TSG-RAN Working Group 4 (Radio) meeting #2 ***TSGW4#2(99)085***
Turin, 15 -19 February 1999

Agenda Item: 8

Source: 3GPP TSG RAN WG4

LS to 3GPP TSG RAN WG1 regarding the scope and structure of S4.03 on System Level Protocol Aspects and the division of responsibility in the definition of Radio Link Procedure (Specifically S1.15, S1.25)

CC: 3GPP TSG RAN

LS to 3GPP TSG RAN WG1 regarding the Scope and Structure of S4.03 on System Level Protocol Aspects and the division of responsibility in the definition of Radio Link Procedures (Specifically S1.15, S1.25).

During the first 3GPP TSG RAN WG4 meeting, a discussion was occurred about the meaning of the sentence "Protocol Aspects from a System Point of View", clearly mentioned in the Terms of Reference of the 3GPP TSG RAN WG4. As a result, a new document, S4.03 on "System Level Protocol Aspect", was added to the list of the 3GPP TSG RAN WG4 documentation. During the last 3GPP TSG RAN WG4 the scope and the structure of the S4.03 document, attached to this Liaison, was discussed.

About this topic in the 3GPP_TSG_RAN_WG1 document structure there are two documents S1.15 “Measurements (FDD)”, S1.25 “Measurements (TDD)” that treat issues that could be relevant also for the 3GPP_TSG_RAN_WG4 activity. These TS contain "the description of the measurements done at the UE and network in order to support operation in idle mode and in connected mode…". In the section of this document that deals with "Radio Link Measurements" it is stated that "This section can provide some requirements on the measurements in terms of precision for various conditions, although some of this might be more applicable to the 3GPP_TSG_RAN_WG4 documentation". Moreover in the document there are some descriptive parts of the document not strictly related to measurements, that could be included in the S4.03.
As a result 3GPP_TSG_RAN_WG4 asks 3GPP_TSG_RAN_WG1 to indicate those parts of these documents that could be treated inside the S4.03 taking into account the current scope and structure of the document. As a matter of fact, the activity of the 3GPP_TSG_RAN_WG4 toward the definition of minimum performance requirements for the radio Sub-System link control could involve the study of procedure necessary to identify those requirements. For this reason this liaison has also the aim to clarify the responsibility of the radio link procedures taking into account the field of competence of the two groups.

3GPP TSG RAN WG4
S4.03 v0.0.2 (1999-02)

Radio Subsystem Link Control

3GPP

Contents

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1 Scope

This Technical Specification (Ts) specifies the minimum performance requirements for the Radio sub-system link control implemented in the UE and UTRAN.

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

3 Definitions, symbols and abbreviations

3.1 Definitions

3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

4 Status

The main objective of this section is to provide summary of the approval status of the various section of this document. The level of progress is defined as follows;

- No proposal exists
- A proposal(s) exists but no working assumption has been made
- A working assumption has been taken and the text contained in that section may have been update in line with that assumption
- This section is assumed to be finalised.

Section number	Section description	Status

5 General

[This section provides a general description of the radio sub-system link control aspects that are addressed in this document.]

6 Handover

6.1 Overall Process

The overall handover process shall be implemented in the UE and RNS. Measurement of serving radio connection downlink performance and candidate cells received signal strengths and quality from must be made in the UE. These measurements shall be signalled to the RNS for assessment. The RNS measures the uplink performance for the UE being served. The RNC uses measurements in conjunction with defined thresholds and handover strategy to make a handover decision

6.2 UE Measurement Procedure

A procedure shall be implemented in the UE by which it monitors the downlink signal level and identity of the handover candidate cells. Other parameters are [ffs]. The method of identification of candidate cells is [FFS]. The requirements for the UE measurements are [ffs].

6.3 RNC Measurement Procedure

6.4 Strategy

The handover strategy employed by the network for radio link control determines the handover decision that will be made based on the measurement results reported by the UE/RNC and various parameters set for each cell. Network directed handover might also occur for reasons other than radio link control, e.g. to control traffic distribution between cells. The network operator will determine the exact handover strategies.. Possible types of Handover are as follows:

- Handover 3G -3G:
    - FDD soft/softer handover;
    - FDD inter-frequency hard handover;
    - FDD/TDD Handover;
    - TDD/FDD Handover;
    - TDD/TDD Handover;
- Handover 3G - 2G:
    - Handover to GSM

6.5 Causes

The following is a non-exhaustive list for causes for the initiation of a handover process.

