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Resource Reservation and Sharing Techniques in Cellular Network

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Abstract: The resource sharing and resource reservation are the two policies which are implemented in the cellular network to maintain quality of services. In this research, existing technique is improved which is based on the priority based technique. The priorities is being assigned to each host on the basis of their usage in the network. The proposed technique is simulated in MATLAB and it is analyzed that network performance is increased in the network.

Key words: Resource reservation, resource sharing, network, performance, implemented, priority

INTRODUCTION

One of the important parts of our day to day lives is the cellular communication technology. With the help of cell phones, one is not only able to stay in touch with other but also have access to various services such as Internet, monetary services, sending text messages and so on. For the purpose of providing communication amongst the various users, each cell phone has its own temporary radio channel (Damnjanovic *et al*., 2011). With the help of one channel being utilized for each mobile, the communication can be held among numerous mobiles. There is a pair of frequencies utilized here. One frequency is utilized for sending the information from the cell site which is also known as the forward link. The second frequency is known as the reverse link which helps in receiving calls for the cell sites sent from the users. It is important for the mobiles to remain within the range of the base station to provide proper communication as the radio channel range fades when the mobile is too far. There are various components that combine to make a cellular system. The most important part of the geographic unit is the cell. The shape of the areas into which the coverage region is divided helps in originating the name cellular for it (Hasan *et al*., 2011). The combination of cells into a group is collectively known as a cluster. Within a cluster there is no reusing of the channels. There is a reduction in the interference between adjacent channels when various frequency bands or channels are allocated to adjacent cells. This is done in covering the margins of an area without causing any interference. The cells are grouped within the margin into clusters. Frequency reuse helps in assigning specific radio channels to each group of cells within an area (Chen *et al*., 2011). The groups of channels are different from the neighbors and various cells are assigned to them. Due to the economic issues being faced, the smaller areas have been combined into larger systems which help in reducing the costs. The concept of cell splitting has been adopted within the system operators to solve th various issues being faced. A single area is split into smaller regions because there are many users involved here. When a call is connected, there are two parties involved within that communication. The signals cannot be received once the user gets out of he provided cell site. A handoff is requested by the cell site involved within this situation. Within this case, the call is switched to a frequency channel which is closer to the connected call. However, it is to be taken care that there is no interruption made on any other calls and no alerts made to the user (Lozano *et al*., 2014). Until, the user is interacting the call also continues and there is no handoff required by the user in this situation. The cellular system faces various security issues during its deployment process. The communication amongst users can be done from anywhere across the world with the help of the 3G services. There are various issues related to the cross region and the cross supplier authentication faced by these services. As there are many users that have been communicated through the cellular phones, it is to be made sure that the communication being made is done through a secure channel. Within the IP based networks, it is to be ensured that the client is associated with an access point. This helps in assuring that the location of the users is not altered (Paxson and Floyd, 1995). There are various issues such as the virus or malware interruptions occurring within the cellular systems due to a huge number of applicants available.

Resource sharing: Resource sharing is a very important factor within the communication systems. The spectral

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efficiency, coverage and expansion of client satisfaction can be ensured by providing equal priority of resource sharing within the remote networks. It also helps in reduction of cost and the operating expenditures faced by the users. All the resources that are utilized on a regular basis are divided into categories as per their properties, infrastructure and requirements. There is an operator and a client present within the resource sharing process. There is no involvement of any other third party to provide the services such as the vendors, marketers, suppliers or central network controllers. There are some prior requirements enlisted by the user's end as well. They involve the various revenue strategies, the private information involving the traffic, mobility and the channel parameters and so on. All such information is not to be discussed with the other end and is to be kept private. There are various constraints available within the process and they are broadly categorized into two categories. The one is regulatory and the other is the one including the environmental constraints (Heffes and Lucantoni, 1986).

