TSG-RAN Meeting #20 ***RP-030287***
Hämeenlinna, Finland, 03-06 June 2003

Title: **‘Out of Service behaviour’ CRs (CRs to TS 25.331) – Solution 4**

Source: **TSG-RAN WG2**

Agenda item: **7.2.2**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.331	1973	1	R99	Keep connection during OOS or perform RAU on return to coverage	F	3.14.0	3.15.0	R2-031490	TEI
25.331	1974	1	Rel-4	Keep connection during OOS or perform RAU on return to coverage	A	4.9.0	4.10.0	R2-031491	TEI
25.331	1975	1	Rel-5	Keep connection during OOS or perform RAU on return to coverage	F	5.4.0	5.5.0	R2-031492	TEI5

3GPP TSG-RAN WG2 Meeting #36
Marne La Vallee, France, 19-23 May 03

Tdoc ⌘R2-031490

CR-Form-v7

CHANGE REQUEST

⌘ **25.331** **CR** **1973** ⌘ **rev** **1** ⌘ Current version: **3.14.0** ⌘

*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:	⌘	keep connection during OOS or perform RAU on return to coverage
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	23/05/03
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)*
Rel-6	*(Release 6)*

Reason for change: ⌘

The RRC specification states that when out of service the UE shall perform cell selection. However, it does not state the behaviour when the cell selection process fails to find a suitable cell of the RPLMN. The behaviour should be clarified to ensure that users can access other PLMNs for normal service or for emergency calls.

The UE behaviour is not specified in the case that the UE camps on an acceptable cell for limited service or the case that the NAS selects a different PLMN. The proposed behaviour is for the UE to simply release the RRC connection.

When the UE releases the RRC connection due to camping on an acceptable cell for limited service or a T317 expiry a UTRAN-UE de-synchronisation can occur. To resolve the de-synchronisation the UE should perform a RAU on return to the RPLMN irrespective of whether the RA has changed.

Summary of change: ⌘

Functionality corrected: UE behaviour when out of service

Changes:
1 - It is clarified that when out of service the UE searches for the RPLMN for one complete scan of the supported bands and frequencies or a TBD time [30s?]. After this time the UE can select another PLMN or camp on an acceptable cell for limited service.
2 - It is stated that when the UE camps on a cell of another PLMN for limited service or for normal service the RRC connection is released
3 - When the RRC connection is released due to camping on a cell of another PLMN for limited service or the RRC connection is released due to a T317 expiry then an indication of the cause of RRC connection release is provided to upper

		layers. The upper layers will perform an RAU on return to the RPLMN irrespective of a change of RAU (to be specified in 24.008).
Consequences if not approved:	⌘	A UE not aligned to this CR would be prevented from accessing emergency calls and from selecting a new PLMN for normal service while out of service of the RPLMN. In addition, if the UE camps on an acceptable cell for limited service while in RRC connected mode or T317 expires and then it returns to the RPLMN could be de-synchronised from the UTRAN. This would mean that the UE could not be paged by the network until the equivalent of T305+T307 expires in the network or a periodic LAU/RAU occurs (unless the network implements a network based solution such as paging with URNTI and CN identities)

Clauses affected:	⌘	7.2.2.1, 7.2.2.2, 8.5.5.4, 8.5.X			
Other specs affected:	⌘	**Y** / **N** ☐ / ☐	Other core specifications	⌘	24.008
		Y / ☐	Test specifications		
		☐ / ☐	O&M Specifications		
Other comments:	⌘				

How to create CRs using this form:

