ETSI TR 125 935 V4.1.0 (2002-03)

Technical Report

Universal Mobile Telecommunications System (UMTS);
Radio Resource Management (RRM);
Optimisations for Iur and Iub
(3GPP TR 25.935 version 4.1.0 Release 4)

Reference
RTR/TSGR-0325935Uv4R1

Keywords
UMTS

ETSI

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Foreword

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Contents

Foreword

This Technical Report (TR) has been produced by the 3rd Generation Partnership Project (3GPP), Technical Specification Group RAN.

The contents of this TR are subject to continuing work within 3GPP and may change following formal TSG approval. Should the TSG modify the contents of this TR, it will be re-released with an identifying change of release date and an increase in version number as follows:

Version m.t.e

where:

m indicates [major version number]

x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

y the third digit is incremented when editorial only changes have been incorporated into the specification.

1 Scope

The purpose of the present document is to help the TSG RAN WG3 group to specify the changes to existing specifications, needed for the introduction of the "Radio Resource Management (RRM) optimisations for Iur and Iub" Building Block (BB) option for Release 4.

Based on [1], the "RRM optimisations for Iur and Iur" BB consists of 7 Work Tasks (WTs):

1) Congestion handling of DCH
2) Procedure parallelism on Iub/Iur
3) DPC Rate Reduction in soft handover
4) Introduction of common measurements over Iur
5) Extension of Radio Interface Parameters updating in the user plane
6) Separation of resource reservation and radio link activation
7) Triggering of the Common Transport Channel Resources Initiation procedure by DRNC

The different WTs will be described in subsequent chapters. It is intended to gather all information in order to trace the history and the status of the WTs in RAN WG3. It is not intended to replace contributions and Change Requests, but only to list conclusions and make references to agreed contributions and CRs. When solutions are sufficiently stable, the CRs can be issued.

It describes agreed requirements related to the WTs.

It identifies the affected specifications with related Change Requests.

It also describes the schedule of the WTs.

This document is a 'living' document, i.e. it is permanently updated and presented to all TSG-RAN meetings.

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, the latest version applies.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] Work Item Description: RRM optimisations for Iur and Iur
RP-000310, submitted and approved at RAN#8

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

3.2 Symbols

None.

3.3 Abbreviations

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

BB	Building Block
RRM	Radio Resource Management
WT	Work Task

4 RRM Opt 1: Congestion handling of DCH

4.1 Introduction

Currently a DRNC accepting a dedicated RL, in principle needs to reserve resources for the maximum bitrate which could possibly be required for the DCH's on this RL. This because the DRNC has a very limited view on the load statistics of the DCH's (source descriptor) and has no possibility to control the DL-rate of the DCH's in congestion situations.

4.2 Requirements

The following requirements are identified:

1) It shall be possible for the DRNS to request the SRNC to decrease the resource usage for one or more DCH's due to local congestion conditions in the DRNS.

2) Primary focus should be on UL interference and DL power congestion conditions, allthough congestion for other types of resources may also be considered;

3) Any chosen solution shall support interworking to Iu rate control for real-time services;

4) It shall be possible to have the requested decrease indicated with a granularity sufficiently small to enable an efficient usage of any remaining DRNS resources;

4.3 Study areas

4.3.1 General

Any new functionality introduced in Release 4 should be introduced with the least possible impact to the existing R99 specifications.

4.3.1A Type of congestion (congestion cause)

The congestion in a RL is associated with Resources that could change dynamically during the lifetime of the Radio Link or that are static during the lifetime of the Radio Link or until the RL is reconfigured. Then, the congestion cause can be divided in two types referred to the resources experimenting the congestion. These types of congestion may be related to both UL and/or DL resources:

- Dynamic Resources: This type of congestion is associated with resources that change dynamically during the lifetime of the Radio Link. The main resources associated to this type are the DL Power and the UL Interference (although the Interference is not itself a resource, it is a parameter that can be modelled as a resource). It is expected that reducing the UL/DL Rate is enough to reduce congestion of this type, however the reaction of the SRNC when receiving a congestion indication of this type is open to the vendor implementation.

- Semi-Static resources: This type of congestion is associated with resources that does not change during the lifetime of the Radio Link or until the Radio Link is reconfigured. The main resources associated to this type are the channelisation codes and other Node B semi-static resources (e.g. Max. DL power, transport resources, etc). It is expected that a Radio Link Reconfiguration for reducing the rate and thus not reserving resources for the highest data rates is enough to reduce congestion of this type, however the reaction of the SRNC when receiving a congestion indication of this type is open to the vendor implementation.

4.3.2 Rate Reduction vs. RL Reconfiguration

4.3.2.1 DL Power

To solve congestion on the average DL power there is no need for a reconfiguration. A reduction of the utilised rate will reduce the average DL power.

To solve congestion on the peak DL power there would be a need to reconfigure. However, congestion on the peak DL power is a problem that has to be dealt with fast, i.e. on a frame by frame basis. The current solution is to use the Frame Handling Priority to prioritise between different frames/users in case of a peak DL power congestion.

Consequently, reducing the maximum rate of a DCH is sufficient to reduce the average DL power..

