QUALITY OF SERVICE FOR GATEWAY RELOCATION IN IEEE 802.16e NETWORKS

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Abstract- Access Service Network Gateway (ASN GW) Relocation is the process of changing the traffic anchor point from one GW to another which is independent of Mobile Stations (MSs) Link Layer Handover. Two-tiered mobility management defined in WiMAX minimizes handover delay and packet loss. The previously defined Standards have details about the Access Service Network (ASN) Relocation procedures. It does not specify when the ASN GW relocation should be performed. As the Gateway Relocation is closely related to Admission Control, the system combines Gateway Relocation and Admission Control for better performance. The Next generation wireless communication system aims at Supporting multimedia services with different Quality of Services and requirements of Bandwidth. So the limited resource of effective management is important to enhance network performance. Admission Control is a Resource Management technique which guarantees QoS. It reduces network congestion by limiting maximum number of traffic in the network. The proposed method makes use of Admission Control (AC) algorithm along with bandwidth considerations to determine when to carry out ASN GW relocation.

Keywords Two- tier mobility in WiMAX, Handover, Gateway relocation, Dropping probability, Blocking probability, Latency

INTRODUCTION

IEEE new standard based on Broadband Wireless Access (BWA) systems, IEEE 802.16, Microwave Access (WiMAX) is an air Interface for Fixed BWA Systems ratified by IEEE as a Wireless Metropolitan Area Network (WMAN) Technology. WiMAX aims at providing broadband wireless- last mile access in a MAN with easy deployment, high speed, high data rate, large spanning area and Quality of Service (QoS) to support all kinds of real-time applications in wireless networks. Digital Subscriber Line (DSL) can cover 3 miles; Wi-Fi can only cover 30 meters. Comparatively WiMAX which is having coverage upto 50km [15]. The IEEE 802.16 standards have defined the specifications for both MAC (Media Access Control) layer and PHY (Physical) layer. IEEE 802.16 standard defines two possible network topologies and are PMP (Point-to-Multipoint) topology and Mesh topology or Mesh mode [14]. Five service types are defined in IEEE 802.16e-2005 standard, which includes UGS (Unsolicited Grant

Service), ertPS (Extended Real-time Polling Service), rtPS (Real-time Polling Service), nrtPS (Non Real-time Polling Service), and BE (Best Effort).

Mobile WiMAX networks supports hybrid mobility management scheme comprising of two layers. The first layer is ASN anchored mobility or Link layer mobility. In ASN Anchored mobility, handover the mobility anchor point the data paths before and after the handover are attached is located in ASN. ASN is not relocated as the part of handover. ASN serves Foreign Agent (FA) functionality. The second layer of mobility management in WiMAX is at IP layer. Home Agent (HA) is being located in CSN. CSN will be actively involved in handling mobility. During this process CSN Anchor point remains unchanged whereas ASN Anchor point in NAP is relocated to different ASN-GW.

Figure 1 shows the ASN Anchored mobility and CSN Anchored mobility.

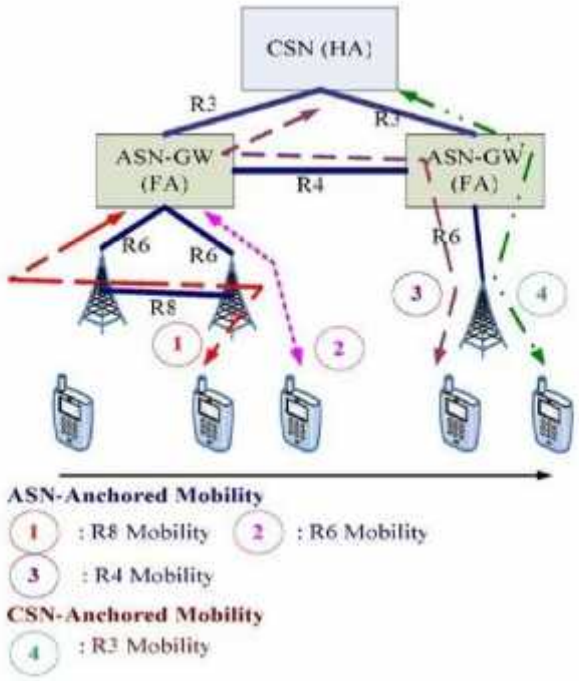

Figure 1: ASN & CSN anchored mobility

Here CSN acts as the Home Agent and ASN acts as the Foreign Agent. Each ASN-GW is connected to the CSN. For Flow 1 there will be occurrence of Intra ASN handover. Here the Handover delay will be very less and the MS is called as serving MS of first Gateway. As the MS is moving, for an instance, in Flow 3 the traffic will be forwarded from the same Gateway i.e first Gateway. It leads to system load in that particular Gateway. In this case the MS is said to be Anchored MS of the first Gateway and Serving MS of the second Gateway. Hence that particular Gateway will drop the new MS if any new MS found in the system. Thus there will be occurrence of blocking probability of the new MS and dropping probability of the Handover MS. In flow 1,2 and 3 there occurs only ASN-anchored mobility whereas in flow 4 there occurs CSN anchored mobility which is called gateway relocation.