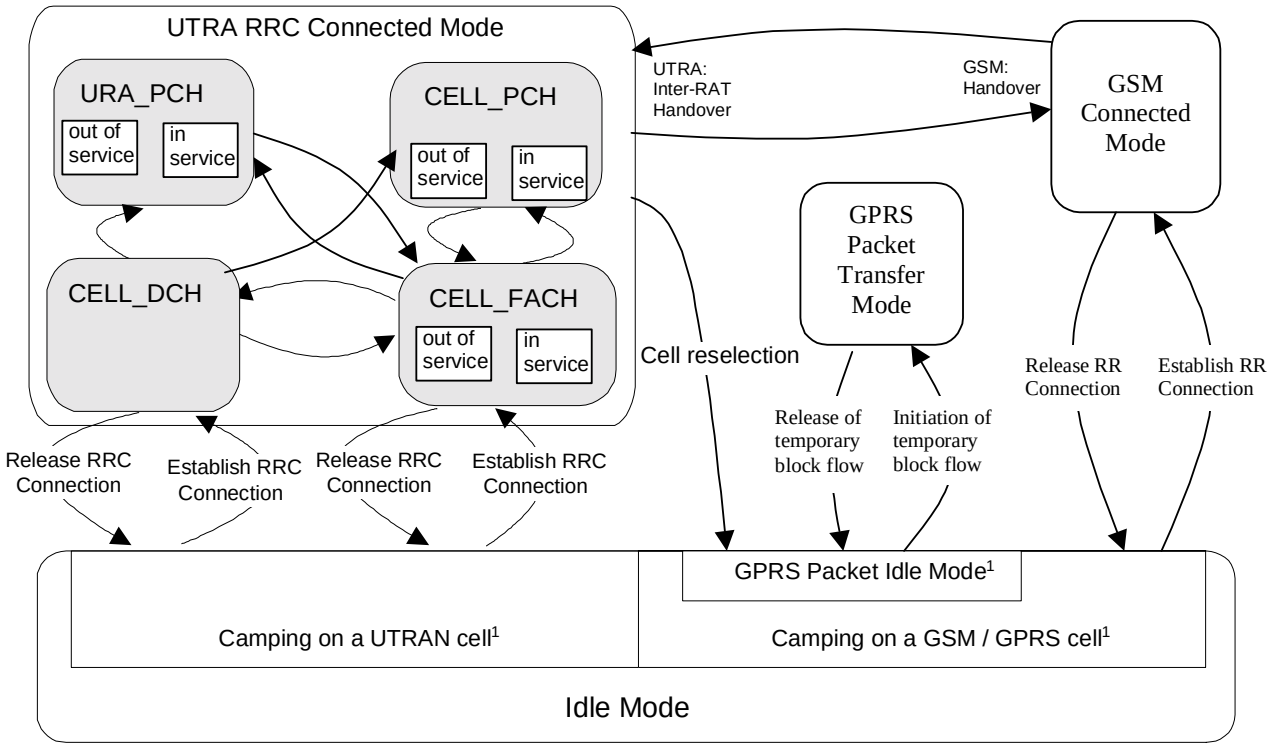
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

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.

7 Protocol states

7.1 Overview of RRC States and State Transitions including GSM

Figure 7.1-1 shows the RRC states in UTRA RRC Connected Mode, including transitions between UTRA RRC connected mode and GSM connected mode for CS domain services, and between UTRA RRC connected mode and GSM/GPRS packet modes for PS domain services. It also shows the transitions between Idle Mode and UTRA RRC Connected Mode and furthermore the transitions within UTRA RRC connected mode.



NOTE: [1]: The indicated division within Idle Mode is only included for clarification and shall not be interpreted as states.

Figure 7.1-1: RRC States and State Transitions including GSM

The RRC connection is defined as a point-to-point bi-directional connection between RRC peer entities in the UE and the UTRAN characterised by the allocation of a U-RNTI. A UE has either zero or one RRC connection.

NOTE: The state transitions are specified in clause 8.

7.2 Processes in UE modes/states

NOTE: This subclause specifies what processes shall be active in the UE in the different RRC modes/states. The related procedures and the conditions on which they are triggered are specified either in clause 8 or elsewhere in the relevant process definition.

7.2.1 UE Idle mode

UE processes that are active in UE Idle mode are specified in [4].

The UE shall perform a periodic search for higher priority PLMNs as specified in [25].

7.2.2 UTRA RRC Connected mode

In this specification unless otherwise mentioned "connected mode" shall refer to "UTRA RRC connected mode".

7.2.2.1 URA_PCH or CELL_PCH state

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

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

1> if the UE is "in service area":

2> maintain up-to-date system information as broadcast by the serving cell as specified in the subclause 8.1.1;

2> perform cell reselection process as specified in [4];

2> perform a periodic search for higher priority PLMNs as specified in [25];

NOTE: If the DRX cycle length is 80ms, then a search for higher priority PLMNs may not identify all the available PLMNs due to the paging occasion on the current serving cell coinciding with the MIB of the cell of interest.

2> monitor the paging occasions and PICH monitoring occasions determined according to subclauses 8.6.3.1a and 8.6.3.2 and receive paging information on the PCH mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;

2> act on RRC messages received on PCCH and BCCH;

2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;

2> maintain up-to-date BMC data if it supports Cell Broadcast Service (CBS) as specified in [37];

2> run timer T305 for periodical URA update if the UE is in URA_PCH or for periodical cell update if the UE is in CELL_PCH.