4.3.2.2 UL Interference

For the UL Interference a reduction of the utilised rate may reduce the UL interference as long as the rate reduction leads to a higher spreading factor, i.e. there is an interaction between the rate matching for the Uu and the DCH rate reduction.

Consequently, reducing the maximum rate of a DCH is sufficient to reduce the UL interference.

4.3.3 Interaction between Fast and Slow DL Power Congestion Control

Currently there is a solution to the peak DL power congestion problem defined, i.e. discard of frames based on the Frame Handling Priority. This is the fast congestion control. The slow congestion control, i.e. Congestion Handling of DCH, is a complementary function that should be able to relieve the Node B in case of sustained congestion (more than occasional frame discard). This means that the slow congestion control is allowed to take “some time” to react.

4.3.4 Detection of Congestion

Detection that there is a (near) congestion situation on the average DL power requires a filtered measurement, providing an average of the DL Power. The Transmitted Carrier Power measurement can be performed as an average measurement (averaging period depending on filter characteristics). Further more, the Transmitted Carrier Power measurement as such is defined as being the mean value measured over 100 ms.

Consequently, the Transmitted Carrier Power measurement is well suited to detect (near) congestion situations on the average DL power.

Detection that there is a (near) congestion situation on the UL interference requires a filtered measurement, providing an average of the UL interference. The Received Total Wide Band Power measurement can be performed as an average measurement (averaging period depending on filter characteristics). Further more, the Received Total Wide Band Power measurement as such is defined as being the mean value measured over 100 ms.

Consequently, the Received Total Wide Band Power measurement is well suited to detect (near) congestion situations on the average UL interference.

4.3.5 Control Plane vs. User Plane

The main advantages of the having the signalling in the user plane are that the signalling fast and that the SRNC reaction anyway shall apply to all RLs (no RL ID needed to indicate the “origin”).

The main disadvantages of the having the signalling in the user plane are that the signalling is unreliable, the DRNC becomes unaware of the congestion situation (unless the DRNC inserts the message th the DCH FP, in which case the DCH FP starts to deviate between Iur and Iub) as well as being unaware of the fact that actions have been taken.

The DRNC handles the admission control of radio interface resources in a cell. It is thus natural that the DRNC is involved in the rate control for DCHs. Given that the congestion handling for DCHs anyway is allowed some time to react the disadvantages of the user plane solution more or less rules out this solution. Further more, since it is concluded in subclause 4.3.4 that the congestion situation is being detected based on measurements provided in the Iub control plane to the DRNC it is quite natural to use also the control plane on the Iur interface. Consequently, a control plane solution is considered superior.

4.3.6 How much can the DRNC reduce the rate?

Without any knowledge of what the SRNC has "promised" to the CN for a certain RAB (DCH or set of co-ordinated DCHs) the DRNC has very little means to pick the correct DCHs to reduce the rate for. The "correct" DCHs are the ones of reasonably low priority where the SRNC has given the CN no or very low guarantees. In order to provide such means to the DRNC it is proposed to provide the DRNC with the "guaranteed bit rate" of each DCH.

4.3.7 Solution Outline

4.3.7.1 General

It is proposed to introduce a new procedure that allows the DRNC to signal the currently allowed maximum rate of a DCH to the SRNC. The DRNC shall be allowed to signal this rate restriction for one or more DCHs for a UE. The SRNC is expected to "respect" the allowed maximum rate and in the case of rate restrictions in the UL to request the corresponding restriction from the UE.

To provide the DRNC with a basis for decision of how much to reduce the rate of a DCH it is proposed to provide the DRNC with a guaranteed rate of a DCH and the Frame Handling Priority of the DCH (included in Release ´99). This information shall be provided in all cases where the SRNC establishes DCHs for the first time in the DRNS, i.e. in the RL Setup, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures.

The DRNC is allowed to reduce the allowed maximum rate of a DCH in the range between the maximum rate and the guaranteed rate. The DRNC shall reduce the rate of RLs starting with RL having the lowest Frame Handling Priority and then "work its way" upwards in priority. If the DRNC does not receive any guaranteed rate for a DCH the DRNC shall assume that the maximum rate is the guaranteed rate for the DCH (to ensure backward compatibility).

4.3.7.2 New information

To indicate to the DRNC how much rate reduction a certain DCH can tolerate the SRNC shall provide the DRNC with the guaranteed rate of a DCH in all cases where the SRNC establishes DCHs for the first time (or modifies the DCH) in the DRNS, i.e. in the initiating messages of the RL Setup, RL Addition, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures.

To indicate a partial resource usage request, the following information should be provided by the DRNS to the SRNC:

1. Indication of one or more affected RL's;
2. Indication of one or more specific DCH's;
3. Indication of the level of allowed rate for a DCH.

For indicating the requested decrease level, one could think of several ways to signal this information. Possibilities included e.g.:

- Desired TFS;
- Desired TFCS;
- User data rate related information;

To leave as much as possible freedom to the SRNC concerning how to smartly adapt to the new resource situation in the DRNS, it is proposed to signal the user data rate that a DRNS requests the SRNC to use as a new allowed rate.

To indicate to the allowed maximum rate to the SRNC also when establishing a DCH in a cell it shall be possible for the DRNC to provide the allowed rate of a DCH, if lower than the maximum rate, in all cases where a DCH is established for the first time in the DRNS (or modifies the DCH), i.e. in the response messages of the RL Setup, RL Addition, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures.

