Optimize Handover with Channel Assignment and Channel Borrowing Procedure in GSM Network

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Abstract

Wireless communication is reveling its fastest growth period in history, due to enabling technologies which allow extensive deployment. Handover is a critical feature in cellular systems and therefore handover algorithms are under extensive research. A handover priority queuing method, which can be used to show rapid handovers with a smaller percentage of dropped calls than any other methods. There is a scheme that allows base stations to borrow channels from neighboring base station in a communication system is presented. Borrowed channels are used with shortened transmitted power to confine interference with co-channel cells. We follow different approaches proposed for achieving handover prioritization and channel allocation with a focus on reservation schemes.

Keywords: Mobility Management, Handoff Management, Frequency Management, Prioritization, Channel Allocation, Mobile Communication.

1. Introduction

In 1988, the European Telecommunications Standards Institute (ETSI) was founded. Its task was to work out the GSM standard for a digital radio telephone network.

In the GSM 900 standard, a frequency range between 890 and 915 MHz was assigned to the uplink, and a range between 935 and 960 MHz was assigned to the downlink. In GSM 1800, the frequency ranges 1710 - 1785 MHz were added in the uplink and 1805 - 1880 MHz in the downlink. AT&T's Bell Laboratories developed the cellular concept in 1947, but it was not until 1974 that the FCC set aside radio spectrum between 800 and 900 MHz for cellular radio systems [8]. In a cellular structure, a MS needs to communicate with the BS of the cell where the MS is currently located and the BS acts as a gateway to the rest of the network. Therefore, to provide a link, the MS needs to be in the area of one of the cells so that the mobility of the MS can be supported. Several BSs are connected through hardwires and controlled by a BS controller (BSC), which in turn is connected to a mobile switching center (MSC). Several MSCs are interconnected to a public switched telephone network (PSTN). The home location register (HLR) and visitor location register (VLR) are two sets of pointers that support mobility and enable the use of the same MS

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number worldwide. HLR is located at the MSC where the MS is registered and having subscription information, allowed services, authentication information and localization of the subscriber are at all times stored in the HLR and is where the initial home location used for access information is maintained[1][9].

2. Handover Procedure

A handover is generally originated by an MSC, which first sends a *Handover_Request* message to request the required resources in the reference cell. The reference cell identified with a *Handover_Request_ack* message. The MSC then sends a *Handover-Command* message to the former cell, which in reverse sends the same message to the MS. The MS then exchanges channel in the new reference cell and sends a *Handover_Complete* message, which is also sent from the new cell to the MSC. Finally the MSC sends a *Clear_Command* message to the old cell, which r the message with *Clear_Complete* [11].

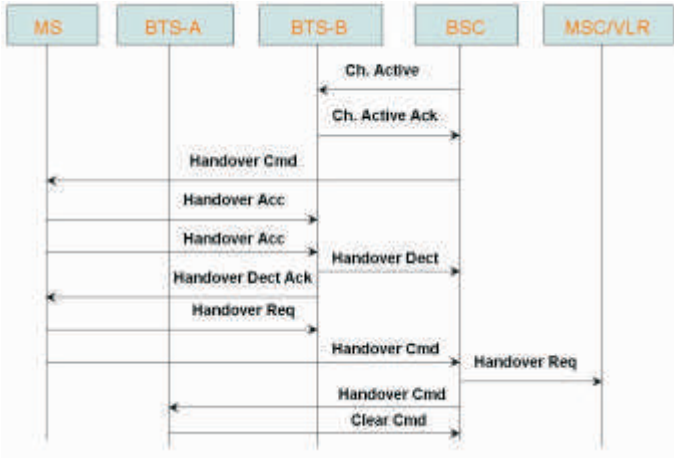

Figure 1: Handover Sequence Diagram [8]

Some Different type of handover is give below:

- Intra-cell handover
- Inter-cell/lntra-BSC handover
- Inter-BSC/lntra-MSC handover
- Inter-MSC handover