1> if the UE is "out of service area":

2> perform cell selection process as specified in [4];

2> run timer T316;

2> run timer T305.

2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE should after a minimum of TBD time of being "out of service area":

3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. If the NAS indicates the selection of a new PLMN the UE should store information for the new PLMN within the variable SELECTED_PLMN and perform actions according to subclause 8.5.X;

3> if an acceptable cell is found then the UE should camp on that cell to obtain limited service as defined in [4] and, perform actions according to subclause 8.5.X. If the RRC connection is released due to camping on an acceptable cell, indicate this to upper layers.

3> else if no acceptable cell is found, the UE should continue looking for an acceptable cell as defined in [4].

NOTE: This indication to upper layers causes the UE to initiate a RAU on return to a suitable cell of selected PLMN irrespective of the RA of that cell. This RAU can be enabled or disabled by an indicator contained in the IE "CN information info" within SIB1.

7.2.2.2 CELL_FACH state

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

NOTE: DCCH and, if configured, DTCH are available in this state.

1> if the UE is "in service area":

2> maintain up-to-date system information as broadcast by the serving cell as specified in subclause 8.1.1;

2> perform cell reselection process as specified in [4];

2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;

2> run timer T305 (periodical cell update);

2> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;

2> listen to all FACH transport channels mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;

2> act on RRC messages received on BCCH, CCCH and DCCH;

2> act on RRC messages received on, if available, SHCCH (TDD only).

1> if the UE is "out of service area":

2> perform cell selection process as specified in [4];

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

2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE should after a minimum of TBD time of being "out of service area":

3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. If the NAS indicates the selection of a new PLMN the UE should store information for the new PLMN within the variable SELECTED_PLMN and perform actions according to subclause 8.5.X;

3> if an acceptable cell is found then the UE should camp on that cell to obtain limited service as defined in [4] and perform actions according to subclause 8.5.X. If the RRC connection is released due to camping on an acceptable cell, indicate this to upper layers.

3> else if no acceptable cell is found, the UE should continue looking for an acceptable cell as defined in [4].

NOTE: This indication to upper layers causes the UE to initiate a RAU on return to a suitable cell of selected PLMN irrespective of the RA of that cell. This RAU can be enabled or disabled by an indicator contained in the IE "CN information info" within SIB1.

7.2.2.3 CELL_DCH state

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

NOTE: DCCH and, if configured, DTCH are available in this state.

1> read system information broadcast on FACH as specified in subclause 8.1.1.3 (applicable only to UEs with certain capabilities and in FDD mode);

1> read the system information as specified in subclause 8.1.1 (for UEs in TDD mode);

1> perform measurements process according to measurement control information as specified in subclause 8.4 and in clause 14;

1> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;

1> act on RRC messages received on DCCH;

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

1> act on RRC messages received on BCCH (TDD only) and, if available, SHCCH (TDD only).

8.5.5.4 T317 expiry

When the T317 expires, the UE shall:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode;

8.5.X Change of PLMN while in RRC connected mode

If the UE camps on an acceptable cell to obtain limited service while in RRC connected mode the UE should either:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.

or:

1> keep the RRC connection of the selected PLMN and its behaviour while camping on the cell of the other PLMN shall be as if in Idle mode in that PLMN.

1> if the UE re-enters “in service area” on the selected PLMN or cannot maintain limited service (i.e. cannot find any acceptable cell of any PLMN), the UE shall resume its RRC Connected mode behaviour as if it had not camped on any cell whilst being in “out of service area”.

If the NAS indicates the selection of a new PLMN while the UE is in RRC connected mode in the selected PLMN or if the UE attempts transmission on a cell of another PLMN (i.e. to initiate emergency call), the UE shall for the selected PLMN:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.

3GPP TSG-RAN WG2 Meeting #36
Marne La Vallee, France, 19-23 May 03

Tdoc ⌘R2-031491

CR-Form-v7

CHANGE REQUEST

⌘ **25.331** **CR** **1974** ⌘**rev** **1** ⌘ Current version: **4.9.0** ⌘

*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:	⌘	keep connection during OOS or perform RAU on return to coverage		
Source:	⌘	RAN WG2		
Work item code:	⌘	TEI	***Date:*** ⌘	23/05/03
Category:	⌘	**A**	***Release:*** ⌘	Rel-4

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

Use one of the following releases:

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

Reason for change: ⌘

The RRC specification states that when out of service the UE shall perform cell selection. However, it does not state the behaviour when the cell selection process fails to find a suitable cell of the RPLMN. The behaviour should be clarified to ensure that users can access other PLMNs for normal service or for emergency calls.

