

A Review: Techniques for Handoff Controller Design In WSN

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Abstract – Wireless Communication plays a significant role in today's communication system because of its ease, scalability and mobility. It helps transferring information from one place to another reliably and at higher speed. One problem that is faced during wireless communication is handoff. Whenever handoff occurs in a communication system, the performance of the system degrades. Handoff is an importance that is to be considered while evaluating the performance of a communication system because this affects the mobility of any system. Mobility is important to user because it affects the quality of call that is provided to the user. This paper is a review of the handoff techniques.

Index Terms – Wireless Communication, handoff, mobility, wsn

1. INTRODUCTION

Wireless Communication is the type of communication in which information is transferred from one place to another without any physical links. Wireless communication offers mobility, reliability and scalability to the users. Mobile devices that are used as source of wireless communication have the advantage that they can be used anywhere i.e. even at remote places. Also wireless communication is preferred over wired networks because of their easy use and maintenance. One problem with wireless communication systems is handoff. Handoff is a technique of transferring an ongoing call from one base station to another without dropping a call. A network is considered to be best when the numbers of call droppings are least. The problem of handoff usually occurs when the users moves from one cell to another. The inability of the next cell or base station to take call causes call dropping and this is what leads to the problem of handoff.

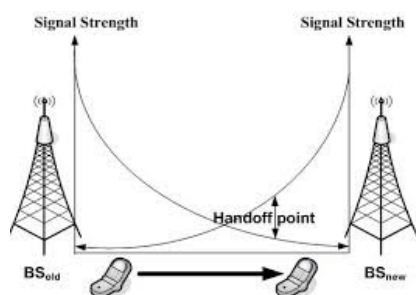


Fig 1 Handoff in Mobile Networks

Mobility is promissory factor in wireless cellular communication systems. It is provided using handoff as handoff enables call transference from one cell to another when a user is moving.

2. TYPES OF HANDOFF

There are two types of handoffs in cellular communication systems:

A. Soft Handoff:

In this type of handoff, the connection with the next cell is first made and then it breaks with the last cell i.e. it is make before break handoff. It is considered to be better handoff because in this first the call is connected to the next cell and therefore the chances of dropping of a call are less

B. Hard Handoff

Hard handoff refers to break before make connection. In this type of handoff the connection with the already connected base station is first broken and then it is made with the next cell. It is the inter-cell or intra-cell handoff. The number of call droppings are more than soft handoff because the connection is first broken.

3. LITERATURE REVIEW

Handoff is a popular term used in cellular communication system. Handoff is referred to as the process of transferring a call from one base station to another without disconnecting it. This feature helps improve the mobility of a communication system provided to the user. Handoff generally occurs when the user is moving and the signal strength of the next base station is stronger than the signal strength of the base station to which mobile unit is currently connected. Numbers of handoff strategies have been explained by researchers and ways to improve mobility are also been introduced. Some of the papers have been described below:

Abhinav kumar et al. [1] In this paper the author has marked mobility as the most important factor that decides the performance and quality of any communication system. Handoff is important for continuity of call which is one of QoS

parameters that decides the quality of network. In this paper the authors has briefly described various techniques of handoff and has made comparison between different handoff strategies that are used in wireless cellular communication. The comparison is made on the basis of various parameters like execution time, S/I ratio, Relative Signal strength, call handling difficulty, handoff made and generation methods.

Nisha et al. [2] In this paper, the author states that handoff between different cells is unavoidable and it is important to avoid call disconnection. Numbers of researches have been carried out to study unsuccessful handoffs. The authors have carried out research to study the efficient channel allocation and have also studied different strategies of handoff to find out QoS parameters to evaluate the quality provided to mobile users. The techniques of handover initiation have been finalized on the basis of hysteresis, signal strength and threshold. Summary of different handoff strategies is also provided in the paper. In the paper, discussion is done on various handoff protocols, handoff management issues and on handoff decisions.

Vidya S. Pande [3] In this paper, the author has mentioned the advancing technology as a reason for rapid advances in wireless communication systems. Advances are being made in the services provided to the users and the quality is being improved so that users can use this technology anytime and anywhere. In this paper proposal of handoff algorithm between WLAN and CDMA 2000 cellular networks is given. The handoff in the proposed algorithm is done on the basis of the handoff delay time and throughput. A flawless vertical handoff procedure between IEEE 802.11 WLAN is proposed in the paper.