Literature review: Esmat proposed in this study, the designing of two phases based resource sharing algorithm in a manner that its computational complexity can be adapted by the network condition. The initial set of candidate channels that can be reused by each DUE is adaptively determined in the first phase. In the second phase, Lagrangian double decomposition is utilized to determine the optimal power for DUEs that amplifying the network cost. As per the simulation results gathered, it can be seen that the optimal performance is achieved. The proposed algorithm outperforms the comparable algorithms, particularly in terms of achievable throughput even with especially reduced complexity levels.

Lin and Yu (2012) proposed in this study, that the issue of deploying different relays within each cell part can be solved by introducing a shared relay engineering method within the wireless cellular networks. This is done by placing a single relay at the edge of the cell which contains numerous receiving wires. This wire can be shared by a large number of sectors. The mitigation of intercell interference can be provided here through the joint processing at the relay. This is an advantage that is provided by the introduction of the shared relaying method. The effectiveness of the proposed system can be checked through the results gathered. It can be seen that the performance of a network can be enhanced and the throughput of the cell edge users can also be increased which is less in the earlier techniques.

Liu *et al.* (2015) proposed in this study, a shared FDR organization which is generated through an FDR relay which is placed at the crossing point of some adjacent cell sectors. At the initial stage, the present interferences can be handled through an easy and practical transmission method. It involves the multi-receiver interference, multi-user interference and self-interference. For the purpose of maximizing the network-level energy efficiency the issue related to joint power and subcarrier allocation is generated. This is done along with the involvement of residual self-interference. The effectiveness of this proposed technique can be determined by analyzing the achieved results.

Mirahsan *et al.* (2015) proposed in this study, a new heterogeneous spatial traffic modeling technique through which the statistical adjustments can be done. The network performance within a system can be affected by factors like heterogeneous and BS-correlated traffic. The effects of such factors can be seen through the proposed method with the help of Heterogeneous wireless cellular Networks (HetNets). There are two different types of heterogeneity involved. One is with the infrastructure and the other with the spatial traffic distribution. Thus, it is also known as HetHetNet. The various factors which affect the performance of the method can be determined after evaluating the results achieved during their implementations.

Qian *et al.* (2015) proposed in this study, that there is a need to dynamically optimize the subcarrier and power allocations for multi-cell wireless networks for enhancing the capacity of the system. For this, an Adaptive SFR (ASFR) method is proposed which is an inter-cell resource allocation algorithm. A search and greedy method is used for searching the subcarrier and power allocations provided within each cell. The process is repeated in an iterative manner within the cells and the process stops only after the predefined convergence criterion is achieved. As per, the simulation results it can be seen that the throughput of the system increases and the performance of the cell edge user is enhanced with the involvement of frequency reuse methods.

Rubin *et al.* (2014) proposed in this study, that there is a need of scheduling mechanisms for multicasting the critical messages within the cellular wireless networks. There is a failure seen within the Macro Base Station (MBS) hub which decreases the robustness of these methods. Through various experiments, small scale base stations (MBS) are introduced within the networks and the comparisons are made with respect to their performances. The TDMA or FDMA adaptive rate and

power scheduling methods are utilized for coordinating the MBS and MBS nodes. It is easy to localize the mobiles located within the cells that have faced failure through this process. The longer ISD range levels included here help in combining the backup of MBS and neighboring MBS nodes. This provides a proper adjustment within the code rate levels also.

MATERIALS AND METHODS

The technique is being proposed in this research which is based on to improve the resource sharing and increase resource reservation mechanism. To provide efficient resource sharing mechanism the priority based technique is being applied in this research. The priority is assigned to each user which is in the network to reserve the resources. The priority of the user is based on the information is stored as the home database or on the visiting database. The database is the information of the user means how much time it spends on the network to access the network resources. The user which spends more time gave less priority and the user which spends less time has high priority. The user which has high priority will get the resources first as compared to user which spends more on the network (Fig. 1).