The UE behaviour is not specified in the case that the UE camps on an acceptable cell for limited service or the case that the NAS selects a different PLMN. The proposed behaviour is for the UE to simply release the RRC connection.

When the UE releases the RRC connection due to camping on an acceptable cell for limited service or a T317 expiry a UTRAN-UE de-synchronisation can occur. To resolve the de-synchronisation the UE should perform a RAU on return to the RPLMN irrespective of whether the RA has changed.

Summary of change: ⌘

Functionality corrected: UE behaviour when out of service

Changes:
1 - It is clarified that when out of service the UE searches for the RPLMN for one complete scan of the supported bands and frequencies or a TBD time [30s?]. After this time the UE can select another PLMN or camp on an acceptable cell for limited service.
2 - It is stated that when the UE camps on a cell of another PLMN for limited service or for normal service the RRC connection is released
3 - When the RRC connection is released due to camping on a cell of another PLMN for limited service or the RRC connection is released due to a T317 expiry then an indication of the cause of RRC connection release is provided to upper

		layers. The upper layers will perform an RAU on return to the RPLMN irrespective of a change of RAU (to be specified in 24.008).
Consequences if not approved:	⌘	A UE not aligned to this CR would be prevented from accessing emergency calls and from selecting a new PLMN for normal service while out of service of the RPLMN. In addition, if the UE camps on an acceptable cell for limited service while in RRC connected mode or T317 expires and then it returns to the RPLMN could be de-synchronised from the UTRAN. This would mean that the UE could not be paged by the network until the equivalent of T305+T307 expires in the network or a periodic LAU/RAU occurs (unless the network implements a network based solution such as paging with URNTI and CN identities)

Clauses affected:	⌘	7.2.2.1, 7.2.2.2, 8.5.5.4, 8.5.X			
Other specs affected:	⌘	**Y** / **N** ☐ / ☐	Other core specifications	⌘	24.008
		Y / ☐	Test specifications		
		☐ / ☐	O&M Specifications		
Other comments:	⌘				

How to create CRs using this form:

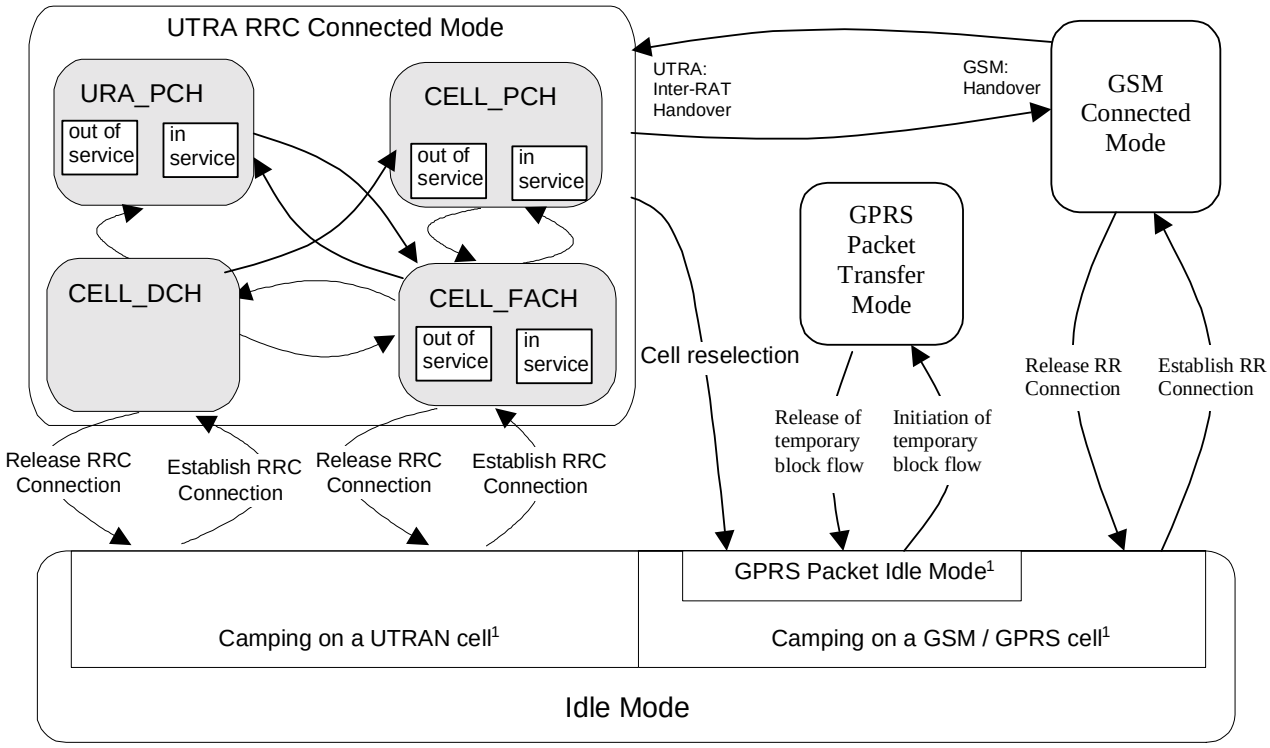
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

