

**Agenda Item:** 14.1  
**Source:** Fujitsu  
**Title:** Proposal of parameters for RRC Connection Re-establishment  
**Document for:** Discussion

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## **Abstract**

The UE should inform to UTRAN in advance whether the RRC connection re-establishment procedure is performed to avoid the user inconvenience. This contribution proposes new parameters in both the RRC Connection Setup Complete message and the System Information message, which indicate the RRC connection re-establish support.

## **1. Introduction**

An RRC connection may happen to be disconnected impermanently when UE goes into a tunnel. When the RRC connection is disconnected temporally, the RRC connection re-establishment procedure is defined to re-connect the RRC connection. But charging account would be continued until RRC connection is disconnected completely so that UE user may suffer from inconvenience, especially when time-volume charging system is adopted.

## **2. Discussion**

During the RRC connection re-establish procedure, UE user can't use user channel. That means he or she can't communicate with the other party. And furthermore, charging would be continued if it depends on the time-volume while the RRC connection re-establish procedure is performed.

In this case, it is apparently inconvenient for UE users. To avoid this, UE should initially decide whether the RRC connection re-establish procedure is necessary or not. When the UE doesn't choose the RRC connection re-establish procedure, the RRC connection would be disconnected immediately when UE or UTRAN detects the RRC connection failure.

The proposed solution is following;

- 1) The RRC CONNECTION COMPLETE message and the UE CAPABILITY message should have the parameter which is the indicator to support the RRC connection re-establishment.
- 2) Furthermore, to terminate the RRC connection re-establishment procedure enforcedly, the SYSTEM INFORMATION message should have the parameter which indicates the maximum waiting time for the completion of re-establishment.

Example flow of this proposal is as follows:

0. At the last step of the RRC Connection Establishment procedure, UE informs UTRAN by the parameter whether RRC connection re-establishment is required.
1. RRC connection happens to break impermanently.
2. (A) UE checks the parameter whether RRC connection re-establishment is required.  
(B) UE releases all radio resources when RRC connection re-establishment is not required.  
(C) UE sets Timer 1 which is for waiting for RRC CONNECTION RE-ESTABLISHMENT from UTRAN.  
(D) UE sends RRC CONNECTION RE-ESTABLISHMENT REQUEST to UTRAN.  
(E and F) UE cuts Timer 1 and send RRC CONNECTION RE-ESTABLISHMENT COMPLETE when it receives RRC CONNECTION RE-ESTABLISHMENT from UTRAN. Note that UTRAN broadcasts Timer 1 value in advance.