- Uplink quality
- Uplink signal strength
- Downlink quality
- Downlink signal strength
- Distance
- Change of service
- Better cell
- O&M intervention
- Directed retry

- Traffic
- Pre-emption

6.6 Requirements

The reliability of handover in all its different forms is essential to the successful operation of a network. In performing handover preparation and execution the minimum requirements shall be

- Quick detection of candidate cells
- Quick synchronisation to candidate cells
- Reporting of sufficient number of candidate cells
- Quick detection of degradation of link quality
- Reliable measurement procedures of serving and target cells
- Reliable and quick reporting mechanisms
- Reliable synchronisation mechanism
- Quick and safe release of resource
- Safe guards for failed handoffs
- Minimal disruption to service
- Minimal degradation to link quality
- Minimal degradation to other users
- Full Flexibility and efficiency to seamlessly handle the spectrum ~~to a network operator~~in a multioperator scenario

6.7 Handover 3G to 3G

6.7.1 FDD Soft/Softer Handover

6.7.2 FDD Inter-Frequency Hard Handover

There will be the need to perform inter-frequency hard handover between two carriers in FDD mode. This is in particularly for the case for networks that support Hierarchical Cell Structures (HCS), i.e., combinations of macro, micro, pico and other specific application cells.

It is known that the service provided by a specific layer will not be continuous. This means that there are trans-layer handovers where the UE will be handed over to a macro layer, before returning again to the micro layer.

This necessitates good performance and also introduces the fact that during soft handoff within one layer, the UE shall be able to monitor other FDD carriers for the purpose of inter-frequency handover.

From the system perspective, the inter-frequency hard handover must have comparable performance to that of soft handover.

6.7.3 FDD/TDD Handover

6.7.4 TDD/FDD Handover

6.7.5 TDD/TDD Handover

6.8 Handover 3G to 2G

In the early days of UMTS deployment it can be anticipated that the service area will not be as contiguous and extensive as existing second generation systems. It is also anticipated that UMTS network will be an overlay on the 2nd generation

network and utilise the latter, in the minimum case, as a fall back to ensure continuity of service and maintain a good QoS as perceived by the user.

6.8.1 Handover to GSM

This section presents some of the important aspects of GSM handover required to be performed by the UE. For the full specifications reference should be made the GSM recommendations.

The underlying requirement is to ensure continuity of service to the UMTS user. The handover from 3G to GSM should be comparable to GSM handover.

The MS (GSM terminology) shall be able to monitor up to 32 carriers.

The MS shall be able synchronise to 6 carriers

The MS shall be able to report back to the network on the 6 strongest cells with correctly identified BSIC.

The MS shall be able to perform this task at levels down to the reference sensitivity level or reference interference levels as specified in GSM 05.05.

The MS shall demodulate the SCH on the BCCH carrier of each surrounding cell and decode the BSIC as often as possible, and as a minimum at least once every [10 seconds].

7 RF Power Control (FDD)

7.1 Overall Process

[RF Power Control is employed to maintain the quality of the RF link between the UE and RNS and to optimize the the overall quality of radio links.]

7.2 UE Implementation

7.3 UE Power Control Range

7.4 BS Implementation

7.5 BS Power Control Range

7.6 Strategy

[The RF Power Control strategy employed by the network determines the ordered power level that is signalled to the UE and the power level that is employed by the BS. Detailed Examples of a basic algorithm appears in Annex B.]

7.7 Timing

8 RF Power Control (TDD)

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8.7 Timing

9 Radio Link Failure (FDD)

9.1 Criterion

[This section describes the criterion for determining Radio Link failure in the UE for circuit and data communications.]

9.2 UE Procedure

[The aim of determining radio link failure in the UE is to ensure that calls with unacceptable voice/data quality, which can not be improved either by RF power control or handover, are either re-established or released in a defined manner. In this section the procedures and the parameters employed for determining the radio link failure are described.]

9.3 BS Procedure

[This section describes the procedures and the parameters employed in the BS for determining the radio link failure.]

