Smart Channel sharing over the WiMax Environments using the Location Awareness

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Abstract The call handover technique comes with some problem such as delay in response, lose of information, disturbance, insecure communication, and out of coverage area etc creates inefficient communication and decreases QoS. The cause of problem can be due to overloaded BS, latency delay and inefficient handover decision. This produces poor end-to-end performance which future produces low throughput, less total packet received, high end-to-end delay etc. This level of QoS is not sufficient for good call handover in mobile WiMAX. In the Proposed scheme we will have to avoid the data loss during handover by considering the soft handovers and propose a technique to select a base station for potential soft handover in WiMAX. We will develop a base station selection procedure that will optimize the soft handover such that there is no data loss; handover decision is taken quickly and thus improving overall handover performance.

Keywords: Call admission control, channel handling, channel assignment, channel sharing.

I. INTRODUCTION

The rapid growth in the area of communication has generated the need of mobility during communication. The concept of mobility of a terminal is a requirement of great importance, supported by a procedure which is known as handover. Handover is a key element in maintaining air link to base station even when mobile node is moving with high velocity and changes its geographical position. So this paper includes the introduction to WiMAX, structure of WiMAX and its applications. The requirement of handover in WiMAX is also discussed. The problem definition is given and objectives of carrying out the research are also explained.

A. Introduction to Wimax

WiMAX stands for Worldwide Interoperability for Microwave Access. The name “WiMAX” was created by the “WiMAX Forum” in June 2001 to promote conformity and interoperability of the standard and based on Institute of Electrical and Electronics Engineering (IEEE) 802.16 standard. The forum describes WiMAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL". Basically WiMAX is a telecommunication technology aimed at providing wireless data over long distance in a variety of ways, from point-to-point links to full mobile cellular type access. The WiMAX technology is intended to provide broadband connectivity to both fixed and mobile user in a Wireless Metropolitan Area Network (WMAN).

B. Call handover in Wimax

When a mobile user travels from one area of coverage or cell to another cell within a call’s duration the call should be transferred to the new cell’s base station. Otherwise, the call will be dropped because the link with the current base station becomes too weak as the mobile recedes. This ability for transference is a design matter in mobile cellular system design is call handover. Handover action is complete when the receiving controller acknowledges assumption of control authority.

1. Mobility and handover management

WiMAX supports four mobility-related usage scenarios.

Nomadic: The user is allowed to take a fixed subscriber station and reconnect from a different point of attachment.

Portable: Nomadic access is provided to a portable device with expectation of a best-effort handover.

Simple mobility: Movement speed of up to 60 Km/h with brief interruptions of less than 1 sec during handoff is allowed for WiMAX subscribers.

Full mobility: Movement speed of up to 120 Kmph and seamless handover and less than 1% packet loss is supported for WiMAX subscribers.

WiMAX supports three different types of MAC-layer handover activities, namely, hard handover (HHO), fast base station switching (FBSS) and macro diversity handover (MDHO). Of these, the HHO is the default handover mechanism and the two soft handover procedures, the FBSS and the MDHO are the optional types.

2. Types of handover

Here we classified handover types from four points of view which is a novel classification of handover in wireless and WiMAX networks. Types of handover can be categorized as Technology, Structural, Initiation, and Execution mechanisms aspects.

a. Technological Aspect: Handovers are also achievable among different technologies. It means that, handover can
be occurred between Mobile WiMAX and other wireless technologies, or vice versa. It can be categorized into two classes, horizontal and vertical handovers. The former occurs when handover is within a single technology and the latter is the handover within different technologies such as wireless LAN and mobile WiMAX.

b. **Structural Aspect:** Handover does not always mean changing the BS, it can also happen within the same BS but among various channels in the same BS, which names intra-cell handover while in inter-cell handover MSs transfer from one BS to another BS.

c. **Initiation Aspect:** The deterioration of radio signal causing in handing over the MS connection to a suitable target BS (TBS). In this case, MS is responsible for conducting handover, so it is named as MS initiated handover. In the case of handover trigger due to an unbalanced distribution of traffic, usually BSs detect the unbalance situation in the system and BS initiates handover. So, it can be called as BS Initiated Handover.

d. **Execution Mechanisms Aspect:** Mobile WiMAX provides three types of handover from the execution aspect as follows. Hard handover (HHO) is mandatory however fast base station switching and macro diversity handover are optional.

