TSG-RAN Meeting #14
Kyoto, Japan, 11 - 14 December 2001

RP-010756

Title: **Agreed CRs (Release '99 and Rel-4 category A) to TS 25.304**

Source: **TSG-RAN WG2**

Agenda item: **8.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-012517	agreed	25.304	091		R99	Correction on DRX cycle length in connected mode	F	3.8.0	3.9.0
R2-012640	agreed	25.304	092		Rel-4	Correction on DRX cycle length in connected mode	A	4.2.0	4.3.0
R2-012740	agreed	25.304	093	1	R99	Correction to definition of 'available' PLMN	F	3.8.0	3.9.0
R2-012641	agreed	25.304	094		Rel-4	Correction to definition of 'available' PLMN	A	4.2.0	4.3.0

3GPP TSG-RAN WG2 Meeting #25
Makuhari, Japan, 26- 30 November, 2001

R2-012517

CR-Form-v4

CHANGE REQUEST

⌘ **25.304** **CR** **091** ⌘ ev **-** ⌘ Current version: **3.8.0** ⌘

*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 on DRX cycle length in connected mode
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	November 26, 2001
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Section 8 deals not only with Paging and SCCPCH selection in idle mode, but also with the definition of the DRX cycle length in connected mode. Moreover, the companion CR to TS 25.331 proposes to reference this spec for the definition of the DRX cycle length in connected mode.
Summary of change:	⌘	For simplicity, it is proposed to make the title of section 8 more generic. **Isolated Impact Change Analysis.** This change clarifies the DRX cycle length to use in connected mode. It would not affect implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	Inconsistent specifications

Clauses affected:	⌘	8		
Other specs affected:	⌘	**X** Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	CR 1147 to TS 25.331 25.304 v4.2.0, CR 092
Other comments:	⌘	This subject was presented in R2-012348 at RAN WG2 #24		

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:

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

[…]

8 Paging and SCCPCH selection ~~in Idle mode~~

8.1 Paging Channel selection

[…]

8.2 SCCPCH selection when entering Connected mode

[…]

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.

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 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

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 as default numbers, IMSI = 0 and DRX cycle length = 256 (2.56 s), 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.

[…]

3GPP TSG-RAN WG2 Meeting #25 ***R2-012640***
Makuhari, Japan, 26- 30 November, 2001

CR-Form-v4

CHANGE REQUEST

⌘ **25.304** **CR** **092** ⌘ ev **-** ⌘ Current version: **4.2.0** ⌘

*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:	⌘	Clarification on DRX cycle length in connected mode
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	November 26, 2001
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
REL-4 *(Release 4)*
REL-5 *(Release 5)*

Reason for change:	⌘	Section 8 deals not only with Paging and SCCPCH selection in idle mode, but also with the definition of the DRX cycle length in connected mode. Moreover, the companion CR to TS 25.331 proposes to reference this spec for the definition of the DRX cycle length in connected mode.
Summary of change:	⌘	For simplicity, it is proposed to make the title of section 8 more generic. **Isolated Impact Change Analysis.** This change clarifies the DRX cycle length to use in connected mode. It would not affect implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	Inconsistent specifications

Clauses affected:	⌘	8		
Other specs affected:	⌘	☒ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	CR 1147 to TS 25.331 25.304 v3.8.0, CR 091
Other comments:	⌘	This subject was presented in R2-012348 at RAN WG2 #24		

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[…]

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8.1 Paging Channel selection

[…]

8.2 SCCPCH selection when entering Connected mode

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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.

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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 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.

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If the UE has no IMSI, for instance when making an emergency call without USIM, the UE shall use as default numbers, IMSI = 0 and DRX cycle length = 256 (2.56 s), 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.