A. Handover Management

When a MS is continue the conversation, the handover procedure should be completed while the MS in the overlap region. As the MS moves toward the edge of the BS coverage, the signal quality and signal strength begin to weaken. At same point, the signal strength from neighboring BS (New BS) gets stronger than the signal strength from the serving BS (Old BS). In addition, the new BS receives a good quality stronger signal from the MS than that received by the old BS. The conversation needs to be handed over to the new BS before the connection between the old BS and the MS becomes unserviceable. Otherwise the call is lost. Three issues need to be considered for handover management:

- Handover detection
- Frequency reuse
- Channel assignment

3. System Architecture

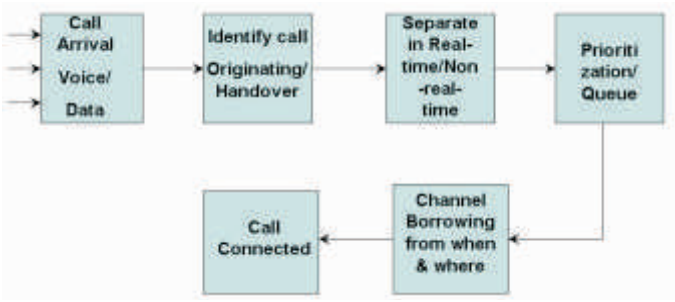

Figure 2: System Architecture

4. Proposed Handover Optimization Approach

In channel allocation algorithm we try to find the best approach to provide channels to all the calls without having any call drop and call block conditions. A channel is available for cells if its use in the cell does not produce any interfere with others. Whenever a cell required a channel it adopts one available channel by using channel allocation algorithm. Channel allocation algorithm provides optimal resource planning and channel model. The channels for each cell are fixed and prioritized. During a channel attainment, a cell adopts the available channel that has the highest priority. If none of the channels is available, the cell borrows a channel from its neighboring cell according to some priority assignment and channel borrowing approach.

The performance of the proposed algorithm has been evaluated by obtaining the average number of blocked hosts in the network. We inspect the performance of a fixed channel allocation scheme Define the cell array, host array. Cell array is for the cells, host array is to represent the mobile hosts in the network.

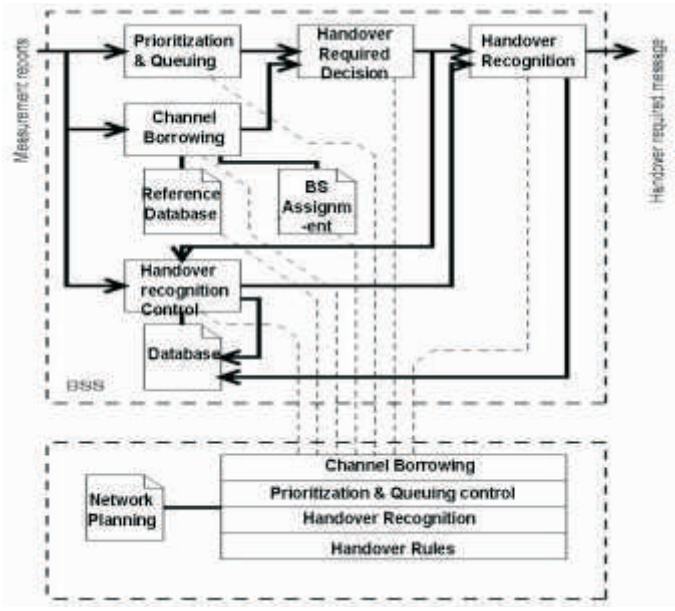

Figure 3: System Flow Chart

5. Result and Discussion

By using above discussed strategies and models we found some good results in communication network. Some results of our work is displayed here through graphs.