4.3.7.3 New message format

One new message is proposed. The message shall indicate which DCHs that has a new allowed maximum rate (for one UE Context). The message indicating the currently allowed maximum rate of a DCH is expected to be possible to use also to remove the restriction, by indicating that the allowed maximum rate is the (configured) maximum rate of the DCH again.

The guaranteed rate of a DCH is proposed to be included in the initiating messages of the RL Setup, RL Addition, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures.

The allowed rate of a DCH is proposed to be included in the response messages of the RL Setup, RL Addition, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures.

To get a limited value range and an efficient encoding of the guaranteed rate and still have a granularity which is well adopted to every set of rates a DCH can have it is proposed to signal the guaranteed rate as the TFI corresponding to the guaranteed (lowest acceptable) user rate for the DCH.

To get a limited value range and an efficient encoding of the allowed rate and still have a granularity which is well adopted to every set of rates a DCH can have it is proposed to signal the allowed rate as the TFI corresponding to the highest allowed user rate for the DCH.

4.3.7.4 Backward Compatibility

By introducing

1. The guaranteed rate of a DCH as an optional IE in the extension container of the *DCH Specific Info* IE with the criticality set to ignore in the RL Setup, RL Addition, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures,

2. The allowed rate of a DCH as an optional IE in the extension container of the *DCH Information Response* IE with the criticality set to ignore in the RL Setup, RL Addition, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures, and

3. The new “DCH Rate Control” procedure with the procedure criticality (criticality of the Procedure ID) set to reject

The following behaviour can be achieved:

General:

- An SRNC providing the guaranteed bit rate also supports the rate reductions requested from the DRNC.

SRNC uses Release 4 and DRNC uses Release ‘99 specifications:

- The DRNC will discard any received guaranteed rate of a DCH and proceed as if it was not received.

- The SRNC will never receive any rate restrictions.

SRNC uses Release ‘99 and DRNC uses Release 4 specifications:

- The DRNC will never received a guaranteed rate of a DCH and shall assume that the maximum rate is the guaranteed rate. Consequently the DRNC will not apply restrictions of the rate to DCHs controlled by this SRNC.

- An SRNC anyway receiving requests to reduce the rate of a DCH will:

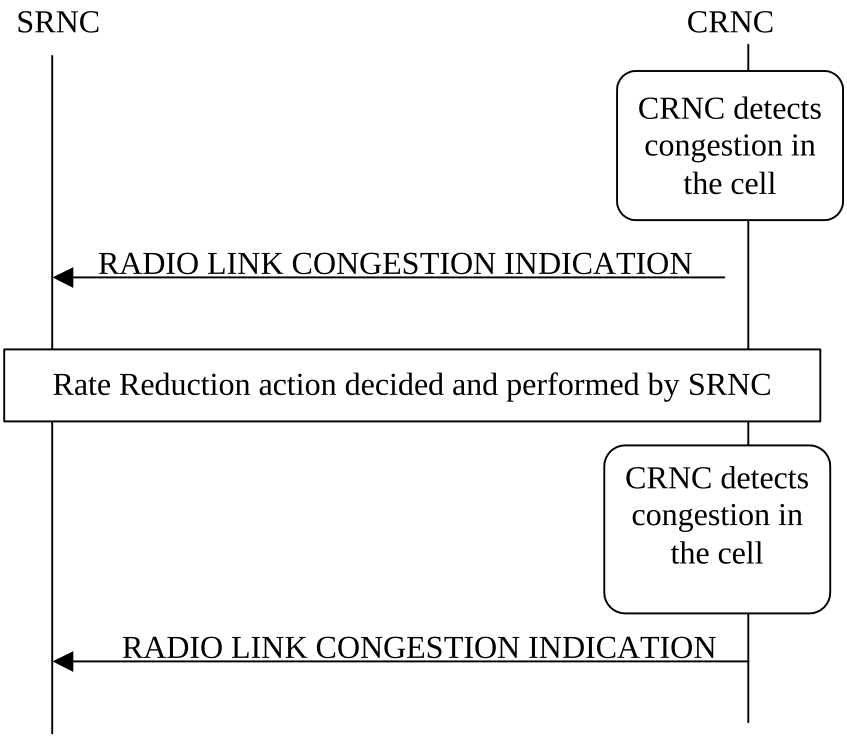
  - Reject the request, if the request was with the new “DCH Rate Control” procedure and

  - Ignore the allowed rate if it was provide in any of the RL Setup, Synchronised RL Reconfiguration Preparation procedures. (This is an erroneous action of the DRNC.)

Consequently, an SRNC not supporting rate reduction will (by not providing the guaranteed bit rate) not receive and rate reduction commends from the DRNC. A DRNC not supporting rate control for DCHs will discard any received guaranteed rate for a DCH.

4.3.7.5 Example scenario

The following sequence shows a possible signalling scenario executed during a temporary local congestion situation in the DRNC.



