



July 2006

Public Review - A Cooperative Uplink Power Control Scheme for Elastic Data Services in Wireless CDMA Systems

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Recommended Citation

Roch A. Guérin, "Public Review - A Cooperative Uplink Power Control Scheme for Elastic Data Services in Wireless CDMA Systems", . July 2006.

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Abstract

This is a paper that is actually an excellent illustration of how CCR differs from more traditional publications, and also one for which I am glad to have the opportunity to write a public review that hopefully can shed some light on the reasons behind its acceptance.

Don't get me wrong, this is not a paper that I regret seeing in CCR, but this is paper that most likely would not have been accepted in most other publications, including conferences and workshops, at least not in its first submission.

The focus of the paper is on resource management on the uplink of a CDMA wireless system, and in particular the combination of an admission control algorithm and a cooperative power control algorithm that maximize a utility function across admitted mobiles while taking QoS requirements into account. The topic is arguably important given the growing presence of CDMA wireless systems and the emergence of new standards such as EVDO-1X Rev. A, which offer a range of new options allowing the use of "independent" transmission policies by mobile devices rather than always subjecting them to tight control from the base station. Understanding, if, when, and how such flexibility can be beneficial or harmful is an interesting and timely research area.

Comments

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Public Review for A Cooperative Uplink Power Control Scheme for Elastic Data Services in Wireless CDMA Systems

George Alyfantis, Stathes Hadjiefthymiades, and Lazaros Merakos

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The acceptance of this paper is to a large extent due to the timeliness and importance of the area, as well as a potentially interesting contribution on the topic. Specifically, the authors demonstrate through numerical examples the apparently significant improvement in performance that can be obtained through the use of a cooperative power control solution, when compared to what is feasible with a distributed but non-cooperative solution. They do so by looking at performance from various perspectives such as the achieved utility, transmission power as well as cell coverage. They show that the cooperative solution out-performs the non-cooperative solution, often by a non-negligible amount, especially when it comes to battery power.

This being said, the contribution is more a tantalizing starting point that piques the reader's curiosity rather than a polished and fully thought-out solution that convinces us of the merit of the approach. In particular, while the paper does indeed highlight the potential of collaborative solutions, it does so by making numerous (unrealistic?) assumptions and glossing over many critical details. Just for illustration purposes, let me list some of the more significant ones as mentioned by the reviewers. The channel model used is somewhat unrealistic and overlooks numerous sources of errors that all have the potential to severely affect the outcome. The results are derived from a single experiment involving a very small number of users. All sessions are assumed to have the same optimal utility SINR and only one specific cost function is used. Power control is the only means being considered to mitigate interference at the exclusion of other possible approaches such as scheduling, etc.

As a matter of fact, all reviewers were consistent in pointing out these shortcomings and as a result many, although not all, recommended rejecting the paper on the grounds that it was still in needs of substantial improvements. I don't disagree with this assessment, but in the end and in spite of all its flaws, the potential that the paper's initial and clearly preliminary contribution would spark interest and further activity in the area, tilted the balance the other way. Again, this is largely motivated by CCR's mandate, which results in decisions that are not always "safe," but hopefully this can contribute to a more active and open brewing of ideas in the long term. You decide!

Public review written by

Roch Guérin

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