TSG-RAN Meeting #24 **RP-040208**
Seoul, Korea, 02-04 June 2004

Title: **CRs to 25.304 (Rel-5 and associated Rel-6)**

Source: **TSG-RAN WG2**

Agenda item: **7.3.5**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Workitem	Doc-2nd-Level
25.304	112	1	Rel-5	Correction to UE selection of reserved cells	F	5.4.0	5.5.0	TEI5	R2-041255
25.304	113	1	Rel-6	Correction to UE selection of reserved cells	A	6.1.0	6.2.0	TEI5	R2-041256
25.304	117	1	Rel-5	Selection of suitable cell	F	5.4.0	5.5.0	TEI5	R2-041232
25.304	114	3	Rel-6	Selection of suitable cell	A	6.1.0	6.2.0	TEI5	R2-041233
25.304	115	-	Rel-5	Modification of the Sintersearch and SsearchRAT,m behaviour	F	5.4.0	5.5.0	TEI5	R2-041147
25.304	116	-	Rel-6	Modification of the Sintersearch and SsearchRAT,m behaviour	A	6.1.0	6.2.0	TEI5	R2-041148

3GPP TSG RAN2 Meeting #42
Montreal, Canada, 10 - 14 May, 2004

Tdoc ⌘R2-041255

CR-Form-v7

CHANGE REQUEST

⌘ **25.304** **CR** **112** ⌘**rev** **1** ⌘ Current version: **5.4.0** ⌘

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

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

Title:	⌘	Correction to UE selection of reserved cells
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	May 2004
Category:	⌘	**F**
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:
2 *(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)*

Reason for change:⌘[H

1. Currently, UE behaviour is not clear in case a cell in System Information is indicated as “reserved for operator use” or “reserved for future extension”.

2. Currently, it is not clear from the specification how the Intra-freqency cell re-selection indicator shall affect emergency calls.

Summary of change: ⌘

1. Section 5.3.1.1:
The wording “…UE may select/re-reselect…” has been changed to give more precise UE requirements.

   Section 5.3.1.3: Text on when emergency calls shall be allowed is deleted. This text is redundant, since rules for UE behaviour w r t cell status and cell reservations are listed in section 5.3.1.1.

2. Section 5.3.1.1: It is clarified that during an ongoing emergency call, the Intra-frequency cell re-selection indicator shall be ignored.

T1 impact: No impact
Backward compatibility: The proposed change has isolated impact, only UE implementation of rules selection/re-selection is impacted.

Consequences if not approved: ⌘ UE behaviour remains unclear.

Clauses affected: ⌘ 5.3.1.1, 5.3.1.3

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	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 Reservations and Access Restrictions

5.3.1 UTRA cells

There are two mechanisms which allow an operator to impose cell reservations or 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 future extension (IE type: "reserved" or "not reserved").

When cell status is indicated as "not barred", "not reserved" for operator use and "not reserved" for future extension (Cell Reservation Extension),

- ~~the~~ all UEs shall~~may select/re-select~~treat this cell as candidate 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 future extension (Cell Reservation Extension),

- UEs shall behave as if cell status "barred" is indicated using the value "not allowed" in the IE "Intra-frequency cell re-selection indicator" and the maximum value for T_{barred}, see [4] (see also below).

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

- UEs assigned to Access Class 11 or 15 ~~may~~ shall ~~select/re-select~~treat this cell as candidate during the cell selection and cell re-selection procedures in Idle mode and in Connected mode if ~~in~~ the cell belongs to the home PLMN.
- UEs assigned to an Access Class in the range 0 to 9 and 12 to 14 shall behave as if cell status "barred" is indicated using the value "not allowed" in the IE "Intra-frequency cell re-selection indicator" and the maximum value for T_{barred}, see [4] (see also below).

When cell status "barred" is indicated,

- The UE is not permitted to select/re-select this cell, not even for emergency calls.
- The UE shall ignore the "Cell Reserved for future extension (Cell Reservation Extension) 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~~ During an ongoing 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.

The reselection to another cell may also include a change of RAT.

