

Resource sharing menggunakan combined order allocation berbasis algoritma mean greedy pada sistem wireless SC- fdma = Resource sharing using combined order allocation based on mean greedy algorithm for sc fdma wireless system

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20364571&lokasi=lokal>

Abstrak

Pertumbuhan jumlah pengguna layanan broadband mobile cellular berbasis internet protocol (IP) telah mendorong peningkatan kebutuhan laju data untuk mengakses berbagai macam jenis layanan telekomunikasi. Disisi lain, jaringan akses wireless sebagai infrastruktur terdepan dalam memberikan berbagai layanan mempunyai keterbatasan dalam hal penggunaan sumberdaya radio. Diperlukan suatu metoda resource sharing dengan menerapkan skema pengalokasian sumberdaya agar penggunaan sumberdaya tetap efisien dan mempunyai quality of service yang tetap terjaga serta mempunyai kompleksitas rendah. Third Generation Partnership Project Long Term Evolution (3GPPLTE) telah diperkenalkan sebagai standar Next Generation Network (NGN) pada sistem seluler generasi keempat. 3GPP-LTE telah mengadopsi sistem Single Carrier Frequency Division Multiple Access (SC-FDMA) sebagai standar teknologi akses jamak pada arah uplink untuk mengakomodasi berbagai macam layanan broadband berbasis internet protocol.

Pada sistem wireless SC-FDMA, kondisi lingkungan dan mobilitas semua user membuat kondisi propagasi setiap user pada semua subcarrier berubah dari waktu ke waktu. Diperlukan skema pengalokasian sumberdaya radio berkompleksitas rendah yang mampu beradaptasi terhadap perubahan kondisi tersebut. Diperlukan pula skema yang mampu menggunakan sumberdaya menjadi lebih efisien dibanding generasi sebelumnya. Pertimbangan dalam pencapaian performansi dan kompleksitas waktu komputasi menjadi area terbuka yang dapat dikembangkan dan dieksplorasi lebih lanjut untuk mendapatkan skema pengalokasian sumberdaya baru.

Disertasi ini menjawab isu tersebut dengan mengembangkan skema baru pengalokasian sumberdaya combined-order allocation berbasis algoritma mean greedy. Skema tersebut dibangun berdasarkan solusi dari persoalan optimasi pengalokasian. Persoalan pengalokasian dimodelkan sebagai persoalan linear programming dengan obyektif optimasi adalah quality of service dengan constraint optimasi berupa persyaratan alokasi. Skema baru dibangun dari algoritma berbasis mean greedy karena mempunyai pertimbangan praktis untuk diimplementasikan. Dengan menggunakan pendekatan asimtotik, skema baru yang dikembangkan mempunyai kompleksitas waktu komputasi yang sama dengan skema mean greedy konvensional. Kemudian berdasarkan hasil pengujian menggunakan metoda montecarlo, skema yang dikembangkan mampu memberikan perbaikan performansi pada skenario dan persyaratan tertentu sehingga dapat dipertimbangkan untuk diimplementasikan pada kondisi nyata.

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The data rate requirements of telecommunication services has increased due to the growth of the number of broadband mobile cellular internet protocol-based services subscriber. Meanwhile, there are the restrictions on the use of radio resource on the radio access network deployment. Therefore, the resource sharing method using the certain resource allocation scheme is required to keep the efficient use of spectral

efficiency and the quality of service as well as. This research addressed those issues by developing the novel resource allocation scheme as a solution of the allocation problem which is modeled using the linear programming optimization. The objective of optimization is a quality of service with a lot low complexity. Third Generation Partnership Project Long Term Evolution (3GPP-LTE) has been introduced as a standard of the Next Generation Network (NGN) on the fourth generation cellular systems. Single Carrier Frequency Division Multiple Access (SC-FDMA) system has been adopted by 3GPP-LTE as a uplink access technology to accomodate a wide range of broadband internet protocolbased services.

In wireless SC-FDMA system, the instantaneous channel conditions of all users always differ from each other, both in time and frequency domains. Therefore, the intelligent radio resource allocation which can adapts to the change of the propagation condition is required to meet its phenomenon. The SC-FDMA technology is designed to be able to more efficiently utilize all the available subcarriers compared to previous generations as well as has a low time complexity by using the intelligent resource allocation scheme. By considering the achieved performance and the time complexity become an attractive area and can be explored further for exploring the new resource allocation scheme.

This research addressed those issues by developing the novel resource allocation scheme as a solution of the allocation problem which is modeled using the linear programming optimization. The objective of optimization is a quality of service with a lot of allocation requirements as constraints. The proposed scheme is built based on the mean greedy algorithm due to the practical implementation and it is called as combined-order allocation. The proposed combined-order allocation has the same time complexity with those of the conventional mean greedy scheme due to the asymptotic method approach. Those scheme also provides the performance improvement on the specific scenarios and the certain requirements regarding to performance evaluation based on the montecarlo method. Accordingly, it can be considered to be implemented in real condition.