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Analysis of QOS in WiMAX Networks

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Abstract

QoS is a key metric for transmission capacity requesting applications in WiMAX (IEEE 802.16 standard) systems. It is accomplished through Bandwidth Reservation for every application. Existing arrangement use Priority based Scheduling Algorithm to guarantee the QoS ensured administrations. Despite the fact that it permits the Subscriber Station (SS) to change the saved transmission capacity through transfer speed demands in every edge, it can't keep away from the danger of neglecting to fulfill the QoS prerequisites. So prior transfer speed reusing was created to reuse the unused data transfer capacity, once it happens. Other than the gullible need based booking calculation, it employments three extra calculations to enhance the reusing adequacy and consequently guaranteeing QOS. These different planning calculations have gotten a few issues terms of usage unpredictability. So we propose to utilize a basic calculation that could be actualized for uplink and downlink booking at the Base Station (BS) and additionally for the uplink planning at the SS. The calculation is taking into account a strict need booking in which the most noteworthy administration class will be served first. The recreation results demonstrate that our proposed calculation enhances the general system throughput.

Introduction:

QoS refers to the ability (or probability) of the network to provide a desired level of service for selected traffic on the network. The demand for multimedia traffic with various QoS requirements such as bandwidth and latency has been the main reason why the IEEE802.16 standard and its derivative, known as WiMAX provide support for QoS. The main advantages of WiMAX when compared to other access network technologies are the longer range and more sophisticated support for the Quality of Service (QoS) at the MAC level. An important principle of WiMAX is that it is connection oriented. It means that an SS(Subscriber station) must register to the base station before it can start to send or receive data. During the registration process, an

SS can negotiate the initial QoS requirements with the BS(Base station). The basic approach for providing the QoS guarantees in the WiMAX network is that the BS does the scheduling for both the uplink and downlink directions. In this paper, a novel scheduling algorithm that guarantees the QoS of various service classes of WiMAX is proposed. We propose to allocate slots based on the QoS requirements and bandwidth request sizes. Furthermore, for each service class we propose a policy to allocate slots so that the BS can perform polling. The algorithm allocates the resources to each service classes in terms of slots. The number of slots needed is calculated based on the minimum and the maximum bandwidth requirements of each connection depending on its service class. The algorithm takes into account the polling interval for uplink scheduling and the packet size for the downlink scheduling in calculating the needed slots. Each service class uses different priority scheme to determine the priority of a connection within a class, either using packet waiting.

PROPOSED SCHEME

We propose a simple algorithm that could be implemented for uplink and downlink scheduling at the BS as well as for the uplink scheduling at the SS. The WiMAX scheduling should comprise three major stages: 1. Allocation of the minimum number of slots: At this stage, the task of the BS is to calculate the minimum number of slots for each connection to ensure the basic QoS requirements. 2. Allocation of unused slots: At this stage, the BS has to assign free slots to some connections to avoid nonwork Conserving behavior. 3. Order of slots: At this stage, the BS has to select the order of slots to improve the provisioning of the QoS guarantees. The scheduling solution we propose concerns only the scheduler at the BS that allocates resources in the WiMAX network Each SS is free to choose the scheduling discipline at its Wi MAX output interface because it will control how the resources, which are allocated by the BS, will be shared between local applications and/or sub connections. A) Allocating the minimum number of slots Suppose Bi is the bandwidth requirement of the connection. Also, suppose that stands for the slot size, i.e. the number of bytes a connection can send in one slot. It is worth noting that the slot size Si depends on an SS since the latter can use different modulations to transmit data. Based on the introduced above parameters, one can calculate the number of slots within each frame by using the following expression: Ni =[Bi / SiFPS]where FPS stands for the number of frames the WiMAX BS sends per one second. In practice, to calculate the number of slots for the WiMAX connections we also have to take their types, or classes, and the request sizes into account. There are four distinct service classes defined by the 802.16 specification: • Unsolicited Grant Service (UGS), • Real time Polling Service (rtPS), non real time Polling Service (nrtPS) and Best Effort (BE).UGS is designated for fixed size data with periodic intervals. The rtPS class is similar to UGS but for variable rate traffic, such as MPEG video data. The sensitive to delay and jitter. The 802.16e specification has added another class, extended real time Polling Service (ertPS). The purpose of this class is to combine efficiency of the UGS and PS classes. The difference between the UGS class is that whereas UGS allocations are fixed, ertPS allocations are dynamic. Depending on the service class the number of slots for each connection is calculated differently. The UGS class does not send the bandwidth requests and cannot participate in the contention. Thus, we always have to allocate the necessary number of slots based on the bandwidth requirement In the case of the rtPS class we allocate slots based on the bandwidth requirements and the request size Ri If the request size equals zero, then we allocate one slot. We cannot allocate zero slots because the rtPS connection cannot participate in the contention. If a connection is allocated at least one slot, then it has a possibility to send the bandwidth request, thus asking BS to allocate more slots. If the request size is bigger than zero, then we calculate the minimum and maximum number of slots based on the minimum and maximum bandwidth requirements. The purpose of the ertPS class is to combine efficiency of the UGS and rtPS classes. The typical application that will use this class is VoIP with the silence suppression. ertPS is allowed to send the bandwidth requests. Since the request size equals zero during a silence period, the BS can allocate one slot thus enabling an SS to ask for more bandwidth when the active phase of the speech starts. The logic behind allocating slots for the nrtPS class is quite similar to the rtPS class. The only difference is that if the request size equals zero, then we do not allocate any slots at all. Unlike the rtPS class, nrtPS connections can participate in the contention. By not allocating slots when the request size equals zero, we preserve some slots that later can be allotted for those nodes that really need them. Since the BE class does not have any requirements at all, we do not reserve any slots for the connections that belong to this class.

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However, the maximum number of slots allocated for the BE connection should not exceed the amount of data specified in the bandwidth request.

Conclusion:

In this paper, we have exhibited a planning answer for the 802.16 BS to guarantee the QoS necessities of SSs in the uplink and downlink headings. Our answer considers parameters, for example, the least/greatest transmission capacity prerequisites, class sort, space size, and the transfer speed solicitation size. The proposed calculation settles on booking choice taking into account the need of the administration classes included and distributes assets regarding required the openings relies on upon the data transfer capacity necessities of every association and the calculation guarantees that the allowed assets don't surpass the greatest necessity of the every association with keep lower administration classes from being famished. The proposed calculation additionally conforms to the standard as it does not present any new flagging component.

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