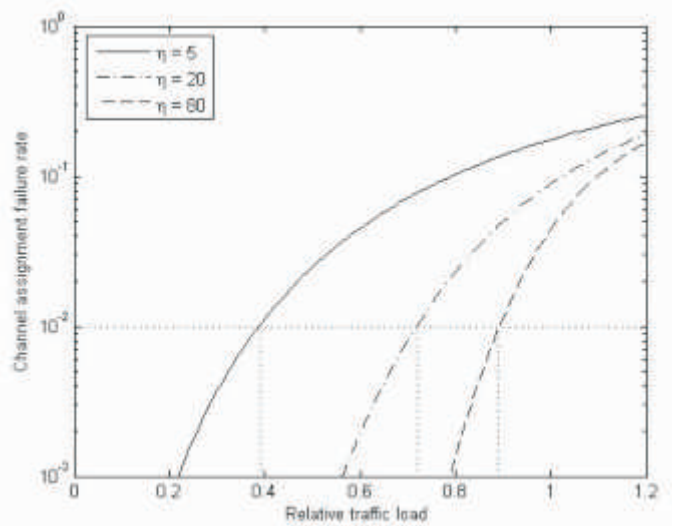

Figure 4: Channel Assignment Failure Rate

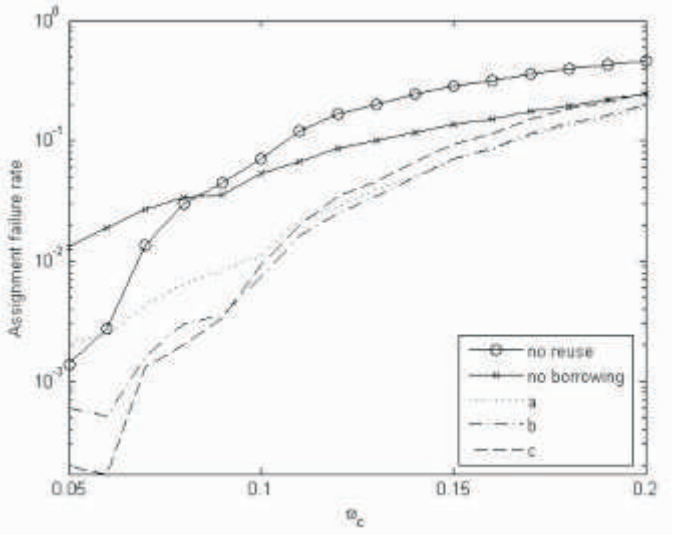

Figure 5: Assignment Failure Rates of Reuse and Borrowing Partitioning

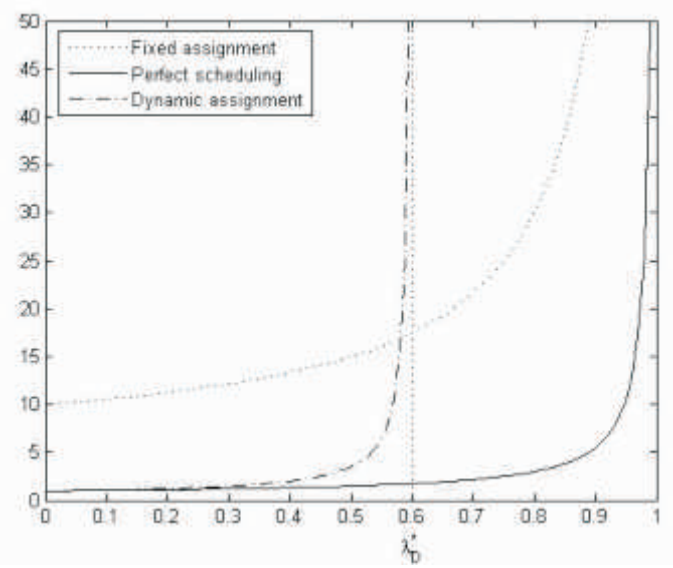

Figure 6: Channel Allocation Strategies Comparison

6. Conclusion and Future Work

This paper analyzes and proposes effective and efficient algorithms for mobile handover management and service management in mobile wireless networks, focusing on communication service cellular networks. We tackle this issue by considering three topics: channel allocation, prioritization and queuing, and by channel borrowing. The design of a handover scheme is an important consideration fro the QoS in a communication network.

We proposed a preemptive priority handover scheme with channel borrowing for integrated voice/data cellular mobile systems. The calls generated in network are classified into three different groups: handover voice calls, originating voice calls and data calls. Priority is given to handover voice calls over the other two kinds of calls [6]. To further reduce the network signaling, capability and communication cost, we have investigated a class of integrated location and service management strategies by co-locating an MS's service proxy with the MS's location database. By using location base services it's easy to provide good facilities to mobile users without any trouble at any time, any place.

7. Acknowledgment

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