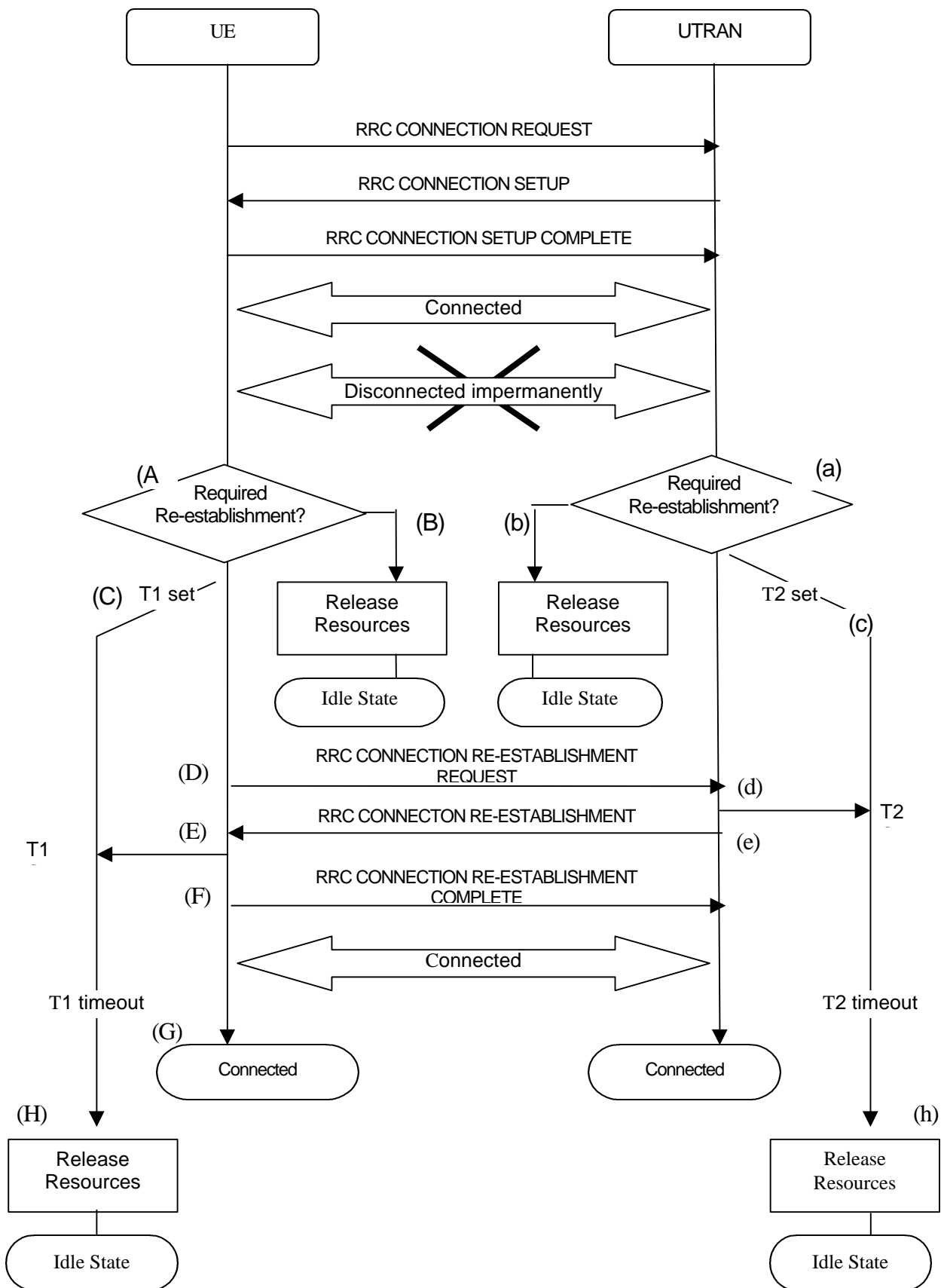
- 2'.(a) UTRAN checks the parameter whether RRC connection re-establishment is required.
  - (b) UTRAN releases all radio resources when UE does not require RRC connection re-establishment
  - (c) UTRAN sets Timer 2 and waits for RRC CONNECTION RE-ESTABLISHMENT REQUEST from UE when UE requires RRC connection re-establishment.
  - (d and e) UTRAN cuts Timer 2 and sends RRC CONNECTION RE-ESTABLISHMENT when it receives RRC CONNECTION RE-ESTABLISHMENT REQUEST.
3. (G) When RRC connection re-establishment procedure is done successfully, RRC connection will be restored.
4. (H) When Timer 1 is expired, UE releases radio resources so that RRC connection will be extinct..
- 4'. (h)When Timer 2 is expired, UTRAN releases all radio resources on UE.

### **3. Proposal**

Modification to TS 25.331 RRC Protocol Specification is proposed.

- (1) Definition of Re-establishment function support
  - 10.2.3.28 Re-establishment function support
- (2) Definition of Re-establishment complete timer
  - 10.2.3.28 Re-establishment function support
- (3) Addition of Re-establishment function support into UE information elements
  - 10.1.4.8 RRC CONNECTION SETUP COMPLETE
  - 10.1.7.1 UE CAPABILITY INFORMATION
- (4) Addition of Re-establishment complete timer into UE information elements
  - 10.1.6.1 SYSTEM INFORMATION

Proposed modifications are shown in ANNEX in this contribution.



