

# Handoff Control in Satellite Communication Applying Multi Billboard Manager Method

Priyajit Sen, Monish Mukul Das, Debabrata Sarddar, Rajat Pandit



**Abstract:** LEO satellites play an important role in global communication system. LEO satellites have some advantages over GEO and MEO satellites, in respect of power requirement, end-to-end delay & more efficient frequency spectrum. But the main problem of LEO satellite, is that they have large relative speed than the speed of mobile nodes (MN) and earth, so that the handover occurrence is more. As a result, the call blocking probability ( $P_b$ ) and force call termination probability ( $P_f$ ) is higher. To overcome this problem, Billboard manager based handover (BMBHO) was introduced to reduce the scanning time significantly and also to reduce the  $P_f$ . But the main problem of single billboard manager (BM) is that, since all handover requests have to be processed from a single point. In this paper, we have proposed the concept of multi-billboard manager based handover (MBMHO) method to resolve this problem. Thus, handover request will be served more efficiently so that both  $P_b$  and  $P_f$  are minimized than the BMBHO method.

**Keywords:** Electromagnetic radiation, False handoff initiation, GPS (Global Positioning System), Handoff, MT (mobile terminals), Mobile IP, NGWS (Next-Generation Wireless Communication System).

## I. INTRODUCTION

The Mobile Station (MS) includes the bodily gadget, including the radio transceiver, show and digital signal processors, and the sim card. It affords the air interface to the user in Global System for Mobile Communication (GSM) networks. A base station is a set communications region and is part of a community's Wi-Fi phone device [1]. It relays data to and from a transmitting/receiving unit, together with a mobile cell phone. A base station allows mobile telephones to paintings within a local vicinity, so long as it is connected to a cellular or Wi-Fi carrier company. It is typically located in a region a long way above the grounded place supplying coverage. A mobile switching centre (MSC) is the centrepiece of a community switching subsystem.

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The MSC is generally associated with communications switching functions, including call set-up, release, and routing. However, it additionally plays a bunch of different responsibilities, such as routing SMS messages, convention calls, fax, and service billing as well as interfacing with different networks, which includes the general public switched telephone community [2]. The MSC is established in order that base stations connect to it, whilst it connects to the Public Switched Telephone Network (PSTN) because mobile phones connect with these base stations, all kinds of conversation, whether among two mobile telephones or between a cellular phone and a landline cell phone, journey through the MSC. A handoff refers to the method of shifting a lively call or records session from one cell in a cellular community to another or from one channel in a cellular to some other [2, 3]. A well-carried out handoff is crucial for handing over uninterrupted carrier to a caller or information consultation consumer. Mobile networks are composed of cells, each of that is able to supplying telecommunications services to subscribers roaming inside them. Each mobile can best serve up to a certain region and wide variety of subscribers. As a consequence, when any of those two limits is reached, a handoff ensues. As an example, if a subscriber actions out of the coverage region of a selected cellular even as coming into another, a handoff takes area between the 2 cells [4]. The cell that served the call previous to the handoff is relieved of its duties, which can be then transferred to the second one cellular. A handoff can also be brought about the variety of subscribers the usage of a selected mobile has already reached the mobile's most limit (potential). Such a handoff is possible because the reach of the cell sites serving those cells can occasionally overlap. As a consequence, if a subscriber is inside an overlapping vicinity, the community may additionally prefer to switch one subscribe call to the cellular concerned inside the overlap. Every so often a handoff can take area despite the fact that no restrict is breached. As an instance, think that a subscriber to start with within the jurisdiction of a massive cell (served via an umbrella-type mobile website online) enters the jurisdiction of a smaller cellular (one served via a micro mobile) [5]. The subscriber may be surpassed off to the smaller cell so as to loosen up capacity on the larger one. Difficult handoff is an actual ruin inside the connection at the same time as switching from one cellular or base station to another. The transfer takes area so quickly that it is able to infrequently be observed by using the user. Because handiest one channel is wanted to serve a system designed for hard handoffs, it is the cheaper option. Soft handoff includes two connections to the cellular smartphone from exclusive base stations. This ensures that no ruin ensues at some stage in the handoff. Certainly, it is more expensive than a hard handoff.

An intra satellite handover is handover from one spot beam to any other. Here, cell stations are present within the footprint of the satellite, but in every other cellular. An inter satellite handover is handover from one satellite to any other satellite. Here, cellular stations leave the footprint of 1 satellite. The gateway handover is handover from one gateway to any other. Cell stations stay within the footprint of a satellite, but gateway leaves the footprint. An inter device handover is handover from the satellite network to a terrestrial mobile community [6, 7]. Right here, cellular stations can attain a terrestrial network again which might be less expensive, has a lower latency etc. Bill board manager takes a vital role in handover. It now not handiest saves the location and updates of various parameters of a satellite however also pick the quality satellite according to the pleasant of service (QoS) parameters. It continues up to date statistics about most carrier time, most variety of unfastened channels, minimal distance. The whole handover management scenario is divided into five elements which may be describes as follows. BM shops all info about satellites: all the satellites resister to BM which includes their IP cope with, their mobility sample in 24hours i.e. which location it covers in any time. This data not subjected to exchange and permanently saved in the BM database. All satellites ship periodic information: all of the satellites will send the subsequent info periodically to the BM [6, 7].

