

A Survey on Resource Allocation Scheme for Balancing QoS in Wireless Mobile Communication

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Abstract: Mobile communication standards are growing up day by day and improvements in the wireless technology environment leads to increase the number of user requirements. According to that, many researches are going on to provide efficient and user friendly network to the end user. Network selection is the one to get the efficient network by the user, as per their needs. New resource allocation scheme for active users needed to be implemented to achieve improved performance in terms of a higher system capacity and better quality-of-service (QoS) guarantee of the users. Exponential growth of user demands on a single convergence platform has brought researchers to explore various features of Fourth Generation (4G) Mobile Communication System. The most important feature of 4G is that selection of application as per the user preference based on QoS (Quality of Service). This user centric system works on the basis to provide best services of the network to the users. Here, a selection algorithm has been presented which gives a finer approach to build user preferences as per the features of 4G. Rank depended on distance function has been calculated for various available service techniques, called network. Weighted distance function is acquired depended on multiple QoS parameters according user needs. The proposed algorithm demonstrates better results contrasted to single parameter based framework, under a heterogeneous network framework.

Keywords: QoS, Resource allocation, Next Generation Network, Distance Function

1. Introduction

Because of late enhancements in mobile computing and communication techniques, mobile ad hoc computational Grids are developing as another computing standard, empowering modern applications through sharing of computing resources among mobile devices without any previous system infrastructure. Mobile ad hoc computational Grids are combination of computational Grids and portable specially appointed systems. Computational Grid is hardware and software architecture that permits distributed computing devices to share computing resources to tackle computationally exhaustive issues [1]. Mobile ad hoc network is a wireless network of mobile devices, which communicate with one another without any previous system architecture [2]. Mobile ad hoc network gives network and communication mechanism to nodes inside a Grid. As mobile ad hoc Grids can be installed quickly and can work without any previous system architecture, they are guaranteeing hopeful for military and calamity help applications [3][4]. They can be utilized as a part of our everyday lives to execute computationally escalated tasks focused around anywhere at whatever time computing model.

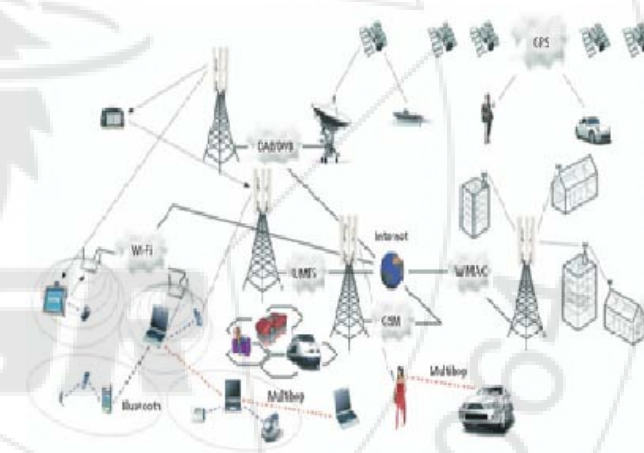


Figure 1: heterogeneous network (source: "4G: A user centric system", Mobile e-conference, 2004)

Resource allocation is one of the key problems in mobile ad hoc computational Grids because they are dynamic and distributed in nature. Specifically, energy-efficient resource allocation is the most significant configuration criteria because of restricted battery life of mobile devices. Primary sources of energy utilization are CPU processing, memory and information transmission in the system. This paper concentrates on energy expended in data transmission. Key elements that help transmission energy utilization are transmission power needed to transmit information and communication traffic instigated by data transfers among tasks. Ineffectual allocation of tasks to mobile nodes can altogether expand communication traffic and energy utilization, which restricts the lifetime of node and may come about into power disappointment. The power disappointment of node won't just influence task executing on that node yet will likewise influence task executing on different nodes.

In past, different methodologies have been presented to attain resource allocation issue however the greater part of them are either focused on framework based computing frameworks or they do not consider conditions among tasks. Not very many plans have tended to energy consumption issue however; they are centered towards preparing energy conservation, while sparing energy because of data exchanges between tasks remains an open issue, which gets to be considerably more discriminating for data-intensive parallel applications. In past study [5], an incorporated distance based resource allocation plan has been presented for mutually dependent tasks in mobile ad hoc computational Grids. The plan chooses nodes focused around distance data to lessen correspondence expense and application communication cost. It is focused around a group mobility model and is versatile to task disappointment because of node portability and low battery power.

