TSG-RAN Working Group 2 meeting #7   *TSGR2#7(99)a53*

Malmö, Sweden 20-24 September 1999   (Based on R2-99784)

Agenda Item: 17.6

Source: Fujitsu

Title: Proposal of a parameter for RRC Connection Re-establishment

Document for: Discussion

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Abstract

RRC in the UE should inform RRC in the UTRAN in advance whether the RRC connection re-establishment procedure may be performed to avoid the user inconvenience. This contribution proposes new parameters in both the RRC Connection Setup Complete message and the UE Capability Information message, which indicates that the RRC connection re-establishment procedure is supported.

1. Introduction

An RRC connection may happen to be disconnected, for example if a 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 the charging account for that user would be continued until RRC connection is disconnected completely so that the UE user may suffer from inconvenience, especially when time-volume charging system is adopted.

2. Discussion

While the RRC connection has been lost, and during RRC connection re-establishment procedure, the UE user can't use his UE for user information transfers. That means he 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-establishment procedure is performed.

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

The proposed solution is following;

1) The RRC CONNECTION COMPLETE message and the UE CAPABILITY message should have a parameter which is the indicator that support of RRC connection re-establishment should be supported.

2) Furthermore, to enforce the termination of the RRC connection re-establishment procedure, the SYSTEM INFORMATION message should have a parameter that indicates the maximum waiting time for the completion of RRC re-establishment.

Example flow of this proposal is as follows:

0. At the last step of the RRC Connection Establishment procedure, RRC in the UE informs RRC in the UTRAN by a parameter which indicates whether RRC connection re-establishment is required.

1. RRC connection happens to be lost for a period of time.

2. (A) UE checks the parameter whether RRC connection re-establishment is required.
   (B) UE releases all radio resources if RRC connection re-establishment is not required.
   (C) UE sets Timer 1, which is for waiting for an 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 if 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 if the 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.
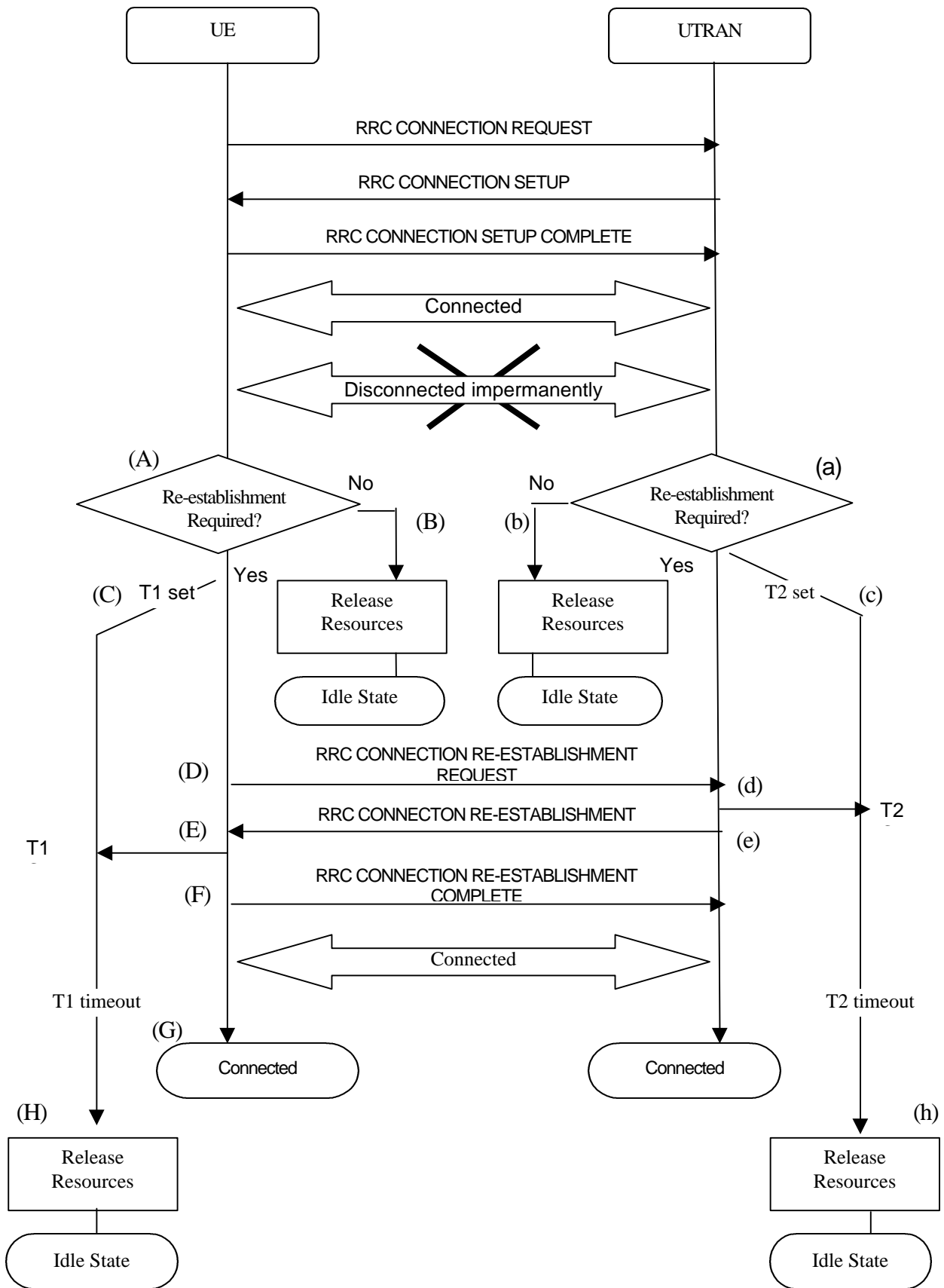(1) Definition of Re-establishment function support
    10.2.3.32 Re-establishment function support
(2) Addition of Re-establishment function support into UE information elements
    10.1.4.8 RRC CONNECTION SETUP COMPLETE
    10.1.7.1 UE CAPABILITY INFORMATION