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.

7 Protocol states

7.1 Overview of RRC States and State Transitions including GSM

Figure 7.1-1 shows the RRC states in UTRA RRC Connected Mode, including transitions between UTRA RRC connected mode and GSM connected mode for CS domain services, and between UTRA RRC connected mode and GSM/GPRS packet modes for PS domain services. It also shows the transitions between Idle Mode and UTRA RRC Connected Mode and furthermore the transitions within UTRA RRC connected mode.



NOTE: [1]: The indicated division within Idle Mode is only included for clarification and shall not be interpreted as states.

Figure 7.1-1: RRC States and State Transitions including GSM

The RRC connection is defined as a point-to-point bi-directional connection between RRC peer entities in the UE and the UTRAN characterised by the allocation of a U-RNTI. A UE has either zero or one RRC connection.

NOTE: The state transitions are specified in clause 8.

7.2 Processes in UE modes/states

NOTE: This subclause specifies what processes shall be active in the UE in the different RRC modes/states. The related procedures and the conditions on which they are triggered are specified either in clause 8 or elsewhere in the relevant process definition.

7.2.1 UE Idle mode

UE processes that are active in UE Idle mode are specified in [4].

The UE shall perform a periodic search for higher priority PLMNs as specified in [25].

7.2.2 UTRA RRC Connected mode

In this specification unless otherwise mentioned "connected mode" shall refer to "UTRA RRC connected mode".

7.2.2.1 URA_PCH or CELL_PCH state

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

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

1> if the UE is "in service area":

2> maintain up-to-date system information as broadcast by the serving cell as specified in the subclause 8.1.1;

2> perform cell reselection process as specified in [4];

2> perform a periodic search for higher priority PLMNs as specified in [25];

NOTE: If the DRX cycle length is 80ms, then a search for higher priority PLMNs may not identify all the available PLMNs due to the paging occasion on the current serving cell coinciding with the MIB of the cell of interest.

2> monitor the paging occasions and PICH monitoring occasions determined according to subclauses 8.6.3.1a and 8.6.3.2 and receive paging information on the PCH mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;

2> act on RRC messages received on PCCH and BCCH;

2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;

2> maintain up-to-date BMC data if it supports Cell Broadcast Service (CBS) as specified in [37];

2> run timer T305 for periodical URA update if the UE is in URA_PCH or for periodical cell update if the UE is in CELL_PCH.

1> if the UE is "out of service area":

2> perform cell selection process as specified in [4];

2> run timer T316;

2> run timer T305.

2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE should after a minimum of TBD time of being "out of service area":

3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. If the NAS indicates the selection of a new PLMN the UE should store information for the new PLMN within the variable SELECTED_PLMN and perform actions according to subclause 8.5.X;

3> if an acceptable cell is found then the UE should camp on that cell to obtain limited service as defined in [4] and, perform actions according to subclause 8.5.X. If the RRC connection is released due to camping on an acceptable cell, indicate this to upper layers.

3> else if no acceptable cell is found, the UE should continue looking for an acceptable cell as defined in [4].

NOTE: This indication to upper layers causes the UE to initiate a RAU on return to a suitable cell of selected PLMN irrespective of the RA of that cell. This RAU can be enabled or disabled by an indicator contained in the IE "CN information info" within SIB1.

7.2.2.2 CELL_FACH state

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

NOTE: DCCH and, if configured, DTCH are available in this state.

