performance of the proposed bandwidth allocation scheme. Section 5 evaluates the performance of the proposed bandwidth allocation scheme. Finally, Section 6 concludes the paper.

II. Related Work

This section deals with the existing WiMAX Relay network systems and how they solve the bandwidth allocation problem. The IEEE 802.16 standard, commonly known as WiMAX, is the latest technology that has promised to offer broadband wireless access over long distance. Since 2001 WiMAX has evolved from 802.16 to 802.16d for fixed wireless access, and to the new IEEE 802.16e standard with mobility support. In this article we provide an overview of the state-of-the-art mobile WiMAX technology and its development. We focus our discussion on QoS provisioning and mobile WiMAX specification [2, 3]. Wireless video multicast enables delivery of popular events to many wireless users in a bandwidth efficient manner. However, providing good and stable video quality to a large number of users with varying channel conditions remains elusive. We propose to integrate layered video coding with cooperative communication to enable efficient and robust video multicast in infrastructure-based wireless networks. We determine the user partition and transmission time scheduling that can optimize a multicast performance criterion[4]. The quick evolution in technologies has allowed IPTV video stream delivery over IP networks. For that reason consumers have anticipated predictions in which the evolution of IP-based next-generation networks may be eventually driven by video service delivery requirements. An IEEE 802.16j mobile WiMAX relay network is a next-generation mobile wireless broadband network. Compared to IEEE 802.16e which also supports mobility, IEEE 802.16j introduces relay stations to the network to offer improved coverage and capacity over multihop radio systems. However, to supply different IPTV services (HD-TV, SD-TV, Web-TV and Mobile-TV) to consumers, providers must have a video server for each IPTV service type, which increases network resource consumption [5]. WiMAX are designed in a proper network planning which is helpful to offer better throughput broadband wireless connectivity at a much lower cost with the help of existing architecture and available resources [6]. Power allocation for mixed multicast and unicast traffic in wireless OFDMA networks, where the multicast data is divided into basic layer and enhancement layer data. Our goal is to maximize the network total throughput with a total power constraint while guaranteeing the minimum rate requirements of both the unicast and multicast traffic. A suboptimal allocation algorithm is proposed, which combines a cost-based sub channel allocation with the traditional water filling (TWF) and an advanced water filling (AWF) [7, 8]. To apply such cooperation over slow fading channels, we consider exploiting the spatial diversity in multiple relay networks [9].Adaptive Modulation and Coding (AMC), which is a technology used when channel condition changes, is adapted in Mobile Worldwide Interoperability for Microwave Access (WiMAX). Scalable Video Coding (SVC) is a video coding scheme used for different users with bandwidth level. SVC encodes a video into a number of layers. Users receive different number of encoded layers based on their channel condition. In this paper, Intermediate Control Server (ICS) is proposed to deal with the signaling between multimedia server and BS. Both AMC and SVC are employed to enhance the user perceived video quality in the system [10, 11]. The systems are generally multiple-cell systems with frequency reuse. In this respect they are similar to cellular wireless telephone systems, but mobility of the subscriber station is not allowed. The range of the radios varies with transmit power, LOS blockage, and rainfall [12]. Video caching in the wireless relay networks (WRNs) for video on demand (VoD) service. We assume the relay station (RS) of the WRNs is capable of caching a small portion of the ongoing video stream [13].Resource allocation is a vital component of call-ad- mission control that determines the amount of resource to assign to new and handoff connections for quality-of-service (QoS) satisfaction. In this paper, we present approximate analytical formulations of virtual partitioning resource-allocation schemes for handling multiclass services with guard channels in a cellular system. Resource-allocation models for best effort and guarantee access with pre-emption for best effort traffic and virtual partition with pre-emption for all classes are investigated [8].
Analysis of the performance of a new handoff scheme called hybrid cut-off priority scheme for wireless networks carrying multimedia traffic. The unique characteristics of this scheme include support for N classes of traffic; each may have different QoS requirements in terms of number of channels needed, holding time of the connection and cut-off priority [14]. Video multicast service would become one potential application over WiMAX with the popularity of streaming applications in the Internet. Our method mainly uses adaptive modulation to achieve the goal of rate-adaptive multicast, and combines with the concept of layered multicast. According to the size of video layer, SS distribution, and available symbols, our method adaptively changes the modulations of each video layer in each group of picture (GOP) time[3]. The Scalable Video Coding (SVC) standard as an extension of H.264/AVC allows efficient, standard-based temporal, spatial, and quality scalability of video bit streams. Scalability of a video bit stream allows for media bit rate as well as for device capability adaptation. Moreover, adaptation of the bit rate of a video signal is a desirable key feature, if limitation in network resources, mostly characterized by throughput variations, varying delay or transmission errors, need to be considered [13].