5.3.1.2 Access Control

Information on cell access restrictions associated with the Access Classes is broadcast as system information, [4].

The UE shall ignore Access Class related cell access restrictions when selecting a cell to camp on, i.e. it shall not reject a cell for camping on because access on that cell is not allowed for any of the Access Classes of the UE. A change of the indicated access restriction shall not trigger cell re-selection by the UE.

Access Class related cell access restrictions shall be checked by the UE before sending an RRC CONNECTION REQUEST message when entering Connected Mode from UTRAN Idle mode. Cell access restrictions associated with the Access Classes shall not apply when the initial access for entering Connected Mode is triggered by an Inter-RAT cell re-selection to UTRAN, and for a UE which already is in Connected Mode.

5.3.1.3 Emergency Call

~~Emergency calls shall be allowed in all cells whose barred status is not barred, independent of restrictions due to cell reservations.~~

A restriction on emergency calls, if needed, shall be indicated in the "Access class barred list" IE [4]. If access class 10 is indicated as barred in a cell, UEs with access class 0 to 9 or without an IMSI are not allowed to initiate emergency calls in this cell. For UEs with access classes 11 to 15, emergency calls are not allowed if both access class 10 and the relevant access class (11 to 15) are barred. Otherwise, emergency calls are allowed for those UEs.

Full details of operation under "Access class barred list" are described in [9].

5.3.2 GSM cells

The cell access restrictions applicable to GSM are specified in [1].

3GPP TSG RAN2 Meeting #42
Montreal, Canada, 10 - 14 May, 2004

Tdoc ⌘R2-041256

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CHANGE REQUEST

⌘ **25.304** **CR** **113** ⌘**rev** **1** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Correction to UE selection of reserved cells
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	May 2004
Category:	⌘	**A**
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)*
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Reason for change:⌘[H

1. Currently, UE behaviour is not clear in case a cell in System Information is indicated as “reserved for operator use” or “reserved for future extension”.

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Summary of change: ⌘

1. Section 5.3.1.1:
The wording “…UE may select/re-reselect…” has been changed to give more precise UE requirements.

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2. Section 5.3.1.1: It is clarified that during an ongoing emergency call, the Intra-frequency cell re-selection indicator shall be ignored.

T1 impact: No impact
Backward compatibility: The proposed change has isolated impact, only UE implementation of rules selection/re-selection is impacted.

Consequences if not approved: ⌘ UE behaviour remains unclear.

Clauses affected: ⌘ 5.3.1.1, 5.3.1.3

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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  - 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~~ During an ongoing emergency call, the Intra-frequency cell re-

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5.3.1.3 Emergency Call

~~Emergency calls shall be allowed in all cells whose barred status is not barred, independent of restrictions due to cell reservations.~~

A restriction on emergency calls, if needed, shall be indicated in the "Access class barred list" IE [4]. If access class 10 is indicated as barred in a cell, UEs with access class 0 to 9 or without an IMSI are not allowed to initiate emergency calls in this cell. For UEs with access classes 11 to 15, emergency calls are not allowed if both access class 10 and the relevant access class (11 to 15) are barred. Otherwise, emergency calls are allowed for those UEs.

Full details of operation under "Access class barred list" are described in [9].

5.3.2 GSM cells

The cell access restrictions applicable to GSM are specified in [1].

3GPP TSG-WG2 Meeting 42
Montreal, Canada, 10th to 14th of May 2004

Tdoc ⌘ R2-041233

CR-Form-v7

CHANGE REQUEST

⌘ **25.304** **CR** **114** ⌘ **rev** **3** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Selection of suitable cell
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	14/05/2004
Category:	⌘	**A**
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)*
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Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	It is currently not clarified which cells are candidate when the UE shall select a suitable cell.
Summary of change:	⌘	In section 5.4.x it is clarified that the UE shall in order to conclude that there is no suitable cell on a given frequency or on any frequency it shall at least attempt to verify whether the strongest cell in the CELL_INFO_LIST on any frequenccy is suitable
Consequences if not approved:	⌘	If this CR is not approved the way the UE seleccts a UTRAN cell at state transition / frequency change will remain unspecified. This will result in unpredictable UE behaviour, and it will be difficcult for operators to configure the network.

