

3GPP TR 25.898 V0.1.0 (2003-09)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Power Control Enhancements; (Release 6)



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Keywords

UMTS, radio, layer1, layer2, layer3

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Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

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

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Power control has been introduced as a basic feature of third generation systems from the very beginning of their standardisation. Closed inner loop downlink and uplink power control for TDD¹, and closed inner loop downlink and uplink power control for FDD with outer loop component have been part of the specifications since Release 99.

Proposals on power control enhancements shall be possible, but not restricted to, in the following areas:

- DL and UL inner-loop components
- DL and UL outer-loop components
- Signalling support in L1 and L2/L3
- Signalling support in UTRAN to support the proposed enhancements

¹ Closed inner loop uplink PC is only applicable in 1.28 Mcps TDD.

1 Scope

The present document is the technical report on features that are proposed to enhance the existing power control procedures in UTRA.

The purpose of this TR is to help TSG RAN WG1 to define and describe potential power control enhancements under consideration and compare the benefits of each enhancement with earlier releases for improving system capacity or coverage in UTRA, along with a complexity and backwards compatibility evaluation of each technique. The impact beyond the physical layer of each proposed technique shall clearly be addressed.

This activity involves the Radio Access Network work area of the 3GPP studies and has impacts both on the Mobile Equipment and Access Network of the 3GPP systems.

This document is intended to gather all information in order to compare the solutions and system gains vs. complexity and draw a conclusion on a way forward.

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. 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*.

3 Definitions, symbols and abbreviations

3.1 Definitions

3.2 Symbols

3.3 Abbreviations

4 Requirements

- The overall goal of power control enhancements is to improve system capacity or coverage with respect to that achievable with existing 3GPP specification releases.
- Features or group of features should demonstrate significant incremental gain, with reasonable complexity. The value added per feature should be considered in the evaluation.
- The UE and network complexity shall be minimised for a given level of system performance.
- The impact on current releases in terms of both protocol and hardware perspectives shall be taken into account.

- It shall be possible to introduce the new features in the network which has terminals from Release '99, Release 4 or Release 5 without a performance degradation being imposed on those terminals. Backwards compatibility for each proposed improvement shall be considered in the following terms;
 - o impacts surrounding the deployment of a network of release “n” comprising support for the improvement, in which some UE’s of release <”n” are present
 - o impacts surrounding the deployment of a network of release <”n” in which some UE’s of release “n” are deployed that comprise support for the improvement

5 Reference techniques in earlier 3GPP releases

Editors note: This section shall contain the description of current power-control techniques specified in earlier 3GPP standard releases for background information and for reference to compare proposed new techniques to. The description shall be limited to the radio access mode for which a proposed enhancement applies.

5.1 Reference techniques for UTRA TDD

(void)

6 Overview of Power Control Enhancements

Editors note: This section shall contain a descriptive overview of each proposed candidate technique. Candidate proposals should clearly describe their dependence and relationship to other candidate proposals as well as relationship to earlier proposals if applicable. A new sub-clause shall be added whenever a new enhancement is proposed and approved to be in this document. Currently, one sub-clause has been added as illustration only.

6.1 <Proposed Enhancement 1 for UTRA TDD>

(void)

7 Evaluation of Techniques for Power Control Enhancements

7.1 <Proposed Enhancement 1 for UTRA TDD>

7.1.1 System performance evaluation

(void)

7.1.2 Complexity evaluation < UE and UTRAN impacts >

(void)

7.1.3 Impacts on UTRAN protocol architecture

(void)

7.1.4 Impacts on UTRAN signalling

(void)

7.1.5 Backwards compatibility

(void)

9. Conclusions and Recommendations

(void)

Annex A: Simulation Methodology, Assumptions and Results

A.1 Evaluation Methodology

(void)

A.2 Link Simulation Assumptions

(void)

A.3 Link Simulation Results

(void)

A.4 System Simulation Assumptions

(void)

A.5 System Simulation Results

(void)

Annex B: Change History

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2003-01	WG1#30	R1-030009			Initial TR skeleton presented for discussion		0.0.1
2003-08	WG1#33	R1-030907			Initial TR skeleton submitted for discussion		0.0.2
2003-08	WG1#33	R1-030947			TR skeleton approved		0.1.0