III. Requirements for a Resource Allocation Algorithm

Every Resource allocation algorithm must have the following features in order to perform more efficiently. Features are as follows.

A. Load Balancing

Conventionally, load balancing can be described as the process of dividing and distributing jobs among more than one server, accordingly more jobs can be accommodated and the entire system can perform more efficiently. Load balancing has been frequently operated in computer systems for load sharing, but has additionally been utilized in telecommunications. Generally, load balancing can be done in a static or dynamic way. Static load balancing is independent of situation of the system whereas in dynamic load balancing, decisions are made regarding to the current loading status of the system and availability of resources. Load definition, load quantification and load balancing mechanism are essential elements in load balancing process. In what follows, the definition of load, the process of load evaluation, and additionally load balancing mechanisms in mobile WiMAX networks will be presented.

B. Resource Allocation algorithm

The scheme of load balancing of the system by utilizing resource allocation is predicated on carrying the unutilized resources to the area where most of users are placed. In this approach, a centralized component assigns supplemental or free resources to overloaded cells. Resource allocation can be categorized into two main classes, fine-tuned channel allocation (FCA) and dynamic channel allocation (DCA). In an FCA class, a fixed number of channels are allocated to each base station. Though, this scheme does not utilize the channel sufficiently because of the variability of the traffic. DCA as an enhancement to the FCA can acclimate itself with transmutations in traffic and adjusts frequency assignments pertinent to the traffic load. Most of the major researches in this domain have proposed channel borrowing algorithms (CBR) which states in the second category, dynamic channel allocation. The main principle of CB algorithms is utilizing remained resources of cells with lower rate of traffic. Albeit Mobile WiMAX provides a flexible way to allocate frequency resources in DCA manner between BS, it won't be applied at least in the early stages of WiMAX deployment. However, FCA was preferred predicated on its simple mechanism.

C. Load Distribution Scheme

In order to balance the load of the system through the load distribution scheme the offered traffic should be directed to where more resources are available. The main way of operating load distribution is to utilize handover-predicated algorithms. Handover process would be conducted in two ways: MS and BS initiated handovers. The first method for load distribution is load balancing predicated MS initiated handover. In this process, the load balancing logic locates in MSs, hence MSs in the overloaded cells configures the load situation and culls the least congested access points. This approach has been implemented in WLAN terminals and it can be additionally utilized in mobile WiMAX networks, predicated on the available resource information broadcasted in the MOB-NBR_ADV message. The second and the most consequential load distribution method that should be considered is load distribution predicated BS initiated handover. In this scheme, the load balancing algorithm resides in BSs and the congested SBS forces the MS to handover to a less congested TBS. This method is opportune for mobile WiMAX, as it enables more vigorous control for BSs withal providing more preponderant QoS in the whole network.

D. Handover

As the main way of load balancing is distributing load of the network with the handover process, overviewing handover process is compulsory. One of the most paramount features of mobile WiMAX through mobility domain is handover. Handover designates transmuting the accommodating BS by the MS if another BS is available to achieve higher throughput in the network. Furthermore, handovers are the essential component of system wide resource utilization and QoS. In 802.16e, handoff process may be initiated predicated on two reasons. The first one is caused by fading of the signal and interference level within the current cell or sector, while the second one is predicated on the fact that another cell or BS can offer a higher caliber of QoS for the MS, so MS will transfer to a neighbor cell or BS.

IV. PROPOSED CAC ALGORITHM

The key conception abaft the proposed scheme is to estimate the utilizable throughput in WiMAX communication as the SSs start to move at sundry speeds, and take this information into account while making a CAC decision. In our precedent work, we showed that it is possible to derive a mathematical formulation to estimate the bit error rate in WiMAX communication at sundry vehicular speeds. In Section 3A, we reproduce on how to calculate the estimated utilizable throughput at sundry mobile terminal speeds. In Section 3B and 3C, we show how to make a CAC decision predicated on the estimated utilizable throughput computed taking the speed distribution model of a mobile node into account.Traffic flows in 802.16 are treated as connections. A traffic flow must establish connection with its BS before transmitting. The operation process of 802.16 is shown in Fig. 2. The blocks drawn with dotted line in Fig. 2 are the parts undefined in

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802.16. The traffic policing model can be simply achieved by applying token bucket mechanism. The 802.16 standard divides transmission time into super frames and each super frame is divided into a downlink sub-frame and an uplink sub-frame. Downlink means the direction of transmission is from BS to SS, and the uplink means the direction is reversed. The downlink scheduling is considered