Clauses affected:	⌘	Section 5.4.4

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

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5.2.7 Cell Selection when leaving connected mode

5.2.7.1 UTRA case

When returning to idle mode from connected mode, the UE shall select a suitable cell to camp on. Candidate cells for this selection are the cell(s) used immediately before leaving connected mode. If no suitable cell is found, the UE shall use the Stored information cell selection procedure in order to find a suitable cell to camp on.

When returning to idle mode after an emergency call on any PLMN, the UE shall select an acceptable cell to camp on. Candidate cells for this selection are the cell(s) used immediately before leaving connected mode. If no acceptable cell is found, the UE shall continue to search for an acceptable cell of any PLMN in state Any cell selection.

5.2.7.2 GSM case

Cell selection when leaving connected mode in GSM is specified in [1].

5.4 Cell Selection and Reselection Processes in RRC Connected Mode

5.4.1 Void

5.4.2 Void

5.4.3 Cell Reselection Process in RRC connected mode

The *cell reselection* process in Connected Mode is the same as *cell reselection evaluation process* used for idle mode, described in subclause 5.2.6.

5.4.4 Cell Selection Process in RRC connected mode

The *cell selection* process in Connected Mode ~~is only valid~~for ~~in~~ 'out of service' conditions [4] ~~and~~is the same as the *cell selection process* used for idle mode, described in subclause 5.2.3.

Selection of a suitable cell during a state transition or a change of frequency in Connected Mode is the same as the selection of a suitable UTRA cell used for idle mode, described in subclause 5.2.3.1. If the UE is ordered to select a suitable UTRA cell on a given frequency, it shall attempt to select a suitable cell on that frequency before considering cells on other frequencies.

5.5 Location Registration

In the UE, the AS shall report registration area information to the NAS.

The non-access part of the location registration process is specified in [5].

Actions for the UE AS upon reception of Location Registration reject are specified in [9] and [16].

3GPP TSG–RAN2 Meeting #42
Montreal, Canada, 10th –14st May 2004

Tdoc ⌘R2-041147

CR-Form-v7

CHANGE REQUEST

⌘ **25.304** **CR** **115** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

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

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

Title:	⌘	Modification of the Sintersearch and $Ssearch_{RAT,m}$ behaviour
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	10/05/2004
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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R96	*(Release 1996)*
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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘ **Implementation of this CR by a R99/Rel-4 UE will not cause compatibility issues.**

1) The measurement rules defined in 5.2.6.1.1 and 5.2.6.1.2 define conditions, based on the quality of the current serving cell, under which the UE shall measure intra-frequency, inter-frequency, and inter-RAT neighbour cells. When these conditions are not met, the spec uses the following phrases, 'UE need not perform measurements ...'. It is the common understanding within RAN2 that this phrase means that the UE may, as an implementation option, choose to not perform the measurements.

2) In case Sintersearch and $Ssearch_{RAT,m}$ are used, based on the option chosen by the UE, different behaviours regarding the cell reselected can be foreseen. Moreover, even if the same rules applies for UE in Idle and Connected Mode, the UE is also allowed to behave differently in the two scenario.
This results in a not predictive behaviour of the mobile, potentially conflicting with the cell-reselection rules in the different frequency/RATs.

Summary of change: ⌘ 1) It is proposed to clarify the phrase 'UE need not...' to make it clear that this is a UE implementation option. The proposed clarification is 'UE may choose to not...

2) In case the inter-RAT or inter-frequency measurements have been performed, until the quality of the service cell is above the relative Sintersearch or $Ssearch_{RAT,m}$ threshold they shall not be considered in the cell-reselection criteria.

Consequences if not approved: ⌘ 1) UE behaviour is not clear.

2) The behaviour of the UE is not predictable. Depending on the specific UE

	implementation, ping-pong effect between different frequencies/RAT cannot be avoided easily without impacting the cell-reselection performances. Also unnecessary and undesired cell-reselection are foreseen. Moreover with typical network configurations inter-RAT cell-reselection ping-pong may cause continuous LAU/RAU triggering with consequent that the UE cannot be reached. **Isolated Impact Change Analysis.** This change impacts only the UE. It would not affect UE implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise. There is no impact on the UTRAN. **Impact on the test specifications** There is no test defined in 34.123 which covers this case.