II. **LITERATURE SURVEY**

In this, we will present the work done by various researchers on the mobility improvement handover scheme in WiMAX. Khosla et al. [1] present a mobility improvement handover algorithm with less scan time implementation for Mobile WiMAX. Mobile. The mandatory handoff method is Hard Handoff for Mobile WiMAX and other two optional soft handoff methods are Macro Diversity Handoff and Fast Base Station Switching Handoff method. Handover delay generates during data transmission but handover delay should be less than 50millisecond for real time applications such as VoIP. The mobility improvement handover scheme that depends upon the velocity factor has been taken into consideration in this paper. Yadav and Mehandia [2] proposed the soft handovers to avoid data loss during handover. We know that there are two types of handovers in WiMAX: Hard handover (break before make) and Soft handover (make before break). To avoid data loss during handover we have proposed a technique to select a base station for potential soft handover in WiMAX. Khan et al. [3] Mobile WiMAX, in the past few years has become one of the most important technologies because it has the ability to provide users with a high speed wireless connection in a Metropolitan Area Network. Mobility brings with it the need of handovers which occur when a user moves from one cell to the other. Handover is considered as a highly important issue in mobile WiMAX. Ashoka et al. [4] proposed that WiMAX serving a large number of Mobile Stations (MS) in practice requires an efficient handover scheme. Currently, mobile WiMAX has a long handover delay that contributes to the overall end-to-end communication delay. Most research is focusing on increasing the efficiency of handover schemes. In this paper, it analyses the performance of the two standardized handover schemes, namely the Mobile IP and the ASN-based Network Mobility (ABNM), in mobile WiMAX using simulation. Our results clearly indicate that ABNM is more efficient for handover in terms of handover delay and throughput.

III. **EXPERIMENTAL DESIGN**

The proposed model has been based upon the new and effective model for the efficient handoff mechanism. The proposed model is entirely based upon the newly designed mechanism of standby request for the efficient use of handoff between the different WiMAX network cells. The WiMAX networks are designed to provide the high bandwidth connectivity to the users in the long-range connectivity.

**Algorithm 1:** Stand-by Request based Super Soft Handoff (SRBSSF)

1. Load the cell information.
2. Enable the cell Base Transceiver Station (BTS).
3. Enable the mobile nodes
4. Prepare the connectivity model.
5. Join the node in the network and assign a global id to the network.
   The Nᵢ is the network node Nᵢ, which equals of equips the connectivity with the node Wᵢ and it is not connected to zero nodes, which means it is not out of the range.
   \[ Nᵢ = Wᵢ \sim 0 \]
6. Compute the user distance from the BTS according to given Threshold. The radius has been set to 250 meters in the whole simulation network.
7. If the user reaches within the limit R of Nᵢ cell, Nᵢ cell will update its membership all from previous to itself.

IV. **RESULT ANALYSIS**

**Transmission Delay:** The transmission delay has been obtained as the parameter from the proposed and existing models. Once the traffic gets stable, the transmission delay remains at the 0.03 seconds for the proposed mode and 0.09 seconds for the existing model. This shows the effectiveness of the proposed model in comparison with the existing model. The proposed model results for transmission delay have been displayed below in fig1:
Packet Delivery Ratio: The packet delivery ratio is the total percentage of the data delivered successfully on the other end. The packet delivery ratio graphs have been shown between the proposed model and the existing model. The graphical representation of the packet delivery ratio clearly shows the effectiveness of the proposed model against the existing model as shown in figure 2. The proposed model has been recorded with the maximum packet delivery ratio at 82 percent and 30 percent for the existing model.

Packet Loss (Data Loss): The packet loss is the parameters which indicate the loss of packets during the transmission between the network nodes. The existing model has been found way higher than the proposed model. The packet loss occurs due to the transmission outage during the handoff. During the handoff the data packets gets lost between the mobile station and the base station. The proposed model has been proposed to be effective than the proposed model as per shown in figure 3:

V. CONCLUSION

The proposed model simulation has been designed for the purpose of soft handoff in the WiMAX networks. The WiMAX networks are the alternatives to the Wi-Fi networks and are popular for the high-speed network connectivity in many forms of networks. The latest popular use of the WiMAX model is its application in the 4G/LTE network, where the networks are used in the high-speed connectivity. The proposed model has been designed for the purpose of soft handoff with minimizing the probability of the connection loss while changing the coverage cell. The proposed work has been equipped with the stand-by request based mechanism. The proposed mechanism enables the WiMAX users to stay connected while changing the cells in the WiMAX network. The WiMAX network nodes connect themselves with the other base station in the vital reach in order to keep itself connected while keeping all of the data or voice connections intact in the given WiMAX network while changing its positions from one cell to another cell. The proposed model proposes the use of standby request for the purpose of improvement in the handoff procedure in the existing schemes. The simulation results have been obtained in the form of network performance parameters of network load, packet loss, throughput, packet delivery ratio and transmission delay. The experimental results have shown in the effectiveness of the proposed model in comparison with the existing models. In the future, the proposed model can be improved for the more balanced and accurate handoff model for the better connectivity. The proposed model performance can be also evaluated and compared with the existing models of handoff for the WiMAX networks.

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