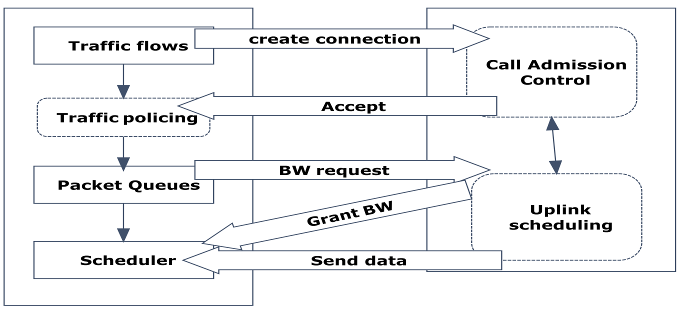

Fig-2: Call Admission Control process.

simple because there is only one sender, BS. Hence we focus on the uplink scheduling. After a BS accepts a new connection, BS will poll this new connection and give the SS the opportunities of sending its BW requests. This connection should send its bandwidth request (BW request) to the BS and wait for receiving BW grants (i.e. time slots for transmitting data) from BS.

A. Throughput and mobile terminal's speed

The CAC scheme considers the currently available bandwidth as a part of CAC decision making process on whether to accept or reject a newly arriving incoming call. One of the major problems with mobile WiMAX communication is that usable throughput (defined as the effective throughput in bps received by the receiver) between the SS and BS becomes significantly low when the subscriber station (SS) moves at vehicular speeds. A CAC decision that is made based on available throughput, computed when the SS moves at a lower vehicular speed (or at a stationary position), may prove very costly when the SS will reach its top speed.The WiMAX technology has been designed with QoS in mind and the CAC scheme is an important part of the QoS architecture that prevents over commitment of available resources. Let us consider a SS that is currently (at time t) moving at a speed of vt. The maximum speed the SS can reach is $vmax$ and there are n numbers of QoS sensitive connections currently being serviced by the BS, consuming a total of Bt bps of usable throughput. A new connection request has arrived with a demand of b bps. Without loss of generality, the CAC scheme can be considered as a mechanism that will accept the connection if and only if the following condition is satisfied

$$T \geq b + B_t$$

The usable throughput capacity T varies with speeds and decreases sharply when the SSs start to move at high vehicular speeds. As the usable throughput decreases, dropping rate increases significantly, causing serious degradation of QoS.

B. Impact of speed and CAC decision

In the currently Existing Systems the mode of allocation of the bandwidth is done using the Bounded Greedy weighted algorithm (BGWA). This greedy weighted method is a heuristic method that can find a suboptimal solution in polynomial time. Specifically, instead of enumerating all the possible choices to find the globally optimal solution, the greedy weighted method makes the locally optimal choice at each decision stage (according to a predefined weighted value). This approach significantly reduces the computational complexity. Unlike conventional greedy algorithms, the proposed algorithm applies table consulting in each greedy stage to determine whether any redundant bandwidth allocation exists. If yes, the algorithm removes this allocation to reclaim the bandwidth. One of the major drawbacks of this algorithm is that every time the SS wants a new connection it has to go through the BS asking for the most optimal connection available to the SS. But once the connection to this BS is lost all the details about where it was previously connected is lost. Thus this SS has to come from the beginning requesting for anadmission to view the new BS from the existing BS. On contrary the proposed CAC algorithm provides an admission Control value that is stored on the BS. Thus every time the connection is lost the BS checks through the list and finds the BS to which the admission was issued to the SS. We can clearly see that the time taken in computing the BS to a particular SS is very much faster in the CAC as the maintenances of an admission list that gives the knowledge of all the BS to which the SS is connected through which RS it is connected. However the connection is also established only through the BS to the next BS thus even when the connection is lost, its lost only between the SS and the parent BS and not the Foreign BS. The CAC rule may prove conservative and overcompensating at times as it always considers the top speed of the SS while computing the overhead and bandwidth requirement for a connection. This is likely to have an impact, particularly when a SS occasionally moves (i.e., city driving) at its top speed. In the following, we show that a probabilistic model can be developed and used for CAC scheme so that overcompensation can be avoided.

IV. SIMULATION RESULTS

The simulation is conducted using the NS2 simulator. NS2 discrete-event network simulator targeted primarily for

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research and educational use. The NS2 simulations can be divided into many phases they are ,

Topology definition:to ease the creation of basic facilities and define their interrelationships, ns-3 has a system of containers and helpers that facilitates this process.

Model development: models are added to simulation (for example, UDP, IPv4, point-to-point devices and links, applications); most of the time this is done using helpers.