Clauses affected:	⌘	5.2.6.1.1, 5.2.6.1.2				
		Y	**N**			
Other specs Affected:	⌘		**X**	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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5.2.6 Cell Reselection Evaluation Process

5.2.6.1 UTRA case

The cell reselection process is specified 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 the serving cell indicates that HCS is not used, then for intra-frequency and inter-frequency measurements and inter-RAT measurements, the UE shall:

- use Squal for FDD cells and Srxlev for TDD for Sx and apply the following rules.

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

2. If Sx > $S_{intersearch}$, UE ~~need~~ may choose to not perform inter-frequency measurements. Inter-frequency measurements that may have been performed shall not be considered in the cell-reselection criteria.
   If Sx <= $S_{intersearch}$, perform inter-frequency measurements.
   If $S_{intersearch}$, is not sent for serving cell, perform inter-frequency measurements.

3. If Sx > $Ssearch_{RAT\ m}$, UE ~~need~~ may choose to not perform measurements on cells of RAT "m". Inter-RAT measurements that may have been performed shall not be considered in the cell-reselection criteria.
   If Sx <= $Ssearch_{RAT\ m}$, perform measurements on cells of RAT "m".
   If $Ssearch_{RAT\ m}$, is not sent for serving cell, perform measurements on cells of RAT "m".

If HCS is not used and if $S_{limit,SearchRATm}$ is sent for serving cell, UE shall ignore it.

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:

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

   use Squal for FDD cells and Srxlev for TDD cells for Sx and apply the following rules.

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

      measure on all intra-frequency and inter-frequency cells

   ELSE

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

         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

         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

   If HCS is used and if $S_{intrasearch}$ or $S_{searchHCS}$ or $S_{intersearch}$ (in FDD) are not sent for the serving cell, UE shall:

   - measure on all intra-frequency and inter-frequency cells.

2. For intra-frequency and inter-frequency 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 intra-frequency and inter-frequency neighbouring cells, which have equal or lower HCS priority than serving cell.
- prioritise re-selection of intra-frequency 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 $T_{CrmaxHyst}$, 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

   use Squal for FDD cells and Srxlev for TDD cells for Sx and apply the following rules.

   IF ($Srxlev_s$ <= $S_{HCS,RATm}$) or (if FDD and S_{qual} <= $S_{SearchRATm}$) THEN

   UE shall measure on all inter-RATm cells

   ELSE

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

   UE ~~need~~ may choose to not measure neighbouring cells in RAT "m". ". Inter-RAT measurements that may have been performed shall not be considered in the cell-reselection criteria.

   ELSE

   UE shall measure on all neighbouring 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

   If HCS is used and if $S_{HCS,RATm}$ is not sent for the serving cell, UE shall measure on all inter-RATm cells.

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 the neighbouring cells in RAT "m", which have an equal or lower HCS priority than the serving cell
     - prioritise re-selection of neighbouring cells in RAT "m" on lower HCS priority level before 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 $T_{CrmaxHyst}$, and
     - revert to measure according to the threshold-based measurement rules.

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.

$Qhyst2_s$

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.

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.

$Ssearch_{HCS}$

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 ~~need~~ may choose to not perform any inter-RAT measurements in RAT "m".

3GPP TSG–RAN2 Meeting #42
Montreal, Canada, 10th –14st May 2004

Tdoc ⌘R2-041148

CR-Form-v7

CHANGE REQUEST

⌘ **25.304** **CR** **116** ⌘ **rev** **-** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Modification of the Sintersearch and $Ssearch_{RAT,m}$ behaviour
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	10/05/2004
Category:	⌘	**A**
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:
2 *(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)*

Reason for change: ⌘ **Implementation of this CR by a R99/Rel-4/Rel-5 UE will not cause compatibility issues.**

1) The measurement rules defined in 5.2.6.1.1 and 5.2.6.1.2 define conditions, based on the quality of the current serving cell, under which the UE shall measure intra-frequency, inter-frequency, and inter-RAT neighbour cells. When these conditions are not met, the spec uses the following phrases, 'UE need not perform measurements ...'. It is the common understanding within RAN2 that this phrase means that the UE may, as an implementation option, choose to not perform the measurements.