Proposed modifications are shown in ANNEX in this contribution.

UE   UTRAN

RRC CONNECTION REQUEST

RRC CONNECTION SETUP

RRC CONNECTION SETUP COMPLETE

Connected

Disconnected impermanently

(A) Re-establishment Required?   No   No   (a) Re-establishment Required?

(B)   (b)

(C) T1 set   Yes   Yes   T2 set (c)

Release Resources

Release Resources

Idle State

Idle State

RRC CONNECTION RE-ESTABLISHMENT REQUEST
(D)   (d)

RRC CONNECTON RE-ESTABLISHMENT
(E)   (e)   T2

T1

RRC CONNECTION RE-ESTABLISHMENT COMPLETE
(F)

Connected

T1 timeout   T2 timeout

(G) Connected   Connected

(H)   (h)

Release Resources

Release Resources

Idle State

Idle State

Example flow

[ANNEX]

10.2.3.32 Re-establishment function support

This parameter indicats whether the UE should require RRC connection re-establishment procedure in the case of a temporary loss of an RRC connection, and this is to inform from UE to UTRAN in advance during the RRC connection establishment complete message.

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	Presence	Range	IE type and reference	Semantics description
Message Type	M			
Phy CH information elements				
SSDT indicator	O			FFS
UE information elements				
Power control capability	M			
Code resource capability	M			
UE mode capability	M			
Transport CH support capability	O			
Ciphering capability	M			
Macro diversity capability	M			
FAUSCH usage support	O			Indicates true/false for "DCH allocation function", "USCH capability request function".
Re-establishment function support	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	Presence	Range	IE type and reference	Semantics description
Message Type	M			
CN information elements				
NAS message	M			Includes the CN capability information
UE information elements				
Power control capability	M			
Code resource capability	M			
UE mode capability	M			
Transport CH support capability	O			
Ciphering capability	M			
Macro diversity capability	M			
FAUSCH usage support	O			Indicates true/false for "DCH allocation function", "USCH capability request function".
Re-establishment function support	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.