4.5 Agreements and associated contributions

1. It is agreed that the end of the congestion should also be signalled.
2. It is agreed that it is not needed to perform a physical channel reconfiguration: user rate limitation on receiving the radio link congestion indication should be sufficient.
3. It is agreed to use the Control plane.
4. It is agreed that the DRNC should be able to limit the user data rate
5. It is agreed that the DRNC can propose to limit the user data rate below any guaranteed rate, in order to enable the SRNC to take the correct action, e.g. renogiation of QOS parameters over Iu.
6. It is agreed that the DRNC should be aware of the guaranteed bit rate, in order to make a good choice of which DCH to limit. Rate limitations above the guaranteed bitrate can be used “quite freely”, whereas rate limitations below guaranteed bitrate should be used with very great care.
7. It is agreed to signal the new maximum rate by signalling a TFI.

4.6 Specification Impact and associated Change Requests

This clause lists up place where Change request needs to be given in order to enhance Release 99 specification to Release 4 specification for the work task.

Table 1: Place where Change request is given in order to refer the new procedure

3G TS	CR	Title	Remarks
3G TS 25.423	339	UTRAN Iur Interface RNSAP Signalling	Introduction of a new procedure for Rate Control of DCHs, indicating the allowed rate of a DCH (for one or more DCHs for one UE).

			The current RL Setup, Synchronised RL Reconfiguration Preparation, and Unsynchronised RL Reconfiguration procedures shall be updated to include the guaranteed rate (SRNC->DRNC) and the allowed rate (DRNC->SRNC) of a DCH.

4.7 Open issues

The following open issues are identified:

1. Should also a TFCS/TFCI based approach for limiting the rate be supported.

2. Consider if further alignment to the outcome of the RAB QOS renegotiation WI is required.

5 RRM Opt 2: Procedure parallelism on Iub/Iur

5.1 Introduction

Currently almost no procedure parallelism is allowed in NBAP/RNSAP (dedicated) procedures. As a result, an RRM procedure used for handling problems in a fast changing radio environment, could have to wait for termination of a procedure e.g. introducing a new service on the RL.

In order to improve the capability of the UTRAN to respond to fast changes in the radio environment, the restrictions on parallelism between procedures coping with radio environment changes (e.g. RL_ADDITION/RL_DELETION) and other procedures (e.g. RL_RECONFIGURATION) should be decreased.

5.2 Requirements

None.

5.3 Study areas

Before accepting any specification modifications as a result of a worktask, it should be clear what the obtained benefit of the specification modifications would be.

No major drawbacks were identified for any of the existing procedure parallelism restrictions.

In some cases where a delay problem could be present, workarounds are already existing. As an example: if an urgent RL Addition procedure needs to be performed but the RL's are in a prepared reconfiguration state and executing the Synchronised RL_Reconfiguration Commit procedure before the Radio Link Addition procedure is considered to take too much time, it is already possible in R99 to first execute a Synchronised RL Reconfiguration Cancel procedure, immediately followed by the RL Addition procedure.

5.4 Agreements and associated contributions

It was concluded that the worktask can be considered finalised without any resulting updates to the specifications.

5.5 Specification Impact and associated Change Requests

No specification Impact.

5.6 Open issues

None.

6 RRM Opt 3: DPC Rate Reduction in soft handover

6.1 Introduction

Currently R1 and R2 describe two DPC_modes in 25.214 and 25.331, however mode change signalling is not supported by R3.

By supporting DPC-mode change signalling in the UTRAN, the UTRAN should be better capable of combating power drifting in the DL.

6.2 Requirements

The following requirements are identified:

1) UTRAN shall support the two DPC_MODEs described in 25.214 and 25.231 to prevent power imbalance during soft handovers

2) When DPC_MODE is set to 1, each node B in the UE-UTRAN connection must apply the TPC rate reduction at the same CFN and timeslot or the change may actually cause a power imbalance

3) The solution shall support the configuration of the initial DPC mode at RL-SETUP.

4) The solution shall support the change of DPC mode of a radio connection between DPC mode 0 and 1.

5) Signaling of the TPC rate reduction must be efficient since the procedure is expected to be executed each time the UE goes into or out of soft handover

6.3 Study areas

6.3.1 General

Any new functionality introduced in Release 4 should be introduced with the least possible impact to the Release 99 specifications.

6.3.2 Initial DPC mode configuration

The SRNC must inform the DRNC of the DPC_MODE of the UE. To enable this, the DPC_MODE of the UE will be signaled to the DRNC in the RNSAP Radio Link Setup procedure.

The DRNC must inform the Node B of the DPC_MODE of the UE. To enable this, the DPC_MODE of the UE will be signaled to the Node B in the NBAP Radio Link Setup procedure.

In order not to require the DRNC to be aware of all DPC_MODE changes signalled in the user plane (see next paragraph), but still initiate an NBAP Radio Link Setup procedure when receiving an RNSAP Radio Link Addition procedure, also the RNSAP Radio Link Addition procedure shall signal the DPC_MODE.

The indicated messages will be extended with a new IE indicating the DPC_MODE of the UE in the DL DPCH Information IE group.

6.3.3 DPC mode change

To communicate the DPC mode change from the SRNC to the Node B two alternatives exist: use of a User Plane DCH frame or use of NBAP/RNSAP messages in the Control Plane.