2) In case Sintersearch and $Ssearch_{RAT,m}$ are used, based on the option chosen by the UE, different behaviours regarding the cell reselected can be foreseen. Moreover, even if the same rules applies for UE in Idle and Connected Mode, the UE is also allowed to behave differently in the two scenario.
This results in a not predictive behaviour of the mobile, potentially conflicting with the cell-reselection rules in the different frequency/RATs.

Summary of change: ⌘ 1) It is proposed to clarify the phrase 'UE need not...' to make it clear that this is a UE implementation option. The proposed clarification is 'UE may choose to not...

2) In case the inter-RAT or inter-frequency measurements have been performed, until the quality of the service cell is above the relative Sintersearch or $Ssearch_{RAT,m}$ threshold they shall not be considered in the cell-reselection criteria.

Consequences if not approved: ⌘ 1) UE behaviour is not clear.

2) The behaviour of the UE is not predictable. Depending on the specific UE

	implementation, ping-pong effect between different frequencies/RAT cannot be avoided easily without impacting the cell-reselection performances. Also unnecessary and undesired cell-reselection are foreseen. Moreover with typical network configurations inter-RAT cell-reselection ping-pong may cause continuous LAU/RAU triggering with consequent that the UE cannot be reached. **Isolated Impact Change Analysis.** This change impacts only the UE. It would not affect UE implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise. There is no impact on the UTRAN. **Impact on the test specifications** There is no test defined in 34.123 which covers this case.

Clauses affected:	⌘	5.2.6.1.1, 5.2.6.1.2				
		Y	**N**			
Other specs Affected:	⌘		**X**	Other core specifications	⌘	
			X	Test specifications		
			X	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/specs/CR.htm. Below is a brief summary:

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

5.2.6 Cell Reselection Evaluation Process

5.2.6.1 UTRA case

The cell reselection process is specified 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 the serving cell indicates that HCS is not used, then for intra-frequency and inter-frequency measurements and inter-RAT measurements, the UE shall:

- use Squal for FDD cells and Srxlev for TDD for Sx and apply the following rules.

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

2. If Sx > $S_{intersearch}$, UE ~~need~~ may choose to not perform inter-frequency measurements. Inter-frequency measurements that may have been performed shall not be considered in the cell-reselection criteria.
   If Sx <= $S_{intersearch}$, perform inter-frequency measurements.
   If $S_{intersearch}$, is not sent for serving cell, perform inter-frequency measurements.

3. If Sx > $Ssearch_{RAT\ m}$, UE ~~need~~ may choose to not perform measurements on cells of RAT "m". Inter-RAT measurements that may have been performed shall not be considered in the cell-reselection criteria.
   If Sx <= $Ssearch_{RAT\ m}$, perform measurements on cells of RAT "m".
   If $Ssearch_{RAT\ m}$, is not sent for serving cell, perform measurements on cells of RAT "m".

If HCS is not used and if $S_{limit,SearchRATm}$ is sent for serving cell, UE shall ignore it.

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:

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

   use Squal for FDD cells and Srxlev for TDD cells for Sx and apply the following rules.

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

      measure on all intra-frequency and inter-frequency cells

   ELSE

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

         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

         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

   If HCS is used and if $S_{intrasearch}$ or $S_{searchHCS}$ or $S_{intersearch}$ (in FDD) are not sent for the serving cell, UE shall:

   - measure on all intra-frequency and inter-frequency cells.

2. For intra-frequency and inter-frequency 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 intra-frequency and inter-frequency neighbouring cells, which have equal or lower HCS priority than serving cell.
- prioritise re-selection of intra-frequency 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 $T_{CrmaxHyst}$, 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

   use Squal for FDD cells and Srxlev for TDD cells for Sx and apply the following rules.