[…]

3GPP TSG-RAN WG2 Meeting #25
Makuhari, Japan, 26th-30th November 2001

Tdoc R2-012740

CR-Form-v4

CHANGE REQUEST

⌘ **25.304** **CR** **093** ⌘ ev **r1** ⌘ Current version: **3.8.0** ⌘

*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:	⌘	Correction to definition of 'available' PLMN
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29/11/01
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Section 5.1.2.1 states 'on request of the NAS, the AS should perform a search for available PLMNs and report them to NAS. According to section 3.1, the definition of an 'available PLMN' is one on which at least one acceptable cell is found, implying that the UE must check the barred status of the cell to determine its acceptability before reporting to the NAS. However, in section 5.1.2.2 it states 'If the UE can read the PLMN identity, the found PLMN shall be reported to NAS ...'. This implies that the UE does not need to check the barred status of the cell before it reports it to the NAS. The contradiction between these two sections of the specification should be resolved.
Summary of change:	⌘	It is proposed that section 5.1.2.1 is taken as the correct interpretation and so the UE does not check the barred status of cells before reporting the PLMN to the NAS. It is proposed to align the definition of available PLMN with section 5.1.2.1 as follows: 'A PLMN for which the UE has found at least one cell and read its PLMN identity'
Consequences if not approved:	⌘	The specification will remain ambiguous leading to different UE implementations. For automatic PLMN selection, the ambiguity will not affect the PLMN selected. For manual PLMN selection, the ambiguity will mean that UEs assuming different interpretations of the specification could display different PLMN lists to the user.

Clauses affected:	⌘	3.1		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications	⌘	25.304 v4.2.0, CR 094

	☐ O&M Specifications	
Other comments:	⌘	

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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.

Available PLMN: A PLMN for which the UE has found at least one ~~acceptable~~ cell and read its PLMN identity.

Barred Cell: A cell a UE is not allowed to camp on.

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.

Equivalent PLMN: A PLMN considered as equivalent to the selected PLMN by the UE for PLMN selection, cell selection, cell reselection and handover according to the information provided by the NAS.

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.

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 (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.

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.

Reserved Cell: A cell on which camping is not allowed, except for particular UEs, if so indicated in the system information.

Restricted Cell: A cell on which camping is allowed, but access attempts are disallowed for UEs whose access classes are indicated as barred.

Selected PLMN: This is the PLMN that has been selected by the NAS, either manually or automatically.

Serving cell: The cell on which the UE is camped.

Strongest cell: The cell on a particular carrier that is considered strongest according to the layer 1 cell search procedure [14][15]. As the details of the layer 1 cell search are implementation dependent, the precise definition of 'strongest cell' is also implementation dependent.

Suitable Cell: This is a cell on which an UE may camp. For a UTRA cell, the criteria are defined in subclause 4.3, and for a GSM cell the criteria are defined in [1].

3GPP TSG-RAN WG2 Meeting #25
Makuhari, Japan, 26th-30th November 2001

Tdoc R2-012641

CR-Form-v4

CHANGE REQUEST

⌘ **25.304** **CR** **094** ⌘ ev **-** ⌘ Current version: **4.2.0** ⌘

*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:	⌘	Correction to definition of 'available' PLMN.
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	29/11/01
Category:	⌘	**A**
Release:	⌘	REL-4

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Reason for change:	⌘	Section 5.1.2.1 states 'on request of the NAS, the AS should perform a search for available PLMNs and report them to NAS. According to section 3.1, the definition of an 'available PLMN' is one on which at least one acceptable cell is found, implying that the UE must check the barred status of the cell to determine its acceptability before reporting to the NAS. However, in section 5.1.2.2 it states 'If the UE can read the PLMN identity, the found PLMN shall be reported to NAS ...'. This implies that the UE does not need to check the barred status of the cell before it reports it to the NAS. The contradiction between these two sections of the specification should be resolved.
Summary of change:	⌘	It is proposed that section 5.1.2.1 is taken as the correct interpretation and so the UE does not check the barred status of cells before reporting the PLMN to the NAS. It is proposed to align the definition of available PLMN with section 5.1.2.1 as follows: 'A PLMN for which the UE has found at least one cell and read its PLMN identity'
Consequences if not approved:	⌘	The specification will remain ambiguous leading to different UE implementations. For automatic PLMN selection, the ambiguity will not affect the PLMN selected. For manual PLMN selection, the ambiguity will mean that UEs assuming different interpretations of the specification could display different PLMN lists to the user.

Clauses affected:	⌘	3.1		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications	⌘	25.331 v3.8.0, CR 093r1

	☐ O&M Specifications	
Other comments:	⌘	

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3 Definitions and abbreviations

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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.

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Equivalent PLMN: A PLMN considered as equivalent to the selected PLMN by the UE for PLMN selection, cell selection, cell reselection and handover according to the information provided by the NAS.

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