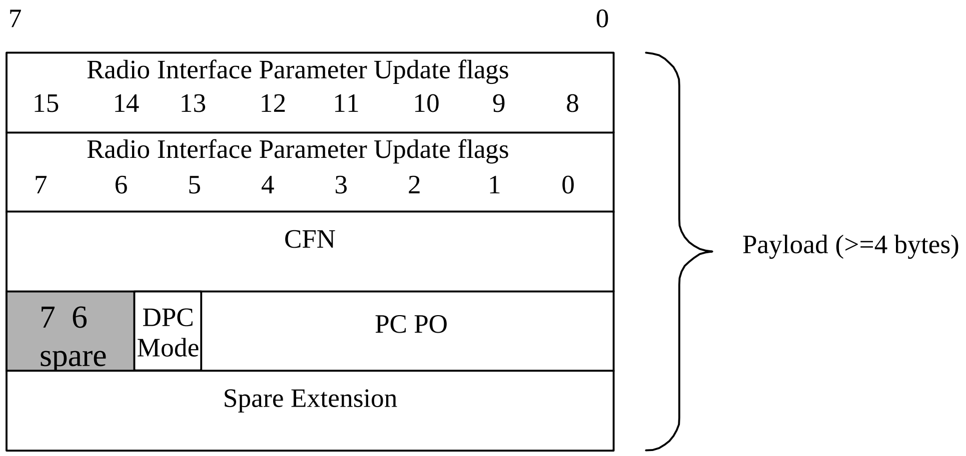
The use of the Control Plane would be based on Radio Link Reconfiguration Procedures. These procedures consists of several messages, and ensure the reliability of the transmission.

The use of the User Plane DCH frame would be based on the Radio Interface Parameter Update Procedure that supports the update of radio interface parameters which are applicable to all RLs for the concerning UE. This procedure is easily extendable to carry the DPC mode change information. The procedure consists of only one frame. The procedure supports synchronised modification by including a CFN.

The use of Radio Interface Parameter Update procedure in DCH FH protocol is proposed to be used for transmission of DPC mode change from the SRNC to the Node B. This because of signalling efficieny reasons. The UP solution is more efficient compared to the CP solution and provides the possibility to combine in the DCH Radio Interface Parameter Update Procedure frame several radio interface parameters which might need to be updated together.

6.3.3.1 Radio Interface Parameter Update control frame [25.427]

The Radio Interface Parameter Update control frame, defined in 25.427, will have the following structure when it is used to signal the 'DPC mode' parameter. Bit 2 of the Radio Interface Parameter Update flags is reserved to indicate that byte 4, bit 0, contains the 'DPC mode' parameter.



The 'DPC mode' parameter will have the following definition:

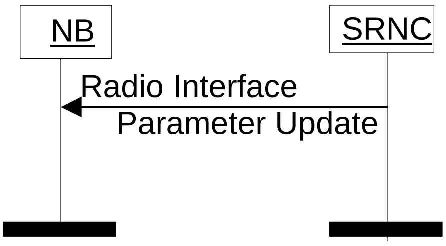
Description: If 'DPC mode' is set to 1, the node B shall apply TPC rate reduction as described in 25.214.

Value range: 0-1.

Field length: 1 bit.

6.3.3.2 Example Scenario

The following sequence shows a possible signaling scenario executed when a UE has entered soft handover and DPC_MODE is 1.



6.4 Agreements and associated contributions

It is agreed that the solution described in the study area is accepted as the DPC Rate Reduction procedure.

6.5 Specification Impact and associated Change Requests

Table 2: Affected Release 4 specifications and the related Change Requests

3G TS	CR	Title	Remarks
3G TS 25.427	45	UTRAN Iub/Iur Interface User Plane Protocol for DCH Data Streams	Change of the DPC mode in the Radio Interface Parameter Update procedure
3G TS 25.423	320	UTRAN Iur Interface RNSAP Signalling	Request for the DPC mode change support and setup of the initial DPC mode value for the Radio Link
3G TS 25.433	373	UTRAN Iub Interface NBAP Signalling	Request for the DPC mode change support and setup of the initial DPC mode value for the Radio Link
	387	Limited power increase window	Correction of the Limited power increase window size

6.6 Open issues

None

7 RRM Opt 4: Introduction of common measurements over Iur

7.1 Introduction

In the Release 99 UTRAN, an RNC can use information about cell load in RRM algorithms as long as the cell is under the control of that RNC. There are many algorithms that can benefit from such an input, but inter-frequency handover will be used as an example (some other examples are listed later). One of the main purposes of inter-frequency handover is to enable the operator to balance (or otherwise manage) traffic load between carriers or cell layers.

Clearly the SRNC (making the handover decision) can only make handover decisions based on load (or considering load) if it has load information available. In the Release 99 UTRAN, this is only possible for cells under the control of that RNC. Thus, in the figures below, only in the first example can the SRNC make a handover decision based on load in the target cell. In the last example, the load in the current cell cannot be included in the decision making either.

