Utility-Based Resource Allocation Framework for QoE/QoS Maximization in OFDMA Networks

Bruno R. S. Silva[1], Pedro L. F. Lima[1], Emanuel B. Rodrigues[2], Roberto P. Antonioli [2] Diego A. Sousa[2] Tarcsio F. Maciel[2] F. Rodrigo P. Cavalcanti[2]

[1] Universidade Federal do Ceará (UFC)
Caixa Postal 6.001 – 60.455-760 – Fortaleza – CE – Brasil

[2]Grupo de Pesquisa em Telecomunicações sem Fio (GTEL)
Fortaleza, Brasil.

{riccelli,pedrolfalc}@alu.ufc.br
{emanuel,roberto,diego,tarcisio,rodrigo}@gtel.ufc.br

Abstract. *This meta-paper describes the style to be used in articles and short papers for SBC conferences. For papers in English, you should add just an abstract while for the papers in Portuguese, we also ask for an abstract in Portuguese ("resumo"). In both cases, abstracts should not have more than 10 lines and must be in the first page of the paper.*

Resumo. *Este meta-artigo descreve o estilo a ser usado na confecção de artigos e resumos de artigos para publicação nos anais das conferências organizadas pela SBC. É solicitada a escrita de resumo e abstract apenas para os artigos escritos em português. Artigos em inglês deverão apresentar apenas abstract. Nos dois casos, o autor deve tomar cuidado para que o resumo (e o abstract) não ultrapassem 10 linhas cada, sendo que ambos devem estar na primeira página do artigo.*

Introduction

In recent years, it is noticeable the growing of users in cellular networks, which poses a challenge for the network operators to satisfy the Quality of Service (QoS) requirements of all these users. Radio Resource Allocation (RRA) techniques are used, for example, to provide an efficient distribution of network resources in order to improve overall system capacity. Another concept, that evaluates the users by your perception, is the Quality of Experience (QoE), where a Mean Opinion Score (MOS) is given ranging between 1 to 5 [1]. Several algorithms based on QoE scheduling can be found in literature. The work in [2] proposed a Proportional Fair (PF) algorithm scheduler that consider the users' QoE maximization and users' fairness. In [3], a downlink scheduling method is proposed, named QoE Scheme, for improving the QoE for Voice over IP (VoIP) traffic in Long Term Evolution (LTE) networks, in order to achieve higher user satisfaction. In [4], the authors proposed a QoE-based carrier scheduling scheme for multiple services that aims at maximizing the users' QoE and showed that their approach provided some improvements in terms of QoE and fairness. The work in [5] presented a QoE-based RRA framework to be applied in heterogeneous wireless networks with different classes of services, such as VoIP, File Transfer Protocol (FTP) and video streaming.

In this work, we are interested at studying the benefits of considering both the QoS and QoE of users in resource allocation process. We propose to extend the utility-based RRA framework and algorithms (Throughput-based Satisfaction Maximization (TSM) and Delay-based Satisfaction Maximization (DSM)) presented in [6] in order to consider QoE effects in system and to maximize the users' satisfaction based on their QoE metrics.

This work is organized as follows. Section **??** presents the system modeling considered in this work. In Section **??**, we describe the proposed utility-based RRA framework suitable for both Non-Real Time (NRT) and Real Time (RT) services. In Section **??** we show the algorithms simulated for comparison with our proposed one. Simulation assumptions are shown in Section **??** and simulation results in Section **??**, while the conclusion is drawn in Section **??**.

First Page

The first page must display the paper title, the name and address of the authors, the abstract in English and "resumo" in Portuguese ("resumos" are required only for papers written in Portuguese). The title must be centered over the whole page, in 16 point boldface font and with 12 points of space before itself. Author names must be centered in 12 point font, bold, all of them disposed in the same line, separated by commas and with 12 points of space after the title. Addresses must be centered in 12 point font, also with 12 points of space after the authors' names. E-mail addresses should be written using font Courier New, 10 point nominal size, with 6 points of space before and 6 points of space after.

The abstract and "resumo" (if is the case) must be in 12 point Times font, indented 0.8cm on both sides. The word **Abstract** and **Resumo**, should be written in boldface and must precede the text.

CD-ROMs and Printed Proceedings

In some conferences, the papers are published on CD-ROM while only the abstract is published in the printed Proceedings. In this case, authors are invited to prepare two final versions of the paper. One, complete, to be published on the CD and the other, containing only the first page, with abstract and "resumo" (for papers in Portuguese).

Sections and Paragraphs

Section titles must be in boldface, 13pt, flush left. There should be an extra 12 pt of space before each title. Section numbering is optional. The first paragraph of each section should not be indented, while the first lines of subsequent paragraphs should be indented by 1.27 cm.

Subsections

The subsection titles must be in boldface, 12pt, flush left.

Figures and Captions

Figure and table captions should be centered if less than one line (Figure 1), otherwise justified and indented by 0.8cm on both margins, as shown in Figure 2. The caption font must be Helvetica, 10 point, boldface, with 6 points of space before and after each caption.

Figura 1. A typical figure

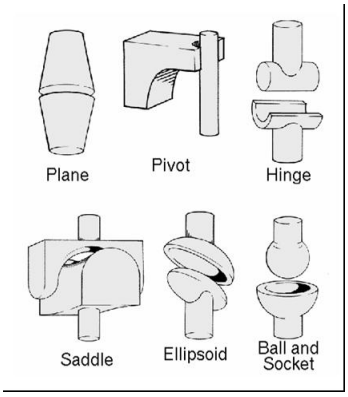

Figura 2. This figure is an example of a figure caption taking more than one line and justified considering margins mentioned in Section 5.

In tables, try to avoid the use of colored or shaded backgrounds, and avoid thick, doubled, or unnecessary framing lines. When reporting empirical data, do not use more decimal digits than warranted by their precision and reproducibility. Table caption must be placed before the table (see Table 1) and the font used must also be Helvetica, 10 point, boldface, with 6 points of space before and after each caption.

Images

All images and illustrations should be in black-and-white, or gray tones, excepting for the papers that will be electronically available (on CD-ROMs, internet, etc.). The image resolution on paper should be about 600 dpi for black-and-white images, and 150-300 dpi for grayscale images. Do not include images with excessive resolution, as they may take hours to print, without any visible difference in the result.

References

Bibliographic references must be unambiguous and uniform. We recommend giving the author names references in brackets, e.g. [**?**], [**?**], and [**?**].

Tabela 1. Variables to be considered on the evaluation of interaction techniques

	Chessboard top view	Chessboard perspective view
Selection with side movements	6.02 ± 5.22	7.01±6.84
Selection with in-depth movements	6.29±4.99	12.22±11.33
Manipulation with side movements	4.66± 4.94	3.47±2.20
Manipulation with in-depth movements	5.71 ±4.55	5.37 ±3.28

The references must be listed using 12 point font size, with 6 points of space before each reference. The first line of each reference should not be indented, while the subsequent should be indented by 0.5 cm.

Referências

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