1> if the UE is "in service area":

2> maintain up-to-date system information as broadcast by the serving cell as specified in subclause 8.1.1;

2> perform cell reselection process as specified in [4];

2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;

2> run timer T305 (periodical cell update);

2> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;

2> listen to all FACH transport channels mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;

2> act on RRC messages received on BCCH, CCCH and DCCH;

2> act on RRC messages received on, if available, SHCCH (TDD only).

1> if the UE is "out of service area":

2> perform cell selection process as specified in [4];

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

2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE should after a minimum of TBD time of being "out of service area":

3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. If the NAS indicates the selection of a new PLMN the UE should store information for the new PLMN within the variable SELECTED_PLMN and perform actions according to subclause 8.5.X;

3> if an acceptable cell is found then the UE should camp on that cell to obtain limited service as defined in [4] and perform actions according to subclause 8.5.X. If the RRC connection is released due to camping on an acceptable cell, indicate this to upper layers.

3> else if no acceptable cell is found, the UE should continue looking for an acceptable cell as defined in [4].

NOTE: This indication to upper layers causes the UE to initiate a RAU on return to a suitable cell of selected PLMN irrespective of the RA of that cell. This RAU can be enabled or disabled by an indicator contained in the IE "CN information info" within SIB1.

7.2.2.3 CELL_DCH state

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

NOTE: DCCH and, if configured, DTCH are available in this state.

1> read system information broadcast on FACH as specified in subclause 8.1.1.3 (applicable only to UEs with certain capabilities and in FDD mode);

1> read the system information as specified in subclause 8.1.1 (for UEs in TDD mode);

1> perform measurements process according to measurement control information as specified in subclause 8.4 and in clause 14;

1> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;

1> act on RRC messages received on DCCH;

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

1> act on RRC messages received on BCCH (TDD only) and, if available, SHCCH (TDD only).

8.5.5.4 T317 expiry

When the T317 expires, the UE shall:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode;

8.5.X Change of PLMN while in RRC connected mode

If the UE camps on an acceptable cell to obtain limited service while in RRC connected mode the UE should either:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.

or:

1> keep the RRC connection of the selected PLMN and its behaviour while camping on the cell of the other PLMN shall be as if in Idle mode in that PLMN.

1> if the UE re-enters “in service area” on the selected PLMN or cannot maintain limited service (i.e. cannot find any acceptable cell of any PLMN), the UE shall resume its RRC Connected mode behaviour as if it had not camped on any cell whilst being in “out of service area”.

If the NAS indicates the selection of a new PLMN while the UE is in RRC connected mode in the selected PLMN or if the UE attempts transmission on a cell of another PLMN (i.e. to initiate emergency call), the UE shall for the selected PLMN:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.

3GPP TSG-RAN-WG2 Meeting #36
Marne la Vallée, France, 19th-23th April 2003

Tdoc ⌘R2-031411

CR-Form-v7

CHANGE REQUEST

⌘ **25.331** **CR** **1975** ⌘ **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:	⌘	keep connection during OOS or perform RAU on return to coverage
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	23/05/2003
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:	⌘	The RRC specification states that when out of service the UE shall perform cell selection. However, it does not state the behaviour when the cell selection process fails to find a suitable cell of the RPLMN. The behaviour should be clarified to ensure that users can access other PLMNs for normal service or for emergency calls The UE behaviour is not specified in the case that the UE camps on an acceptable cell for limited service or the case that the NAS selects a different PLMN.
Summary of change:	⌘	1 - It is clarified that when out of service the UE searches for the RPLMN for one complete scan of the supported bands and frequencies or a TBD time [30s?]. After this time the UE can select another PLMN or camp on an acceptable cell for limited service 2 - It is stated that when the UE camps on a cell of another PLMN for limited service or for normal service, the RRC Connection is kept and only released if the UE tries to transmit on the new cell. 3 - When the RRC connection is released due the expiry of T317, RRC shall inform upper layers. **The Rel-5 solution (shall) is different from the Rel-4 solution (should).**
Consequences if not approved:	⌘	It will remain unclear what actions the UE should take for Limited Service provision under 'out of service' conditions. In addition, the UE will not have access to emergency services during out of service conditions even if cells of other PLMNs (non ePLMNs) are available.

Clauses affected:	⌘	7.2.2.1, 7.2.2.2, 8.5.5.2.1, 8.5.5.2.2, 8.5.5.4

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	25.304-3c0
			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.

