3GPP TSG-RAN Meeting #12 **RP-010439**
Stockholm, Sweden, 11-15 June 2001

Agenda item: **8.4.2**

Source: **Qualcomm Europe**

Title: **Elimination of TFCs based on power requirements**

Document for: **Discussion and Decision**

1. Introduction

TFC selection is a MAC function, as mentioned in [1]. The algorithm for performing TFC selection on the uplink is described in [2]. This algorithm is precluding TFCs that cannot be reliably transmitted from being considered as candidates for the selection. Defining the reliable transmission criteria is left up to RAN WG 4 specifications [3].

Several proposals were introduced at the last RAN WG4 meeting in Gothenburg to attempt to clarify the specification of this function ([4] and [5]). A compromise was found among the participants in the form of [6].

This discussion document will attempt to show that the proposed changes do not resolve all ambiguity between the RAN WG2 and WG4 specifications and that, with these changes, the specifications still do not describe a coherent or complete set of rules to be followed by implementers.

2. Discussion

The changes performed by [6] can be summarized as follows:

- Adoption of the concept of maximum UE transmitter power according to the definition in [7]: takes into account the possibility that UTRAN may have set a Maximum allowed UL TX power.
- Refinement of the TFC elimination criterion: instead of eliminating TFCs for which required transmit power has exceeded the maximum UE transmitter power continuously during a period of T1 ms, it is verified whether it has exceeded it in the last X out of Y measurement periods. Re-instating TFCs remains essentially unchanged.
- Inclusion of application rate-adaptation considerations: TFC elimination that reduces the data-rate of applications will only be applied once the new rate has been adopted by the application.

Rate adaptation of applications is not mentioned in the stage-2 description of MAC functions and services. Even though there used to be a mention of this in the section describing the TFC selection algorithm, this was removed by CR66r2 [8]. Therefore, the current set of specifications does not mention this functionality. At RAN WG2 meeting #21 in Busan a CR re-introduced the concept [9]. However, the language used is very mild: "*Note: Based on the selected TFC, MAC should indicate the available bitrate for each logical channel to upper layers in order to facilitate adaptation of codec data rate when codecs supporting variable-rate operation is used. The details of the interaction with the application layer is not further specified*". This contrasts sharply with the language used in [6]: "*MAC shall request RLC to provide data in formats and sizes, which are suitable for the supportable TFC selected by MAC, within 15 ms from the moment the Limited TFC Set criterion has been fulfilled*". In the case of transparent mode, which is of particular interest here, RLC has no control over the data format. Therefore, the functionality that is described here is rate-adaptation of the application. RAN WG4 is specifying mandatory performance requirements for a functionality that is optional in the UE, according to RAN WG2 specifications.

Also, it is written in [6] that: "*The UE may change TFC step by step according to the TFC selection rules in [19] towards supportable TFC since data provided by RLC may not be in suitable formats in the first TFC selection(s) after the Limited TFC Set criterion has been fulfilled*". However, the TFC selection algorithm that is described in [2] has no provision for gradually applying the TFC elimination indications that are specified in [3]. According to the algorithm, if the TFCs that allow the transmission at the higher rate are not supported and the corresponding application has not been able to change the data to the new format then no data is going to be transmitted from that RLC entity.

Finally, the sentence: "*The UE shall take supportable TFC in use as soon as all data provided by RLC is in the correct format for the new TFC*" is confusing since the supportable TFCs were being allowed even before the data format is changed.

3. Proposal

Based on the current state of the specifications it is deemed that rate-adaptation of the applications (e.g. vocoders) is a MAC functionality which requires further clarification. The detailed operation of this function should be discussed in RAN WG2 since it heavily affects the interface between MAC and higher layers. If modifications to the TFC selection algorithm need to be introduced in order to clarify such functionality, it is appropriate that they be proposed at a RAN WG2 meeting. The joint RAN WG2/WG4 meeting in Berlin in July may be a good opportunity to bring up this topic.

The other modifications proposed are regarded as significant improvements and should be included in the June version of the specifications. It is therefore proposed to replace the versions of the CRs included in [6] with the ones included [10], where the following paragraph is proposed to be deleted:

[Beginning of paragraph, which is proposed to be deleted from CRs 109 and 110]
MAC shall request RLC to provide data in formats and sizes, which are suitable for the supportable TFC selected by MAC, within 15 ms from the moment the Limited TFC Set criterion has been fulfilled. The UE may change TFC step by step according to the TFC selection rules in [19] towards supportable TFC since data provided by RLC may not be in suitable formats in the first TFC selection(s) after the Limited TFC Set criterion has been fulfilled. The UE shall take supportable TFC in use as soon as all data provided by RLC is in the correct format for the new TFC
[End of paragraph, which is proposed to be deleted from CRs 109 and 110]

Only the above paragraph is proposed to be removed from the original CRs.

4. References

[1] 25.301: Radio Interface Protocol Architecture

[2] 25.321: MAC Protocol Specification

[3] 25.133: Requirements for support of Radio Resource Management

[4] R4-010584: Transport Format Combination selection in UE, Ericsson

[5] R4-010641: Requirements for TFC selection at the maximum power, Nokia

[6] RP-010354: Agreed CR 109 (R'99) and CR 110 (Rel-4 Category A) to 25.133, Requirements for TFC selection at the maximum power, RAN WG4

[7] 25.331: RRC Protocol Specification

[8] RP-010025: RAN Plenary agreed CRs on MAC, RAN WG2

[9] R2-011324: Rate adaptation, Ericsson

[10] RP-010440: Proposed CR 124 (R'99) and CR 125 (Rel-4 Category A) to 25.133, Requirements for TFC selection at the maximum power, Qualcomm