   IF ($Srxlev_s$ <= $S_{HCS,RATm}$) or (if FDD and S_{qual} <= $S_{SearchRATm}$) THEN

   UE shall measure on all inter-RATm cells

   ELSE

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

   UE ~~need~~ may choose to not measure neighbouring cells in RAT "m". Inter-RAT measurements that may have been performed shall not be considered in the cell-reselection criteria.

   ELSE

   UE shall measure on all neighbouring 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

   If HCS is used and if $S_{HCS,RATm}$ is not sent for the serving cell, UE shall measure on all inter-RATm cells.

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 the neighbouring cells in RAT "m", which have an equal or lower HCS priority than the serving cell
     - prioritise re-selection of neighbouring cells in RAT "m" on lower HCS priority level before 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 $T_{CrmaxHyst}$, and
     - revert to measure according to the threshold-based measurement rules.

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.

$Qhyst2_s$

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.

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.

$Ssearch_{HCS}$

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 ~~need~~ may choose to not perform any inter-RAT measurements in RAT "m".

3GPP TSG-WG2 Meeting 42
Montreal, Canada, 10th to 14th of May 2004

Tdoc ⌘ R2-041232

CR-Form-v7

CHANGE REQUEST

⌘ **25.304** **CR** **117** ⌘ **rev** **1** ⌘ Current version: **5.4.0** ⌘

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

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

Title:	⌘	Selection of suitable cell
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	14/05/2004
Category:	⌘	**F**
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:
2 (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)

Reason for change:	⌘	It is currently not clarified which cells are candidate when the UE shall select a suitable cell.
Summary of change:	⌘	**Implementation of this CR by a R99/Rel-4 UE will not cause compatibility issues.** In section 5.4.4 it is clarified that the UE shall in order to conclude that there is no suitable cell on a given frequency or on any frequency it shall at least attempt to verify whether the strongest cell in the CELL_INFO_LIST on any frequenccy is suitable
Consequences if not approved:	⌘	If this CR is not approved the way the UE seleccts a UTRAN cell at state transition / frequency change will remain unspecified. This will result in unpredictable UE behaviour, and it will be difficcult for operators to configure the network.

Clauses affected:	⌘	Section 5.4.4			
Other specs Affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	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://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.

5.2.7 Cell Selection when leaving connected mode

5.2.7.1 UTRA case

When returning to idle mode from connected mode, the UE shall select a suitable cell to camp on. Candidate cells for this selection are the cell(s) used immediately before leaving connected mode. If no suitable cell is found, the UE shall use the Stored information cell selection procedure in order to find a suitable cell to camp on.

When returning to idle mode after an emergency call on any PLMN, the UE shall select an acceptable cell to camp on. Candidate cells for this selection are the cell(s) used immediately before leaving connected mode. If no acceptable cell is found, the UE shall continue to search for an acceptable cell of any PLMN in state Any cell selection.

5.2.7.2 GSM case

Cell selection when leaving connected mode in GSM is specified in [1].

5.4 Cell Selection and Reselection Processes in RRC Connected Mode

5.4.1 Void

5.4.2 Void

5.4.3 Cell Reselection Process in RRC connected mode

The *cell reselection* process in Connected Mode is the same as *cell reselection evaluation process* used for idle mode, described in subclause 5.2.6.

5.4.4 Cell Selection Process in RRC connected mode

The *cell selection* process in Connected Mode ~~is only valid~~for ~~in~~ 'out of service' conditions [4] ~~and~~is the same as the *cell selection process* used for idle mode, described in subclause 5.2.3.

Selection of a suitable cell during a state transition or a change of frequency in Connected Mode is the same as the selection of a suitable UTRA cell used for idle mode, described in subclause 5.2.3.1. If the UE is ordered to select a suitable UTRA cell on a given frequency, it shall attempt to select a suitable cell on that frequency before considering cells on other frequencies.

5.5 Location Registration

In the UE, the AS shall report registration area information to the NAS.

The non-access part of the location registration process is specified in [5].

Actions for the UE AS upon reception of Location Registration reject are specified in [9] and [16].