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Dynamic versus Static Channel Allocation Scheme

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Abstract: ***Channel Allocation Schemes have achieving better performance of Wireless networks. This paper has studied the comparison between two of the most known techniques of channel allocation namely: Static Channel Allocation and Dynamic Channel Allocation. The Comparison is made over many types of networks parameters, in case Dynamic and Static channel allocation. This paper presents the detail survey of all the existing comparison made between these two schemes.***

Keyword: static, dynamic, channel, scheme

1. Introduction

Channel allocation A given radio spectrum is to be divided into a set of disjointed channels that can be used simultaneously while minimizing interference in adjacent channel by allocating channels ppropriately (especially for traffic channels)._ Channel allocation schemes can be divided in general intoFixed Channel Allocation schemes (FCA schemes) Dynamic Channel Allocation schemes (DCA schemes);Hybrid Channel Allocation schemes (HCA schemes: combining both FCA and DCA techniques

Fixed Channel Allocation (FCA)
In FCA schemes, a set of channels is permanently allocated to each cell in the network If the total number of available channels in the system ***S*** is divided into sets, the minimum number of channel sets ***N*** required to serve the entire coverage area is related to the frequency reuse distance ***D*** as follows: due to short term fluctuations in the traffic, FCA schemes are often not able to maintain high quality of service and capacity attainable with static traffic demands. One approach to address this problem is to borrow free channels from neighboring cells.

Dynamic Channel Allocation (DCA)
In DCA schemes, all channels are kept in a central pool and are assigned dynamically to new calls as they arrive in the system._ after each call is completed, the channel is returned to the central pool. It is fairly straightforward to select the most appropriate channel for any call based simply on current allocation and current traffic, with the aim of minimizing the interference._ DCA scheme can overcome the problem of FCA scheme. However, variations in DCA schemes center around the different cost functions used for selecting one of the candidate channels for assignment.

Hybrid Channel Allocation (HCA)
HCA schemes are the combination of both FCA and DCA techniques. In HCA schemes, the total number of channels available for service is divided into fixed and dynamic sets._ the fixed set contains a number of nominal channels that are assigned to cells as in the FCA schemes and, in all cases, are to be Preferred for use in their respective cells The dynamic set is shared by all users in the system to increase flexibility. This paper to provide a survey of the channel allocation problem in cellular systems and presented a detailed and comparative discussion of the major channel allocation schemes including different FCA and DCA schemes . The comparison is in term of Average call dropping probability, load in the network traffic and resources utilization.

1.1. Dynamic Channel Allocation

Anand, Mahmoud& Himanshu (2009) [1], Had addressed the challenge of how to assign these dynamic spectrum leases to various service providers and design fast and scalable spectrum allocation algorithms. A centralized spectrum broker owns a part of the spectrum and issues dynamic spectrum leases to competing base stations in the region it controls.

Narendran & C.Mala (2011) [3], presents work based on the optimization of dynamic channel allocation using genetic algorithm (GA). This attempts to allocate the channel to users such that overall congestion in the network is minimized by reusing already allocated frequencies. The working of Genetic Algorithm which is used in the optimization procedure is also explained. The optimized channel is then compared with a non-optimized channel to check the efficiency of the genetic algorithm.

Mishra1& Saxena (2011) [4], paper provides details of the diff rent categories of channel allocation schemes including static channel allocation, dynamic channel allocation and hybrid channel allocation studied in literature. Also in this paper, we explore the different channel allocation strategies,

Alagu & Meyyappan(2012) [6], a new scheme DCAS (Dynamic Channel Allocation Scheme) for call admission control. In this new scheme, the number of guard channel(s) is adjusted automatically based on the average handoff blocking rate measured in the past certain period of time. The handoff blocking rate is controlled under the designated threshold and the new call blocking rate is minimized. The result shows that the DCAS scheme outperforms the Static Channel Allocation Scheme by controlling a hard constraint on the handoff rejection probability.

Nishant Ranjan Pathak(2014) [7], posed scheme guarantees the quality of service of the user equipments by identifying the user equipments situated at the worst-case locations. The energy-saving performance is evaluated and compared with the conventional uni-pattern operation. The approach is able to minimize the interference significantly. With the limited frequency spectrum, the Kar & Nayak(2014) [8], had proposed an adaptive Channel Allocation Scheme (ACAS)

in which the channels for handoff requests are dynamically allocated based on the observation of certain past period in the network. This scheme is aimed to utilize the available resources efficiently and also to balance the load in the network traffic.

1.2. Fixed Channel Allocation

Swati & Sedamkar (2012) [5], demonstrates that intelligent agent acting collaboratively in a multi-agent system is able to increase the robustness of the cellular network as a whole, to distribute the knowledge and to allow negotiation of radio resources. found that the average call dropping probability of FCA scheme is 96% to 98% and the average call dropping probability of DCA is 26% to 28% in different conditions. Keun(2009)[2], present methods that statically allocate channels to flows at each link when oblivious routing is used, and ensure deadlock freedom for arbitrary minimal routes when two or more virtual channels are available.

2. Comparison between FCA and DCA

Evaluation Parameter	*FCA*	*DCA*
Average handoff blocking rate	High	Low
Average call dropping probability	More	Less
Minimize the interference	Not good	Good
The load in the network traffic	Un balance	Balance
Resources utilization	Less	More
Channel Al location	Do not change during processing of calls	Change Dynamically
Complexity	Less	**More**
Flexibility	Less	More
Implement at ion Cost	Low	High

3. Comparison

The Average handoff blocking rate of FCA scheme is high when compared with Average handoff blocking rate of DCA scheme. In FCA schemes, a set of channels is permanently allocated to each cell in the network, this led to be fixed channel and don't change during process. In DCA schemes, all channels are kept in a central pool and are assigned dynamically to new calls as they arrive in the system, this led to change dynamically.

In an FCA system, the distance between cells using the same channel is the minimum reuse distance for that system. In DCA, channels are allocated dynamically as call arrives and has higher degree of randomness but involves complex algorithms. FCA is simpler and out performs DCA under heavy load conditions, but FCA does not adapt to changing traffic conditions.

4. Conclusions

In recent years, the wireless resource allocation problem has received attention. As a consequence of it , vast amount of innovations taken place, which introduced a large number of new techniques for solving channel allocation problem. This paper to studding the FCA and DCA scheme and comparing between them .The FCA scheme is simple to use and does constrain channel utilization. In the DCA scheme there is no pre-assignment of frequency channels to the cells of the cellular network.

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