10 Radio Link Failure (TDD)

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11 Idle Mode Tasks (FDD)

11.1 Introduction

[In idle mode a UE shall implement the cell selection and re-selection procedures described in "3GPP TSG RAN WG2 YY.04, Description of Idle Mode Procedures"; these procedures make use of measurements and sub-procedure described in this clause.]

11.2 Measurements Requirements for normal Cell selection

11.3 Criteria for Cell Selection and Re-Selection

[This section specifies the algorithue used for cell selection and re-selection versus a certain number of RF parameters specified in this part of the text.]

11.4 Downlink Signalling Failure

[This section describes the procedure to determine a downlink failure and the RF parameters on which this particular procedure is based.]

11.5 Measurements Requirements for Cell Re-Selection

[This section describes the procedures that an UE has to perform when a cell selection is completed and cell re-selection task starts.]

11.5.1 Received level and BCCH data monitoring Requirements

11.5.2 Path Loss Criteria and Timings for cell re-selection

[*The UE is required to perform the following measurements to ensure that the path loss criterion to the serving cell is acceptable.]*

11.6 Release of Traffic and DCH

11.6.1 Normal Case

[The procedures performed by an UE when it releases a traffic or a DCH channel and returns in idle mode. The UE must now camp, as soon as possible, on the same cell whose channel has just been released.]

11.6.2 Call Re-Establishment

[This section describes the algorithm to determine which cell has to be used for the call re-establishment attempt, when a radio link failure happens and a call re-establishment may be attempted.]

11.6.3 Abnormal Cases and Emergency Calls

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13 Network pre-requisites (FDD)

13.1 Identification of Surrounding BS for Handover measurements

14 Network pre-requisites (TDD)

14.1 Identification of Surrounding BS for Handover measurements

15 Radio Link Measurements (FDD)

[Radio Link Measurements are used in the handover and RF power control processes.]

15.1 Signal Strength

15.1.1 General

[The received signal level may be employed as information to be used in the algorithue for the RF power control and handover processes.]

15.1.2 Physical Parameter

[This section describes:
- *The range of the signal level at the receiver input for both UE and BS;*
- *The accuracy of the measurement versus the range of the signal.]*

15.1.3 Statistical Parameters

[The statistical definition, for each channel, of the received signal level measurement (RX level).]

15.1.4 Range of Parameters

[Range of the RX level possible values.]

15.2 Signal Quality

15.2.1 General

[The received signal quality shall be employed as information to be used in the algorithue for the RF power control and handover processes.]

15.2.2 Physical Parameters

[The received signal quality shall be measured by the UE and BS in a manner that can be related to an equivalent average BER before channel decoding.]

15.2.3 Statistical Parameters

[This section defines the statistical method used to calculate the measured parameters(i.e. RXQUAL) that represents an estimation of the received signal quality.]

15.2.4 Range of Parameters

[This section describes the range of values of the RXQUAL parameter.]

15.3 Measurement Reporting

15.3.1 Measurement Reporting for the UE on a Traffic Channel

15.3.2 Measurement Reporting for the UE on a Signalling channel

15.3.3 Measurement Reporting for the BS

15.4 Abosolute MS-BS Distance

15.4.1 General

15.4.2 Physical Parameters

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16 Radio Link Measurements (TDD)

[Radio Link Measurements are used in the handover and RF power control processes.]

16.1 Signal Strength

16.1.1 General

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16.1.2 Physical Parameter

[This section describes:

- *The range of the signal level at the receiver input for both UE and BS;*
- *The accuracy of the measurement versus the range of the signal.]*

16.1.3 Statistical Parameters

[The statistical definition, for each channel, of the received signal level measurement (RX level).]

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[Range of the RX level possible values.]

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16.3.3 Measurement Reporting for the BS

16.4 Abosolute MS-BS Distance

16.4.1 General

16.4.2 Physical Parameters

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17 Control parameters

Annex A (Informative) Basic UMTS Handovers

Annex B (Informative) RF Power Control Algorithm

Annex C (Informative) Power Control Procedures

18 History

Document history		
S4.03 v0.02	02-1999	In Section 6.6 the last requirement was extended to a multioperator scenario.In Section 6.8.1 10 seconds was put in square bracket.
S4.03 v 0.01	02-1999	The structure of the document was proposed from document TSGW4#2(99)30. Some sections of the document TSGW4#2(99)68 were included in section 6 of this document.

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This document is written in Microsoft Word 7