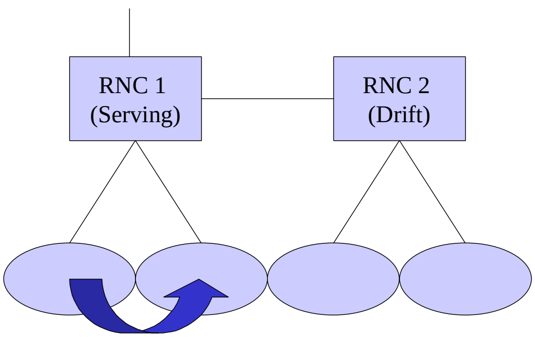
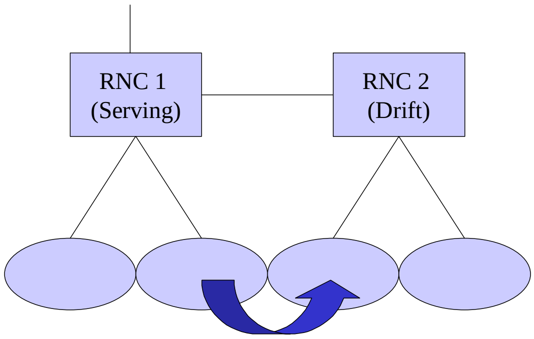


Figure 1: SRNC has visibility of target cell load



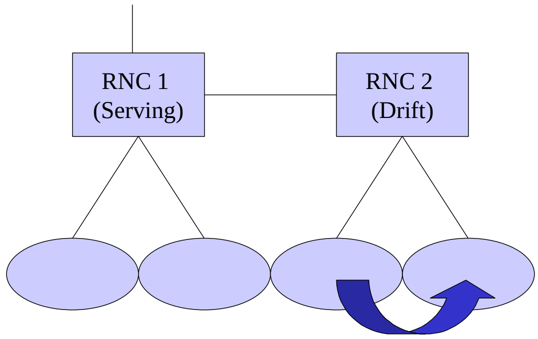


Figure 2: SRNC is blind to target cell load Figure 3 - SRNC is blind to both cell loads

Some other examples of algorithms/processes that could benefit from load information on cells (could be neighbours or current cell) are:

- Admission Control (i.e. could admit less calls if all neighbours are very loaded)
- HO Decision (e.g. to bias thresholds, or to trigger inter-frequency HO)
- Compressed Mode Initiation
- Reconfiguration (PhCh or RL) (e.g. to be less demanding on a loaded cell)
- RRC State Management (e.g. if cell is highly loaded, move more quickly from Cell_DCH to Cell_FACH, Cell_PCH or URA_PCH)

The list is not intended to be comprehensive.

7.2 Requirements

The following requirements have been identified:

1) It is required that an RNC can request cell load measurements on a cell controlled by another RNC.
2) The cell load measurements should assist an RNC in the role of SRNC. This e.g. relates to SRNC decisions like HO decisions, reconfiguration decisions or RRC state management decisions
3) The cell load measurements should assist an RNC in the role of CRNC. This e.g. relates to a CRNC performing admission control decisions on cells or [TDD – performing DCA] at the boundary of the RNS coverage area
4) It is required that such measurements can be triggered on demand, periodically or by thresholds.
5) It is required that such measurements are available separately for UL and DL.

7.3 Study areas

7.3.1 Measurement Information

There are two common channel measurement options that could provide load information on Iur, these are discussed below.

Specific Measurements
To determine the load on the radio resources in another RNS, there are three main factors that must be considered – DL Power, UL Interference and DL Channelisation Codes. It is FFS whether any additional factors would be required/useful. Assuming that suitable metrics could be agreed, then the first solution would be to allow an RNC access to these measurements using a common measurement procedure over the Iur interface.

Generic Load Measure
An alternative approach would be to allow the DRNC to calculate (in a vendor-specific manner) the cell load (e.g. on a

0-9 scale). This could be performed separately for downlink and uplink, and would be made available via a common measurement procedure over Iur.

Comments

- Variations of the second approach were proposed on several occasions (by multiple companies) for Release 99, but a compromise between them was never agreed because of lack of time and higher priorities.
- The second approach has the advantage that under our architectural model it should be the task of the CRNC to determine how loaded a cell is, rather than each RNC reaching its own conclusion, because an RNS is responsible for the management of its internal resources.
- It is believed that the first approach will be difficult to agree/specify, because of agreeing a set of suitable metrics, if this approach would be used for providing an SRNC with usefull information.
- The second approach is open to criticism because of the applicability of a vendor-specific load measure. While being less than ideal, this should not provide significant interworking problems because the DRNC is not expecting specific behaviour, and because (in the worst case) the receiving RNCs could pre-process the Load Measure before using it (e.g. for Vendor A, Load>7 is considered very high, for Vendor B, Load=9 is very high). Also, it should be noted that the load measure is not designed to allow an SRNC to pre-judge the DRNC's admission control, but rather to allow it to make more "responsible" use of the resources in the DRNS.
- The second approach would allow (but not force) the DRNC to include objects that are not visible over Iur in the load evaluation. For example, if a cell is highly loaded because of hardware limitations in the Node B, the DRNC should be aware of this (Node B capacity model), but another RNC would not have access to this information.
- From these arguments, it appears that the second method (generic load measure) is more flexible, and is a better solution, when providing an SRNC with cell load information.

For providing a CRNC with neighbouring cell load information in order to assist in admission control decisions, the first approach is considered feasible. In this respect the [FDD - Received total wide band power][TDD – UL ISCP] and Transmitted Carrier Power measurements are considered to provide the most relevant information..