2. Literature Review

Jignesh S. Panchal ET. AL [6] concentrated on two LTE cellular networks on collocated and non-collocated antenna topologies with aggregate of 114 areas, two MMEs, and A sharing entity (SE). They executed fundamental sharing methodology including the SE, the MMEs and the sectors. They demonstrated CS and SS alternatives on conventional foundation and VSS and VPS on virtualized infrastructure. They characterized sharing parameters including overload threshold, supply threshold and execution measurements and ran simulation tests to evaluate and think about performance of the sharing choices in overwhelming, moderate to light sector stacking conditions.

In light of the experimental results, they inferred that CS, an extension of roaming on conventional framework, performed the best. It is the most straightforward and the ideal inter-operator sharing alternative for LTE cellular networks. VSS and VPS choices on virtualized framework likewise performed well however are essentially more perplexing to execute. From the point of view of framework and service deployments, there are advantages for operators to utilize virtualized framework sharing. Notwithstanding, they demonstrate that virtualization is not key for the performance enhancements derived from inter-operator resource sharing. Specifically, easier sharing techniques in which clients successfully roam to frameworks with accessible limit would for the most part perform equally or better than more complex range reallocation and base station virtualization systems.

Nonetheless, VSS and VPS virtualization procedures would be more appropriate for execution on enhanced dynamic spectrum access (DSA) based cellular frameworks. SS was discovered to be the minimum powerful inter-operator sharing alternative. It can be more viable with dynamic inter-operator co-channel interference control or in sharing between cellular/macro and micro/femto networks and additionally inter-wireless service system SS situations. The simulation outcomes demonstrated low adequacy of inter-operator sharing alternatives for higher UE density components. The inter-operator sharing alternatives were

powerful just when there were vast contrasts in resource utilization between the two networks. Their adequacy relied on upon location of the accessible surplus resources. For higher UE density situations in which mobile networks are intensely stacked and surplus resources are rare, inter-wireless-service-network resource sharing is prone to be more viable than the intra-service, inter-operator sharing inspected in this work. Simulation and modeling of inter-operator resource sharing in the middle of cellular and femto systems, inter-wireless-service network SS on customary framework and VSS, VPS and other enhanced DSA procedures on virtualized framework are great applicants for future study.

Chetna Singhalet. al [7] have exhibited a QoS aware handoff system in OFDMA broadband cellular systems, called split handoff that permits sharing of channel sharing from more than one BS when the client is in their joint coverage range. They have presented a methodology framework that supports the proposed plan, summarized the framework interactions included, and gave a systematic framework to measure the capacity gain shared resource. The capacity enhancement analysis has been accepted by network simulation results utilizing Qualnet. Further, they have given a heuristic class based shared resource allocation approach for the cell-edge clients that targets for amplifying the QoS support to diverse service classes while amplifying the resource usage. They have performed thorough network simulations in Qualnet simulator, where mobile WiMAX has been considered as a case broadband wireless access network standard. Their results exhibited that the shared resource allocation in the presented split handoff plan fundamentally enhances the network performance as for the hard handoff and the macro diversity handoff regarding framework capacity, QoS ensure, and additionally traffic load balancing, without causing extra system operation expense, for example, power consumption and data transfer capacity use. The proposed methodology and framework model can be modified to situation particular prerequisites.

Amit Sehgalet. Al [8] proposes a new algorithm for optimal network selection focused on numerous client preferences under heterogeneous networks. As 4G framework helps multi-mode and reconfigurable mobile devices to help inter-working of heterogeneous networks. The algorithm chooses suitable network amid handoff focused around client preferences and investments. The client can choose different QoS parameters like data transfer capacity, expense of service, security level, call drop probability and so on to choose proper networks. The proposed algorithm utilizes a distance function to produce an ordered list of different accessible access networks in a specific district as per the various client preferences and level of investment. In the situation of an occurrence of handoff because of the movement of the client starting with one locale then onto the next region, the methodology is rehashed to discover again a suitable network from all the accessible networks in the new district. The results obviously demonstrate that the proposed algorithm constantly best connect the client, according to his preferences of QoS parameters in a 4G System.

Mustafa Ergenet. Al [9] considered the issue of resource allocation for versatile modulation in OFDMA frameworks. The issue is considered in two separate methodologies: one augments the capacity and the other one fulfills altered QoS criteria in every image. In an OFDMA framework, subcarriers are circulated among clients and number of bits transmitted in every subcarrier is accustomed as indicated by the rate prerequisites of clients to minimize aggregate transmit power. It has been demonstrated that Integer Programming can enhance resource allocation. Notwithstanding, the ideal solution cannot be implemented continuously. They proposed a basic suboptimal solution that reasonably allocates and effectively converges near optimal meeting the QoS criteria for every symbol. The algorithm demonstrated great performance regarding tight power control, iterative well being and reasonable scheduling among clients when contrasted against the optimal solution and existing proposed suboptimal plans. The presented solution can be applied to the uplink when there is ideal synchronization.