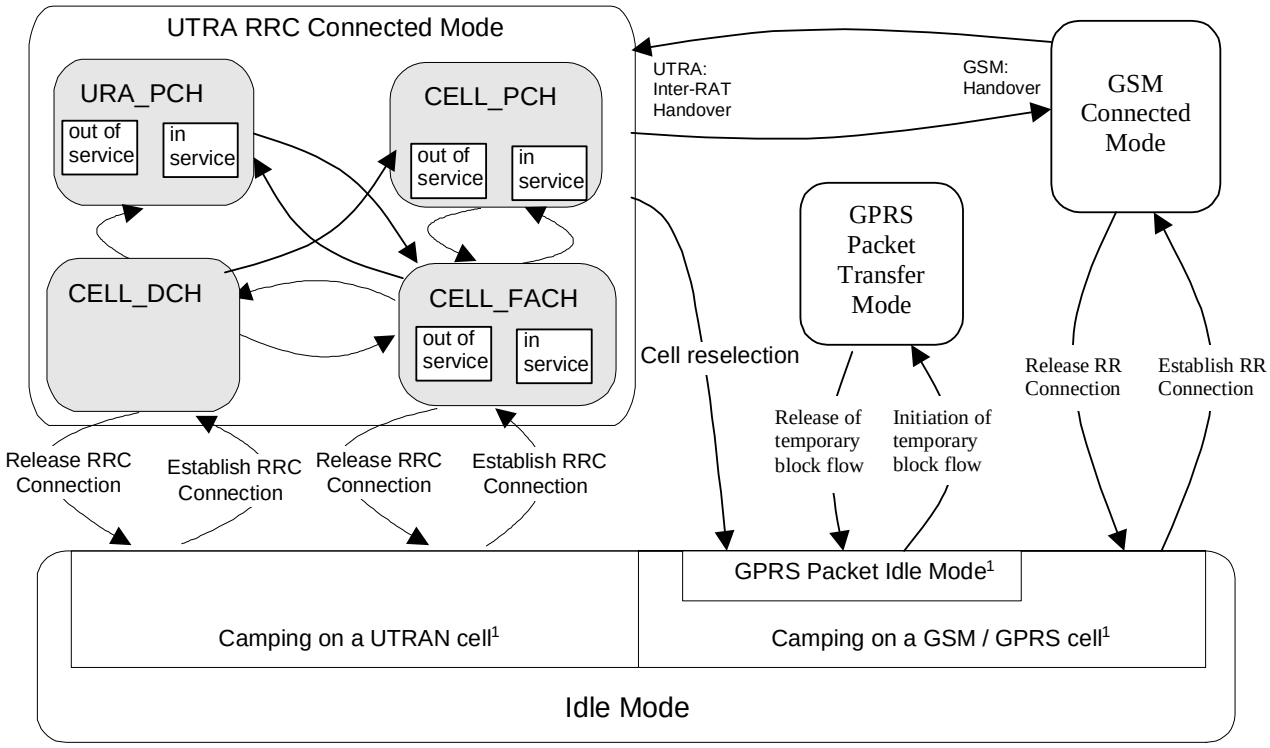
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest 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.

7 Protocol states

7.1 Overview of RRC States and State Transitions including GSM

Figure 7.1-1 shows the RRC states in UTRA RRC Connected Mode, including transitions between UTRA RRC connected mode and GSM connected mode for CS domain services, and between UTRA RRC connected mode and GSM/GPRS packet modes for PS domain services. It also shows the transitions between Idle Mode and UTRA RRC Connected Mode and furthermore the transitions within UTRA RRC connected mode.



NOTE: [1]: The indicated division within Idle Mode is only included for clarification and shall not be interpreted as states.

Figure 7.1-1: RRC States and State Transitions including GSM

The RRC connection is defined as a point-to-point bi-directional connection between RRC peer entities in the UE and the UTRAN characterised by the allocation of a U-RNTI. A UE has either zero or one RRC connection.

NOTE: The state transitions are specified in clause 8.

7.2 Processes in UE modes/states

NOTE: This subclause specifies what processes shall be active in the UE in the different RRC modes/states. The related procedures and the conditions on which they are triggered are specified either in clause 8 or elsewhere in the relevant process definition.

7.2.1 UE Idle mode

UE processes that are active in UE Idle mode are specified in [4].

The UE shall perform a periodic search for higher priority PLMNs as specified in [25].

7.2.2 UTRA RRC Connected mode

In this specification unless otherwise mentioned "connected mode" shall refer to "UTRA RRC connected mode".