7.3.2 New Procedures

The simplest way to introduce Common Measurements on Iur would be to add a number of procedures to the Global Module of RNSAP. As the measurements are not associated with a particular UE connection, it would make little sense to include these in the user plane.

The required procedures would be:

- Common Measurement Initiation
- Common Measurement Reporting
- Common Measurement Termination
- Common Measurement Failure

To avoid confusion, the existing RNSAP Measurement Procedures should be renamed as "*Dedicated* Measurement xxxx". Ideally, this should be done for Release 99 (this will be commented in the RNSAP Review).

The structure of the new procedures would be identical to the other measurement procedures in RNSAP and NBAP (in terms of messages flows).

7.3.3 New Message Contents/IEs

The message contents would be similar to those of the Dedicated Measurement messages, but with new IEs to reflect the different measurement objects/types.

The only Common Measurement Object would be Cell.

The Common Measurement Types will depend on the outcome of measurement information issue (see 7.3.1), but would probably be either UL and DL Load, or, UL Interference, DL Power and DL Channelisation Code Usage.

The Measurement Identifier definition would need updating to reflect its wider use (unless it is already changed for Release 99). Alternatively, a new Common Measurement Identifier would need to be introduced.

7.3.4 Interaction with Congestion Handling of DCH item

It is not intended that this mechanism should replace the Congestion Handling mechanism, but would provide a mechanism such that it is less likely that the procedure would be used. The Common Measurements can be seen as a congestion avoidance mechanism (enabler), while the Congestion Handling is invoked once congestion is occurring.

7.3.5 Ensuring the validity of the transmitted Measurements

In case of a partial failure in the RNC_2, this problem is dealt with the Common Measurement Failure procedure. So the only real problem is the case of the Reset or Failure of the RNC_2, in this case the validity of the information in RNC_1 may be compromised:

- On-demand common measurements are not a problem in that they are one-shot procedures.
- Periodic common measurements are not a problem, since if there is no update as expected by the requesting entity a Local Error Handling procedure can be started.

Event-triggered common measurements are a problem, since there actually is no way to know whether the lack of update (no COMMON MEASUREMENT REPORT message) is due to the fact that the triggering event has not occurred or if the context associated to the considered information has been deleted due to a Reset or a Restart of the concerned CRNC.

The last case hints at the necessity of some mechanism insuring that the information is still valid, it means that RNC_1 must be informed if RNC_2 has been reset.

The solution proposed here is to adopt a mechanism similar to the one used on Iub for Common Measurements (use of SSCOP): a specific SCCP connection shall be used between RNCs for Common Measurements between the RNCs. It is further proposed to have one SCCP connection for all of the Common Measurements required by RNC_1 from RNC_2 (and a different SCCP connection if Common Measurements are requested the other way around).

This SCCP connection shall be set up at the first Common Measurement Initiation procedure initiated by RNC_1.

This SCCP connection shall be released when the RNC_2 does not have to provide any Common Measurement to RNC_1 anymore. This means that all the Common Measurements that have been initiated by RNC_1 using the Common Measurement Initiation procedure with a *Report Characteristics* different from "On-Demand" have been terminated either by RNC_1 using the Common Measurement Termination procedure or by RNC_2 (due to e.g. a failure) and indicated to the RNC_1 using the Common Measurement Failure procedure. This can be achieved, for instance, by keeping a list of the Measurement IDs for the Common Measurements RNC_2 must provide to RNC_1, when this list is empty the SCCP connection is released.

7.3.6 Reporting Mechanism

As many of the radio resource management algorithms will require both uplink and downlink load as an input, and to reduce the number of signalling messages, it is proposed that the working assumption is modified such that the measurement type is “load”. However, when reporting “load”, an RNC shall provide values for both uplink and downlink load.

7.3.7 TDD Aspects

For TDD, it is should be possible for load measurements to be requested per cell or per timeslot on a cell. This can be achieved by the same mechanism as in the NBAP common measurement procedures.

7.4 Agreements and associated contributions

It is agreed that the common measurement type shall be "load". When load measurements are reported, an RNC shall include both uplink and downlink load.

In addition, the [FDD - Received total wide band power][TDD – UL ISCP] and Transmitted Carrier Power measurements will be introduced as non generic common measurements.

It is agreed to use the connection oriented mode of the signalling bearer for the common measurement procedures. Each RNC requesting meaurements shall establish a new connection if it has not already established an ongoing connection to the requested RNC.

7.5 Specification Impact and associated Change Requests

The introduction of Common Measurement Procedures would mainly affect 25.423. *Specification of the handling of the signalling bearer would* be required in 25.420.

Table 3: Affected Release 4 specifications and the related Change Requests

3G TS	CR	Title	Remarks
3G TS 25.420	12	SCCP handling for common measurements	Describes common measurement context concept.
3G TS 25.423	323	Intro for common measurements over Iur	

7.6 Open issues

None.

8 RRM Opt 5: Extension of Radio Interface Parameters updating in the user plane

8.1 Introduction

Currently the Iub/Iur DCH FP supports a fast update of the TPC Power Offset in the DL RL via user plane signalling.

It should be studied if more radio interface parameters would benefit from a similar handling. If such parameters are identified, the user plane should be extended for this purpose.

8.2 Requirements

None.

8.3 Study areas

It was realised that the WorkTask is really promoting a solution rather than indicating a problem which needs to be solved.