RELATED WORK

The two-tiered mobility management defined in WiMAX is similar to that in Hierarchical MIP (HMIP)[1]. In HMIP, the multiple levels of FA hierarchy can reduce handover latency and localize the MIP signaling traffic. In [2], the authors design a dynamical HMIP scheme for MIP networks only. Each MS hierarchy is dynamically determines of FAs according to the ratio of call-to-mobility.The MIP registration is only performed to update for when a threshold is reached. Therefore, MIP can be reduced significantly for when the signaling overhead incurred.In WiMAX, if the MS connects to the BS.The MS is only performs ASN Anchored Mobility which is under another ASN.Because of that if both ASN Anchored Mobility and CSN Anchored Mobility are performed simultaneously. so the handover delay will become too long. Although the aforementioned techniques can reduce the load of the old serving ASN GW, the load of the new serving of

ASN GW is also increased. Therefore, only the Anchored MS needs Anchored Mobility. But in Case of flow 4, the traffic will be tunnelled to the second ASN-GW as the MS is currently in the second Gateway. This step is called ASN GW relocation. This is to eliminate the system load in the first GW. The MS is then not served by the first ASN-GW to perform ASN GW relocation to reduce the load of the Anchored ASN GW. So the load of the Serving ASN GW is irrelevant. Admission Control (AC) is one of the resource management techniques to limit maximum amount of traffic in the network to guarantee service quality for subscribers. In mobile networks and wireless networks, in the AC algorithms are much more complicated due to the movement of MSs and to be served in current network may move from one to another network.If the connection required resources in the target network cannot be supported of the MS may be dropped. It is generally agreed that keeping an on-going connection unbroken is more important than the new connection of MS. Therefore, a handover MS is given higher priority to access the network resources.The overall resources are partitioned and some resources are preserved for the handover in MSs only.This is called priority-based AC. The Various priority-based AC algorithms have been proposed in [3-11]. Here, we discuss two commonly used priority-based AC algorithms: cutoff priority algorithm [4-6] and new call bounding algorithm. These methodologies had problems such as increased system load, handover latency, increased blocking probability of new MS and dropping probability of new MS.

PROPOSED SYSTEM:

Motivated by the aforementioned issues, Besides, the problem is closely related to Admission Control (AC), which is widely used in wireless networks to ensure service quality and reduce network congestion by limiting the number of MSs served in the network. However, traditional AC algorithms [3-11] cannot be used directly when the two-tiered mobility management is deployed in WiMAX.. MS may perform ASN Anchored Mobility without performing CSN Anchored Mobility to reduce handover latency. After the handover is completed.The MS may perform immediately the relocation of ASN GW.So the number of Anchored MSs can be kept in small. However, it may not be a good strategy it also always to relocate for an Anchored MS quickly. For example, an MS may move fast and keep changing its Serving ASN GW. In WiMAX standards [12], [13], it is specified that ASN GW can decide when to perform the relocation of ASN GW. In this paper, we consider that the system load is heavy so Anchored MSs are forced to perform ASN GW relocation. The proposed GRAC determines request of when to Anchored MSs to perform ASN GW relocation and how many Anchored MSs should be relocated. After ASN GW relocation,all the resources are released and system performance is improved.

NEW CALL BOUNDING AC WITH ASN GW RELOCATION

Let a new MS or handover MS is requesting to connect with the ASN GW at time t, if New MS arrives, it will compare the current Serving and Anchored MS with the Threshold value. If it is less than that of threshold value then the New MSs are served. If both are equal, then it will check for any Anchored MS found in the

system.If any Anchored MS is found in the system, then the ASN relocation is performed and that MS is decremented from current ASN and then the new call was accepted. Else the call will be blocked. For Handover MS, the number of MSs in the current ASN GW is calculated and if it is less than maximum number of MS in one ASN GW, then the Handover MS is accepted. Else it will be dropped.

Algorithm: New call bounding of AC with ASN GW relocation

Require: A new or handover MS is requesting to connect with the ASN GW at time t.

if a new MS arrives then

if $Ns(t)+ N_A(t) < \min (Tncb , C- N_H(t))$ then

$Ns(t)= Ns(t)+1$ /* The new MS is accepted. */

else if $Ns(t)+ N_A(t)= \min (Tncb , C- N_H(t))$ then

if $N_A(t) > 0$ then

$N_A(t) = N_A(t) - 1$

$Ns(t)= Ns(t)+1$ /* The new MS is accepted. */

else

The new MS is blocked.

end if

end if

I

C - Maximum number of MSs in one ASN GW

Tncb - Threshold for blocking new MS

W(t) - Number of MSs in one ASN GW at time t

Ns(t) - Number of serving MSs in one of the ASN GW at time t

$N_A(t)$ - Number of Anchored MSs in one of the ASN GW at time t

NCBA ALONG WITH BANDWIDTH

The New Call Bounding Algorithm which was defined earlier includes threshold values for the MS to enter into a Network. Motivated by aforementioned issues, the proposed method considers the Bandwidth for allowing any MS into the Network.

The Idea behind is that, there will be a Bandwidth limit for each GW. And if the requested Bandwidth of the New call or Handover call is less than the remaining Bandwidth (difference between total bandwidth for that Gateway and sum of all MS's bandwidth that are currently servicing by that Gateway) in one particular Gateway, that call will gets accepted. Else it will be dropped.

CONCLUSION

By using New Call Bounding Algorithm along with Bandwidth considerations the Handover MSs are handled efficiently. Hence the Handover MSs are not dropped when system load is full. Handover delay is minimized. It can effectively reduce the blocking probability of new MSs. It also reduces dropping probability of

Handover MSs. Thus the average Serving rate gets improved.

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