Example flow

[ANNEX]

10.2.3.28 Re-establishment function support

This parameter indicates whether UE should require RRC connection re-establishment procedure in case of an impermanent disconnection, and this is to inform from UE to UTRAN in advance.

10.2.3.29 Re-establishment complete timer

This parameter indicates the maximum waiting time until when UTRAN should receive RRC CONNECTION RE-ESTABLISHMENT REQUEST from UE at the break of the radio connection. UE starts this timer when it detects disconnection of a line. When RRC connection re-establishment is completed, UE stops the timer. When the timer is expired, UE releases radio resources.

10.1.4.8 RRC CONNECTION SETUP COMPLETE

This message confirms the establishment of the RRC Connection by the UE.  
 RLC-SAP: t.b.d.  
 Logical channel: DCCH  
 Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
Phy CH information elements	SSDT indicator		O	<u>Necessity is FFS</u>
UE information elements	<u>Power control capability</u>		M	UTRAN capability information
	<u>Code resource capability</u>		M	
	<u>UE mode capability</u>		M	
	<u>Transport CH support capability</u>		O	
	<u>Ciphering capability</u>		M	
	<u>Macro diversity capability</u>		M	
	<u>Re-establishment function support</u>	(10.2.3.28)	M	

### 10.1.7.1 UE CAPABILITY INFORMATION

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
CN information elements	NAS message		M	Includes the CN capability information
UE information elements	Power control capability		M	UTRAN capability information
	Code resource capability		M	
	UE mode capability		M	
	Transport CH support capability		O	
	Ciphering capability		M	
	Macro diversity capability		M	
	Re-establishment function support	(10.2.3.28)	M	
Other information elements	Inter-system message		O	Includes inter-system classmark

Note: The WG1 and WG4 discussion should be concluded before the contents of this message can be finalized.

## 10.1.6.1 SYSTEM INFORMATION

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: BCCH or DCCH or CCCH

Direction: UTRAN → UE

*NOTE: The division of the system information into messages is FFS.*

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
CN information elements	PLMN Identity		M	
	CN domain identity		M	For each Core Network Domain.  Information must be included for at least one core network domain type.
	NAS system information		M	
UTRAN mobility information elements	URA identity		M	For each URA
	Information for periodic cell and URA update		M	<i>Note: not for each URA any more</i>
	Cell identity		M	The necessity and usage of cell identity is FFS.
	Cell selection and re-selection info		M	
UE information elements	<b>Uplink access control info</b>		M	
	<b>Transmission probability</b>		O	For all UE having DCH controlled by DRAC procedure  For each class of UE Note2
	<b>Maximum bit rate</b>		O	
	<b>Re-establishment complete timer</b>	(10.2.3.29)		
PhyCH information elements	<b>Frequency info</b>		O	For each RACH
	<b>PRACH info</b>		M	
	<b>Frequency info</b>		O	For each FACH on secondary CCPCH
	<b>Secondary CCPCH info</b>		M	
	<b>Frequency info</b>		O	For each PCH on secondary CCPCH
	<b>Secondary CCPCH info</b>		M	
	<b>PRACH power control info</b>		M	

Measurement Information elements	Measurement Identity Number		M	Note 1	For each Intra-frequency measurement control
	Intra-frequency cell info		M	For each measurement object	
	Intra-frequency measurement quantity		M		
	Intra-frequency measurement reporting criteria		M		
	Intra-frequency reporting quantity for RACH reporting		C	Only included if RACH reporting is indicated in the reporting criteria	
	Measurement Identity Number		M	Note 1	For each Inter-frequency measurement control
	Inter-frequency cell info		M	For each measurement object	
	Inter-frequency measurement quantity		M		
	Inter-frequency measurement reporting criteria		M		
	Measurement Identity Number		M	Note 1	
	Inter-system cell info		M	For each measurement object	
	Inter-system measurement quantity		M		
	Inter-system measurement reporting criteria		M		

Note 1: The necessity and usage of Measurement identity number in this message is FFS.

Note 2: The split of parameters into several System Information message X is FFS.