## II. RELATED WORKS

Debabrata Sarddar et al. [1] have proposed handover management in LEO satellite Network using Angular and Distance Based Algorithm. Papapetrou E. and Pavlidou [2] have a Quality of Service aware handover management scheme in LEO/MEO satellite systems. Re E. Fantacci et al. [3] proposed a handover queuing strategies with dynamic and fixed channel allocation techniques in LEO satellite systems. Tekinay S. and Jabbari B. [4] discussed handover and channel assignment strategies in mobile cellular networks. Xu Y. et al. [5] studied on elastic handover scheme for LEO satellite mobile communication systems. Debabrata Sarddar et al. [6] have discussed minimization hand off latency using stack based BMBHO Algorithm in LEO Satellite. Suman Kumar Sikdar et al. [7] worked on cost analysis of algorithm based billboard manger based handover method in LEO satellite networks. Debabrata Sarddar et al. [8] have proposed a handover management technique in LEO satellite network using area and angle based algorithm.

## III. PROPOSED WORK

**The procedural steps for handoff initiation and handoff management are as shown below:**

**Step1:** Handoff occurs when the mobile stations (MSs) leave the spot beam area (footprint) of one satellite to another and cross the threshold angle.

**Step 2:** During handoff, MS communicates with the base station that belong to other satellite through radio wave.

**Step 3:** MS will request the BS for any free channel that can handle the request.

**Step 4:** The BS will request the Bill Board Manager (BM) for details of available number of channel.

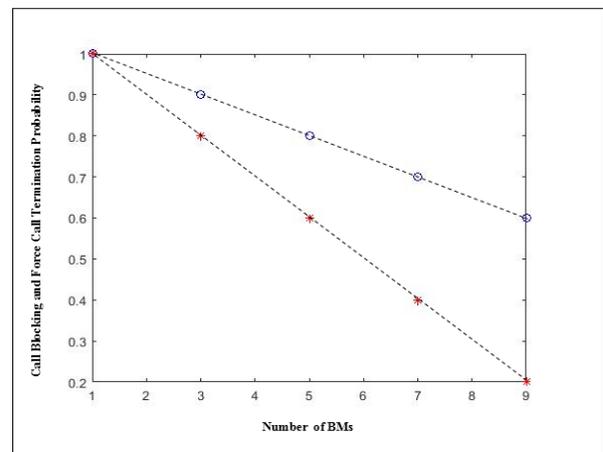
**Step 5:** Multiple BM (MBM) devices can keep more details regarding available and already allocated channels, so that more handover request can be served at a time.

**Step 6:** The channel will be allocated to the requesting MS, successful handover will occur and communication will be continued.

**Step 7:** End

### A. Simulation and Analysis.

The result using MBMBHO method & result applying BMBHO method in respect of call blocking and call termination probability are presented in Fig. 1. The simulation of these two algorithms have been performed accordingly by applying MATLAB 2015. It appears from the graphical presentation of results that probability of call blocking and call termination is inversely proportional to the no. of BMs.



**Fig. 1. Relationship of No. of BM's with probability of Call blocking and Forced Call termination.**

In Fig. 1. "\*" denotes the result using MBMBHO method & "o" denotes the result using BMBHO method.

## IV. RESULT AND DISCUSSION

From Fig 1, we can see that as the number of billboard managers are increasing call blocking and force call termination probability is decreasing. Probability can range between 0 and 1. 1 represents the high chance of call blocking or termination and 0 represents the low. Using MBMBHO, call blocking probability decreases to 0.2 whereas in BMBHO, it is 0.7. So, it can be concluded that, the call blocking and force call termination probability in MBMBHO is lesser than BMBHO method. Thus, our proposed method MBMBHO is proved to be a significant method of handoff management.

## V. CONCLUSION AND FUTURE WORK

Handover using Bill Board Manager has several advantages and disadvantages. To overcome those drawbacks of Bill Board manager based handoff management, we have introduced an upgraded approach which is Multi Bill Board Manager (MBM) based handoff management approach. We have simulated the proposed algorithm and showed that our proposed mechanism has reduced the handoff latency.

Though multiple billboard manager increases the cost but the probability of call blocking and call termination will be minimized. Also, handoff probability will increase.

research interest includes Mobile Computing, Wireless Sensor Network and Cloud Computing.

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