A

Synopsis for

**Ph D** (External)

On

**INCREASING BANDWIDTH UTILIZATION IN IEEE 802.16 NETWORKS**

IN

**COMPUTER SCIENCE & ENGINEERING (CSE),**

JNTUH, HYDERABAD.

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**Increasing Bandwidth Utilization in IEEE 802.16 Networks**

**1. Introduction**

Mostly the computer industry has been developed vastly as computer networks technology came into existence. There are so many standards are proposed by the experts. Among these standards wireless networks standards play a dominant role on over all available industries, organizations around the world. To support wireless networks most of the standards came into existence. Among these standards, IEEE 802.16 plays a major role because of having flexibility at high data transmissions.

Obviously, the intention for designing IEEE standards is to provide guaranteed quality of service for applications having more demand on bandwidth. In addition to this, IEEE 802.16 standards have aided to facilitate services with high transmission rates for data and multimedia applications in metropolitan areas. For supporting the services that are described above was carried out by using WiMAX. The physical and medium access control layers of WiMAX have been specified in the IEEE 802.16 standards. The most significant communication technologies such as Orthogonal Frequency Division Multiple Access and Multiple-Input and Multiple-Output are embraced in the standards.

Presently the scheme is used for supporting variable bit rare applications and real time applications with guaranteed quality of service are Bandwidth reservation. With this scheme it is very difficult to the subscriber station to predict the amount of incoming data. To ensure guaranteed quality of service more bandwidth reservation is needed than that required. Thus, the amount of reserved bandwidth transmitted data and may not be fully utilized all the time. Although the amount of reserved bandwidth is adjustable via making bandwidth request the adjusted bandwidth is applied as early as the next incoming frame. The unused bandwidth in the current frame has no chance to be utilized. Moreover, it is very challenging to adjust the amount of reserved bandwidth precisely. Therefore, the subscriber may be exposed to the risk of degrading the guaranteed quality of service requirement of applications due to insufficient amount of reserved bandwidth.

The research work is to improve the bandwidth utilization while maintain the same guaranteed quality of services. This objective will be carried out by the following things.

1. Never change the reserved bandwidth which affects the guaranteed quality of services.
2. Increasing Bandwidth utilization by utilizing unused bandwidth.

The above prescribed points are utilized in the research work and make to develop a methodology that improves the bandwidth utilization and over all throughputs of the IEEE 802.16 networks.

**2. Related Work and Motivation**

Bandwidth reservation allows IEEE 802.16 networks to provide guaranteed quality of services. The subscriber reserves the required bandwidth before any data transmissions. Due to the nature of VBR applications, it is very difficult for the subscriber to make the optimal bandwidth reservation. It is possible that the amount of reserved bandwidth is more than the demand. Therefore, the reserved bandwidth cannot be fully utilized. Although the reserved bandwidth can be adjusted via Bandwidth requests, however, the updated reserved bandwidth is applied as early as to the next coming frame and there is no way to utilize the unused bandwidth in the current frame. In our scheme, the subscriber releases its unused bandwidth in the current frame and another subscriber pre-assigned by the base station has opportunities to utilize this unused bandwidth. This improves the bandwidth utilization. Moreover, since the existing bandwidth reservation is not changed, the same guaranteed quality of service is provided without introducing any extra delay.

Many research works related to bandwidth utilization improvement have been proposed in the literature. In a dynamic resource reservation mechanism the amount of reserved resource can be dynamically changed, depending on the actual number of active connections. The investigation of dynamic bandwidth reservation for hybrid networks is presented in [3]. The authors evaluated the performance and effectiveness for the hybrid network, and proposed efficient methods to ensure optimum reservation and utilization of bandwidth while minimizing signal blocking probability and signaling cost. In [5], the authors enhanced the system throughput by using concurrent transmission in mesh mode. The authors in [6] proposed a new quality of service control scheme by considering MAC-PHY cross-layer resource allocation. A dynamic bandwidth request-allocation algorithm for real-time services is proposed in [7]. The authors predict the amount of bandwidth to be requested based on the information of the backlogged amount of traffic in the queue and the rate mismatch between packet arrival and service rate to improve the bandwidth utilization. The research works listed above improve the performance by predicting the traffic coming in the future. Instead of prediction, our scheme can allow subscribers to accurately identify the portion of unused bandwidth and provides a method to recycle the unused bandwidth. It can improve the utilization of bandwidth while keeping the same guaranteed quality of services and introducing no extra delay.

**3. Proposed work**

The main objective of the proposed work is to utilize the unutilized bandwidth without affecting quality of services and try to improve overall throughput of a steady network.

To achieve the above objectives the sub objectives as formulated as:

1. Study of IEEE wireless network standards
2. Study of IEEE 802.16 standards
3. Study of WiMAX and other Advanced Communication technologies.
4. Study of bandwidth-request allocation algorithms.
5. Evaluation of different types of scheduling algorithms.
6. Study the factors that affect the guaranteed quality of services.
7. To study on lab studies, field studies on Reservation request mechanisms.
8. To work on proposed work by designing new scheduling algorithms that will utilize the unused bandwidth.
9. Mathematical analysis and simulations will be used to evaluate the performance of proposed system and existing system.

The main idea of the proposed scheme is to allow other subscribers to utilize the unused bandwidth left by the current transmitting subscriber. Since the unused bandwidth is not supposed to occur regularly, our scheme allows Subscribers with non-real time applications, which have more flexibility of delay requirements, to utilize the unused bandwidth. Consequently, the unused bandwidth in the current frame can be utilized. It is different from the bandwidth adjustment in which the adjusted bandwidth is enforced as early as in the next coming frame. Moreover, the unused bandwidth is likely to be released temporarily and the existing bandwidth reservation does not change. Therefore, the proposed scheme will improve the overall throughput while providing the same guaranteed quality of services.

**4. Work Plan**

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| **S.No** | **Objectives** | **Time(Months)** |
| 1. | To survey on IEEE 802.16 standards and other advanced communication Technologies and preparing for pre PhD exams. | 6 |
| 2. | To study on scheduling algorithms that improve bandwidth utilization | 3 |
| 3. | To study on stimulation tools and their importance in the field of wireless networks. | 3 |
| 4. | To study on guaranteed quality of services for various types of applications exist in the wireless networks | 3 |
| 5 | To work on alternative proposed methods | 9 |
| 5. | To send papers for publications. | 3 |
| 6. | To compare and analyze the proposed methods with existing methods based on utilization and overall throughput performance | 3 |
| 7. | To documentation | 6 |
| **8.** | **Total** | **36** |

**5. References**

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