7.2.2.1 URA_PCH or CELL_PCH state

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

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

1> if the UE is "in service area":

2> maintain up-to-date system information as broadcast by the serving cell as specified in the subclause 8.1.1;

2> perform cell reselection process as specified in [4];

2> perform a periodic search for higher priority PLMNs as specified in [25];

NOTE: If the DRX cycle length is 80ms, then a search for higher priority PLMNs may not identify all the available PLMNs due to the paging occasion on the current serving cell coinciding with the MIB of the cell of interest.

2> monitor the paging occasions and PICH monitoring occasions determined according to subclauses 8.6.3.1a and 8.6.3.2 and receive paging information on the PCH mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;

2> act on RRC messages received on PCCH and BCCH;

2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;

2> maintain up-to-date BMC data if it supports Cell Broadcast Service (CBS) as specified in [37];

2> run timer T305 for periodical URA update if the UE is in URA_PCH or for periodical cell update if the UE is in CELL_PCH.

1> if the UE is "out of service area":

2> perform cell selection process as specified in [4];

2> run timer T316;

2> run timer T305.

2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE shall after a minimum of TBD time of being "out of service area":

3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. If the NAS indicates the selection of a new PLMN the UE shall store information for the new PLMN within the variable SELECTED_PLMN and perform actions according to subclause 8.5.X;

3> if an acceptable cell is found then the UE shall obtain limited service as defined in [4], perform actions according to subclause 8.5.X.

3> else if no acceptable cell is found, the UE shall continue looking for an acceptable cell as defined in [4].

7.2.2.2 CELL_FACH state

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

NOTE: DCCH and, if configured, DTCH are available in this state.

1> if the UE is "in service area":

2> maintain up-to-date system information as broadcast by the serving cell as specified in subclause 8.1.1;

2> perform cell reselection process as specified in [4];

2> perform measurements process according to measurement control information as specified in subclause 8.4 and in subclause 14.4;

2> run timer T305 (periodical cell update);

2> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;

2> listen to all FACH transport channels mapped on the S-CCPCH selected by the UE according to the procedure in subclause 8.5.19;

2> act on RRC messages received on BCCH, CCCH and DCCH;

2> act on RRC messages received on, if available, SHCCH (TDD only).

1> if the UE is "out of service area":

2> perform cell selection process as specified in [4];

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

2> if the cell selection process fails to find a suitable cell after a complete scan of all RATs and all frequency bands supported by the UE, the UE shall after a minimum of TBD time of being "out of service area":

3> indicate all available PLMNs to NAS to enable the selection of a new PLMN. If the NAS indicates the selection of a new PLMN the UE shall store information for the new PLMN within the variable SELECTED_PLMN and perform actions according to subclause 8.5.X;

3> if an acceptable cell is found then the UE shall obtain limited service as defined in [4], perform actions according to subclause 8.5.X.

3> else if no acceptable cell is found, the UE shall continue looking for an acceptable cell as defined in [4].

7.2.2.3 CELL_DCH state

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

NOTE: DCCH and, if configured, DTCH are available in this state.

1> read system information broadcast on FACH as specified in subclause 8.1.1.3 (applicable only to UEs with certain capabilities and in FDD mode);

1> read the system information as specified in subclause 8.1.1 (for UEs in TDD mode);

1> perform measurements process according to measurement control information as specified in subclause 8.4 and in clause 14;

1> select and configure the RB multiplexing options applicable for the transport channels to be used in this RRC state;

1> act on RRC messages received on DCCH;

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

1> act on RRC messages received on BCCH (TDD only) and, if available, SHCCH (TDD only).

8.5.5.4 T317 expiry

When the T317 expires, the UE shall:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.

8.5.X Change of PLMN in Connected mode

If the UE camps on a cell of another PLMN in order to obtain limited service while the UE is in RRC connected mode in “out of service area”:

1> the UE shall keep the RRC connection of the selected PLMN and its behaviour while camping on the cell of the other PLMN shall be as if in Idle mode in that PLMN.

1> if the UE re-enters “in service area” on the selected PLMN or cannot maintain limited service (i.e. cannot find any acceptable cell of any PLMN), the UE shall resume its RRC Connected mode behaviour as if it had not camped on any cell whilst being in “out of service area”.

If the NAS indicates the selection of a new PLMN while the UE is in RRC connected mode in the selected PLMNor if the UE attempts transmission on a cell of another PLMN (i.e. to initiate emergency call), the UE shall for the selected PLMN:

1> move to idle mode;

1> release all dedicated resources;

1> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> perform actions specified in subclause 8.5.2 when entering idle mode from connected mode.