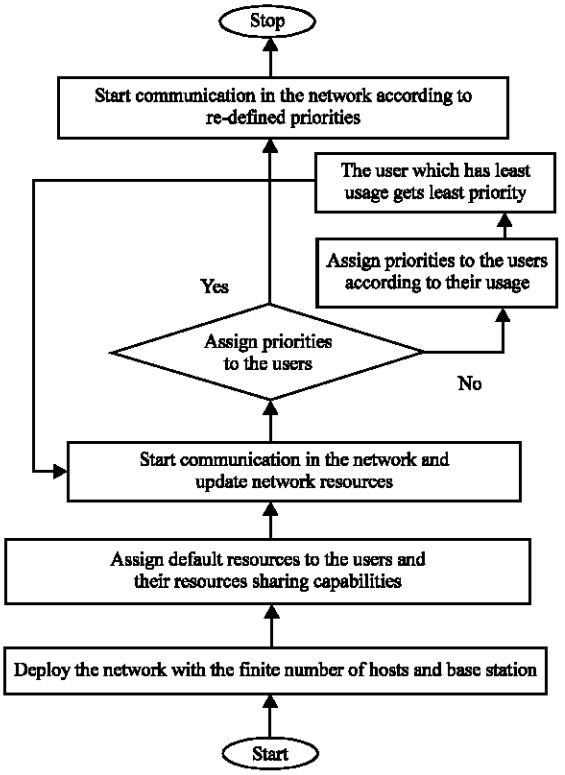

Fig. 1: Proposed methodology

RESULTS AND DISCUSSION

The proposed technique is being implemented in MATLAB by considering parameters which are described in Table 1.

As shown in Fig. 2, the efficiency of the proposed and existing technique is done in terms of resource sharing. In Fig. 2, illustrated that number of resource sharing is increased in the proposed technique as compared to existing technique.

As shown in Fig. 3, the proposed technique reserves number of resources as compared to existing technique.

Table 1: Parameter values

Parameters	Values
Antenna type	Omi directional
Link layer	LL
Queue	Priority queue
Mac	802.11
No. of nodes	21
Area	800×800
Range	18 (m)
Frequency	2.4 (GHz)

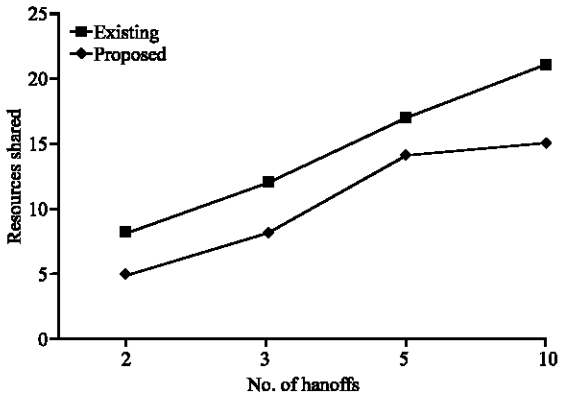

Fig. 2: Resource sharing comparison

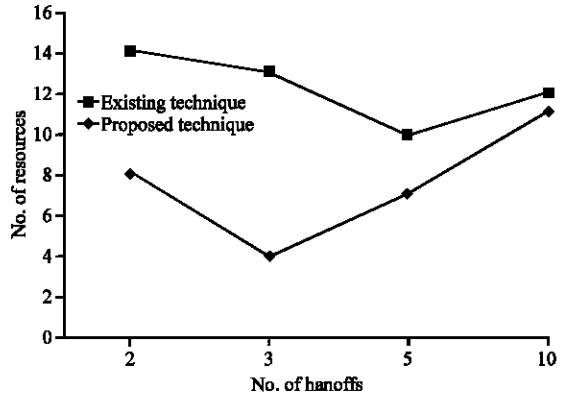

Fig. 3: Resources reserved

CONCLUSION

In this research, it has been concluded that efficient resource reservation leads to easy handoff in the cellular networks. The efficient priority based technique is proposed in this research which assigns priority to the users according to data usage of the host. The user which spends more time in the network has a least priority and vice-versa. The proposed technique is simulated in MATLAB and it is being analyzed that resource sharing is done in the most efficient manner as compared to existing technique.

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