Extending the usage of the Radio Interface Parameter Update procedure should not be a goal in itself, but could be proposed/decided if it solves an identified problem.

Note that currently for the RRM Opt 3: DPC rate reduction in soft handover, it is actually proposed to extend the Radio Interface Parameter Update procedure.

8.4 Agreements and associated contributions

It was concluded that the worktask can be considered finalised without any resulting updates to the specifications.

8.5 Specification Impact and associated Change Requests

No specification Impact.

8.6 Open issues

9 RRM Opt 6: Separation of resource reservation and radio link activation

9.1 Introduction

This work task aims at introducing the possibility to have dedicated resources reserved in UTRAN without transmitting energy on the corresponding radio link(s). Furthermore, a separate mechanism for activating and deactivating radio transmission related to the reserved resources shall be introduced.

The separation will enable the following optimisations in UTRAN:

- Delayed activation of a radio link at soft handover for high bit rate users, thus avoiding a potential handover problem;
- Quicker channel type switching back to Cell_DCH;
- Quicker radio link additions of radio links that recently were part of the active set.

9.2 Requirements

The following requirements are identified:

1) It shall be possible for the SRNC to request the establishment of RL's as normal, but without the activation of the transmitter for the Uu interface.
2) It shall be possible for the SRNC to command transmission of a certain RL on the Uu to be switched on at a certain CFN. This to enable synchronised activation over multiple RL's and synchronised activation between UTRAN and UE.
3) It shall be possible for the SRNC to command transmission of a certain RL on the Uu to be switched on immediately. This to enable fast activation.
4) It shall be possible for the SRNC to command transmission of a certain RL on the Uu to be switched off at a certain CFN. This to enable synchronised de-activation over multiple RL's and synchronised activation between UTRAN and UE.
5) It shall be possible for the SRNC to command transmission of a certain RL on the Uu to be switched off immediately. This to enable fast de-activation.
6) When the SRNC commands transmission of a certain RL on the Uu to be switched on, it shall be possible for the SRNC to set an initial DL power level.

9.3 Study areas

9.3.1 General

Any new functionality introduced in R4 should be introduced with the least possible impact to the existing R99 specifications.

9.3.2 New information

The non-activation of the RL at RL-SETUP or RL-ADDITION, can realistically only be signalled by including additional flags in these messages. The additional flags shall indicate per RL if it should be immediately activated or not.

Two signalling approaches were identified for switching the transmitter on/off during the life-time of the RL:

1) Using the Synchronised/Unsynchronised RL Reconfiguration procedures

2) Using the DL Power Request Procedure

Several problems were identified in case the second procedure would be used:

- The procedure is currently only defined for FDD;
- The procedure currently does not contain the required information (activation./de-activation flag and initial DL power level);
- The procedure only supports an unsynchronised operation;

Allthough the RL-Reconfiguration procedures do currently also not contain the required information, using these procedures seems a smaller step compared to using the DL Power request procedure. Therefore it is proposed to signal the RL activation/de-activation by using the RL-Reconfiguration procedures.

9.3.3 Backward compatibility

Assuming a CP solution based on RNSAP/NBAP signalling, backward compatibility shall be ensured by using the correct setting of the criticality.

9.4 Agreements and associated contributions

9.5 Specification Impact and associated Change Requests

This section is intended to list the affected specifications and the related agreed Change Requests. It also lists the possible new specifications that may be needed for the completion of the Work Task.

9.6 Open issues

The following open issues are identified:

1. Should it be possible to indicate an activation CFN in the procedure establishing an RL? This approach would mean a “delayed activation” of the DL transmitter without requiring a separate procedure to perform the activation.

2. Should also the CRNC be allowed to set the initial DL power level at activation ?

3. Is a 2 step (like synchronuous RL-Reconf) required for activation/de-activation or would a 1 step procedure be sufficient ?

Note: Due to insufficient progress, this worktask is not completed for Release 4.

10 RRM Opt 7: Triggering of the Common Transport Channel Resources Initiation procedure by DRNC

10.1 Introduction

Currently the DRNC has no possibility to request an SRNC to move a UE from using one combination of RACH/FACH channels to other RACH/FACH channels. However this functionality is provided by Rel (99) RRC signalling and is considered beneficial for obtaining a good distribution of the common resource usage in the DRNS.

For Rel (4) an appropriate solution should be specified to provide this capability to the DRNC.

10.2 Requirements

10.3 Study areas

Lately, the possibility for the UTRAN to direct the UE to use a certain RACH or S-CCPCH has been removed from the RAN2 (RRC) and RAN3 (RNSAP) specifications.

This removes the need for a triggering of the Common Transport Channel Resource Initiation procedure by the DRNC.

10.4 Agreements and associated contributions

It was concluded that the worktask can be considered finalised without any resulting updates to the specifications.

10.5 Specification Impact and associated Change Requests

No specification Impact.

10.6 Open issues

Annex A: Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
03/2001	11	RP-010143	-	-	Approved at TSG RAN #11 and placed under Change Control	2.0.0	4.0.0
03/2002	15	RP-020183	002		Description of causes of DRNS congestion	4.0.0	4.1.0

History

Document history		
V4.0.0	March 2001	Publication
V4.1.0	March 2002	Publication