Chunming Liu et. Al [10] presented a new resource management plan to help both voice and data services with QoS provisioning in next-generation incorporated WLAN/cellular networks. A novel joint call admission policy is initially inferred with considering heterogeneous network framework, service sorts, QoS levels, and client portability qualities. To mitigate traffic congestion in cellular networks, an optimal channel searching and replacement algorithm (oCSR) is further built to balance complete framework traffics in WLAN and 3G cellular network and in addition to decrease average framework QoS cost. A single dimensional Markov model is further built to analyze interworking framework performance measurements. Both hypothetical investigation and simulation results demonstrate that their plan performs better than both conventional disjoint guard channel plan and non-optimized joint RM plan.

Ramarajan A. and Thangadurai N. [11] examine the network selection plans that were accessible for the 4G frameworks and the presented plan provides the concept utilizing various parameters to choose the network. In any case to implement with the services of network selection the devices ought to be reconfigurable and to backing multi-mode operation. Network selection plans that were presented before were performed utilizing restricted parameters just. At the same time, this plan gives proficient one due to the quantity of parameters included is more. As indicated by that, this plan fulfills the client requirements effectively. The presented algorithm performed by utilizing distance function values to make an ordered list of networks. The last outcomes about plainly demonstrate that the proposed plan gives the proficient system choice to the clients according to their advantage.

Amir Esmailpour and Nidal Nasser [12] have proposed a structure, which is named as DQBA, for the RRM systems in Wimax, which supports different sorts of service streams and makes BA that is dynamic, reasonable, and effectively used. They indicated by simulation outcomes about that DQBA could convey QoS support while being reasonable to all classes of service characterized by the standard. They

acquainted two new measurements with assess QoS separation in WiMAX, specifically, decency and usage. They utilized the new measurements to perform PS, CAC, and BA utilizing traffic conduct and network conditions. DQBA demonstrates predominant performance in the accompanying two cases:

- a) In examination with the MPQ model for NRT applications
- b) In examination with MDRR for RT applications.

Nonetheless, it gives perfect performance in both cases regarding RT applications utilizing MPQ and concerning NRT applications utilizing MDRR. As far as the general performance of the framework concerning both RT and NRT applications, DQBA undoubtedly outperforms both MPQ and MDRR models. Likewise, DQBA demonstrates a granular level of traffic separation in both inter- and interclass levels and QoS support assures to both RT and NRT applications in both levels. As far as call blocking probabilities for RT applications, the MPQ model rejects the slightest measure of calls, with DQBA and MDRR after. Regarding NRT applications, MPQ rejects half of the calls, while both DQBA and MDRR permit 80% of the calls.

3. Proposed System

In this paper, a hybrid power-based energy efficient resource allocation (EERA) scheme is presented for allocation of interdependent tasks to nodes in mobile ad hoc computational Grids. The task dependencies are isolated into two categories: precedence dependencies and parallel execution dependencies. With precedence dependencies, tasks execute independently however oblige inputs produced by different tasks. While with parallel execution dependencies, tasks periodically swap data and communication among tasks may happen at any time during execution. In addition to dependencies, tasks are also characterized into three categories: computation-bound tasks, local communication-bound tasks, and remote communication-bound tasks.

Contrasted with conventional algorithms, complexity of presented algorithm relies on number of transmission power levels as opposed to number of nodes within a Grid. The EERA is quite different from existing algorithms due to it considers dependencies in the middle of tasks and is depended on hybrid architecture which results into compelling allocation decisions furthermore reduces processing burden from a single node.

4. Conclusion

In this paper, a plan based on transmission power control system is presented to address the issue of energy efficient resource allocation to mutually dependent tasks in mobile ad hoc computational Grids. The essential concept is to exploit dependencies and task sorts and allocate mutually dependent tasks to nodes open at least transmission power. This decreases energy consumption and communication cost due to tasks executing on two nearby located nodes do not have to utilize maximum transmission power to communicate. The presented plan is depended on a hybrid framework that

brings about compelling allocation furthermore decreases handling load from a solitary node and communication cost associated with exchange of control data. This study addresses the issue of searching a group of closest nodes inside a Grid to allocate a set of mutually dependent tasks. The issue of searching a group of closest nodes is displayed as a k-nearest neighbor search issue and an algorithm based on transmission power control mechanism is developed. Compared to conventional algorithms, the complexity of KNN search algorithm depends on number of transmission power levels rather than number of nodes within a Grid.

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