" one, the UE shall after expiry of the time interval T_{barred} again check whether the status of the barred cell has changed.

    -   If the "Intra-frequency cell re-selection indicator" IE is set to "not allowed" the UE shall not re-select a cell on the same frequency as the barred cell. For emergency call, the Intra-frequency cell re-selection indicator IE" shall be ignored, i.e. even if it is set to "not allowed" the UE may select another intra-frequency cell.

        -   If the barred cell remains to be the "best" one, the UE shall after expiry of the time interval T_{barred} again check whether the status of the barred cell has changed.

7 Measurements for cell selection / reselection

7.1 Use of Mapping Functions

Different types of measurements are used in different radio access technologies and modes for the cell selection and reselection (CPICH Ec/N0 or CPICH RSCP in UTRA FDD, P-CCPCH RSCP in UTRA TDD, RXLEV in GSM). The use of mapping functions is indicated in system information.

Mapping functions are used for mapping a certain range of measurement values Q_{meas_LEV} (CPICH_EC/N0, CPICH_RSCP_LEV, P-CCPCH_RSCP_LEV, RXLEV) to a representing quality value Q_{map} (0..99, step size 1).

For each radio access technology and mode, one mapping function is defined. It may be defined over one or several consecutive intervals of the measurement values Q_{meas_LEV}.

The size of the consecutive intervals is sufficiently defined by their upper limit (given by parameter Upper_limit). In case of only one interval specified, the parameter Upper_limit is not needed and the interval is equivalent to the measurement range defined for that radio access technology. In case of more than one interval specified, the upper limit of the last interval defined is equivalent to the upper limit of the defined measurement range. The lower limit of an interval is equivalent to the upper limit of the interval before that interval. For the first interval, the lower limit is equivalent to the lower limit of the defined measurement range.

Within each interval, one function type (given by parameter Function_type) is defined by two parameters Map_parameter_1 and Map_parameter_2. ~~For release 99, only~~The function type "linear" ~~functions are~~is specified: $Q_{map} = a * Q_{meas\_LEV} + b$, if Q_{meas_LEV} is the measured value and Q_{map} is the representing quality value.

Map_parameter_1 and Map_parameter_2 for an interval define the Q_{map} values that the Q_{meas_LEV} values at the upper and the lower limit of this interval are mapped to, respectively. In other words, the linear function within one interval is defined by two tuples (Q_{meas_LEV}, Q_{map}) at the interval limits, so that the parameters a and b can be derived from this.

Accordingly, if the mapping function is steady between two consecutive intervals, Map_parameter_2 for the first interval has the same value as Map_parameter_1 for the following interval. This is illustrated in the following Figure 3:
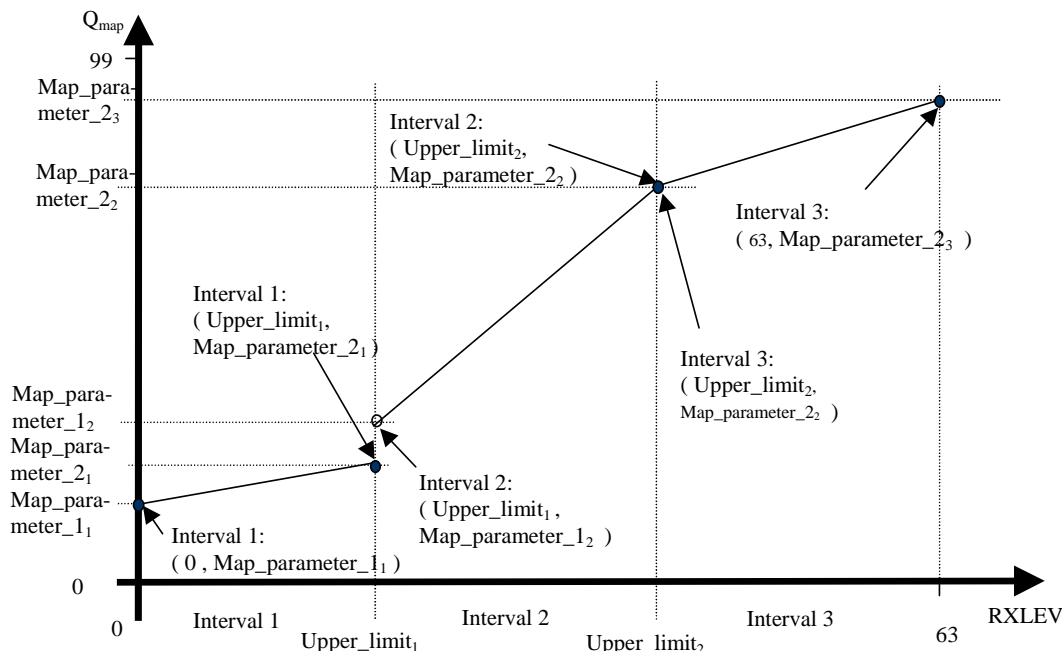

Figure 3: Illustration of mapping of RXLEV using multiple linear models

If no mapping functionality is needed (e.g. in FDD- or TDD-only networks), an implicit mapping is used: $Q_{map} = Q_{meas\_LEV}$. This is specified as default case.

The parameters defined for each interval (Function_type, Map_parameter_1, Map_parameter_2 and Upper_limit)are broadcast in system information.