Madan Lal Tatarwal et al. [4] In his paper the author states the advantages of wireless communication systems such as flexibility, mobility and scalability. Lots of researches have been done to reduce delays caused by handoffs. Author states that Handoff is more important in WLAN as compared to communication systems because of limited range of APs in WLAN. Authors have proposed various schemes for reducing handoff latency and to enable rapid handoff in IEEE 802.11 wireless networks. A review of various fast hand off techniques have been done and then are listed its merits and demerits. The purpose of the author of the paper is to reduce handoff latency for ITS in vehicles and to mark the importance of fast handoff for flawless connectivity. Authors have tried to reduce handoff delays by proposing various techniques.

Piyush S. Jirapure et al. [5] In this paper authors have mentioned mobility as an important factor contributing in evaluating the performance of wireless networks. Mobility is only possible due to handoff. The service continuity wholly depends on the handoff that occurs while call is to be transferred from one cell to another. Some decisions are to be made while transferring a call i.e. selection of best network is

done so that call continues. Handoff decision strategies are proposed in the paper that works on the basis of certain parameters like RSS Based, Cost function Based, QoS Based, Processing Delay Based, Policy Based, Context-Aware Based etc. The performance criteria of the proposed strategies is measured and handoff parameters are calculated.

Geetanjali Chellani et al. [6] In this paper the authors have discussed various handover techniques by classifying and comparing them. The conventional techniques of handoff have been discussed in the paper that was introduced to enhance the performance of wireless communication systems during handoff. Solutions are provided in the paper to overcome the problems faced in the conventional systems and a brief discussion is done on the proposed techniques.

4. PROTOCOLS OF HANDOFF

Numbers of factors are to be considered while designing protocols for handoff. The factors that are considered are the issues that occur in handoff and the constraints that are imposed by the operating environment. Classification of handoff protocols is described below:

1. **Full Connection Re-routing:** In this protocol external processors known as IWDs or Inter-Working Devices are employed to handle handoff. During handoff, a new VC is established like done during anew call. This protocol is optimal. The new routes are computed every time, which makes this protocol latent.
2. **Route Augmentation:** This protocol requires least buffering for handoff and is considered as the simplest protocol. In this protocol there is no need of cell sequencing or additional routing. the route extension in this protocol is made by analyzing the last and the current position of MT. No optimal path is provided by this protocol for handoff.
3. **Partial Connection Re-routing (Incremental Re-establishment):** This protocol is both simple and optimal. Some of the part of route is re-routed while the rest is preserved which offers both optimality and simplicity to the protocol. The route connections are done by employing the NCNR algorithm. Nearest Common Node Rerouting reroutes the handoff at the closest network. The rerouting of the path in this protocol is done between Cross Over Switch (COS) and the target whereas the rest of the path is kept same. The protocol provides better resource utilization and it also helps reduce signaling.
4. **Multicast Connection Rerouting:** This protocol is mixture of all the three above stated protocols. In this protocol the pre-allocation of the resources is done in the area where the mobile user is located. The connections are created on the establishment of any

new connection and a virtual connection tree is set up which is connecting all the base stations towards which the mobile user may move in future. This protocol offers choice o mobile user to move freely during handoff. The allocation of Virtual connection Tree can be static or dynamic. The advantages of this protocol are that it is fast and it also guarantees better QoS parameters. The only disadvantage of this protocol is that it do not offers effective bandwidth utilization.

5. MANAGEMENT ISSUES IN HANDOFF

Several challenges come in the way while deciding or selecting a handoff strategy. These challenges occur while implementation of handoff is done in wireless communication systems. These challenges are discussed below:

1. **QoS (Quality of service):** first challenge is obtaining the expected value of the quality of service parameters. the parameters that are the causes of disruption in handoff are - handover blocking due to limited resources, out-of-order cell delivery, cell losses, delay and delay variations. these parameters are needed to be obtained as negotiable to get a better performance wireless communication system.
2. **Rerouting Connections:** the second challenge is regarding rerouting the current path or creating the signalling protocols that are employed for the feasibility of solutions and also for rerouting the path.
3. **Point to Multipoint:** This is regarding the development of protocols that are used for rerouting the connections. the connections hat are to be made are from point to multipoint.
4. **Mobile-to-Mobile Handoff:** The connection routing and the QoS are supported or enhanced by upgrading the conventional protocols for connections between mobile users.
5. **Optimization:** the current MT connection is to be rerouted along the optimal path by developing the conventional methods.

6. CONCLUSION

Since, many strategies have been developed for handoff as per the literature study. Many researchers have worked on the control of handoff to offer higher mobility the users. Many algorithms have been designed till date for efficient working of the communication system but yet many more advancements are to be made in the system. More effective strategies are to be developed for handoff in cellular communication systems so that mobility of the system can improve.

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