Node and link configuration: models set their default values (for example, the size of packets sent by an application or MTU of a point-to-point link); most of the time this is done using the attribute system.

Execution: simulation facilities generate events, data requested by the user is logged.

Performance analysis: after the simulation is finished and data is available as a time-stamped event trace. This data can then be statistically analyzed with tools like R to draw conclusions.

Graphical Visualization: raw or processed data collected in a simulation can be graphed using tools like Gnuplot, matplotlib or XGRAPH.

Once these steps are followed the simulations is set up and ready to be tested. In the test simulation we are using one BS and the SS are trying to obtain access to other BS using this BS. We are using the throughput formula to check the network throughput and the amount of bandwidth utilized is also obtained using the simulator environment thus we plot a graph between these two entities to check the efficiency of this implementation. The Through put is given by

$$Throughput\,(TP) = \frac{Tcp\ windows\ size}{latency}$$

From the Fig-3 it is clear that performance of the proposed is far better than the existing system. It is also observed that the amount of bandwidth utilized start be same for both of the existing and the proposed to be same (where existing is par more),however as the network throughput start to increasealong with the amount of bandwidth utilized, they increase linearly until they converge at a point of coincidence here the value of bandwidth=2000khz and the network throughput is 10000kbps.After this the existing system linearly increases until the end of the simulation. On the other hand the existing system slowly decrease and increase at the end of the simulation.

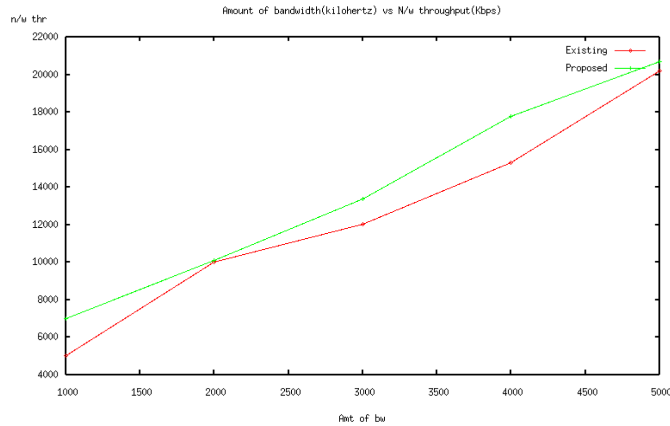

Fig-3: Amount of bandwidth v/s Network throughput

The other performance analysis include the plotting a graph between the amount of bandwidth used to the network throughput to bandwidth consumption ratio.

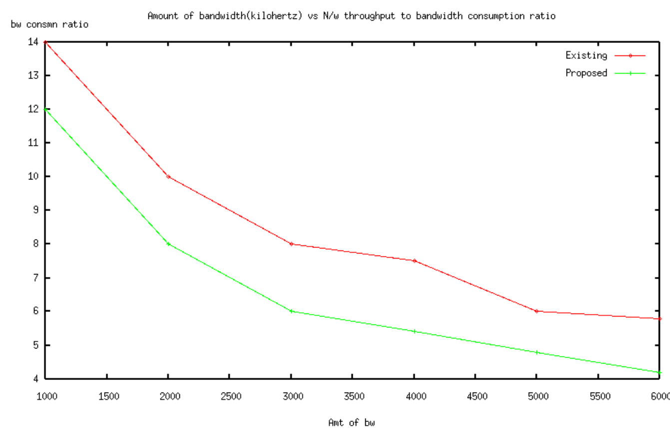

Fig-4: Amount of bandwidth v/s Network throughput to bandwidth consumption ratio

From the Fig-4 which shows the graph that is plotted between the amount of bandwidth verses the network through-put to the bandwidth consumption ratio shows that the bandwidth consumption ratio decreases exponentially in case of the proposed system but in case of the Existing system the decrease is not gradual. The proposed bandwidth consumption ration is asymptotic meaning that the graph when extended forms a parallel line to the x axis. Thus we can say that the proposed system's consumption ratio is almost zero when it approaches the highest bandwidth , this is not the same compared to the existing system the consumption ratio is very high when the bandwidth reaches the highest.The next performance analysis involves the number of SS to the network throughput.

From the Fig-5 we can clearly see that the scalability of the proposed algorithm is quite high compared to the existing algorithmThe graph shows that as the number of SS increases the existing system's network throughput slowly increase and then finally attains saturation after which any number of increase in the number of SS shall lead to a constant value of the Network throughput, on the other hand the proposed system's network through put increase drastically with the increase in the number of SS but after a particular value the Network Throughput saturates and constantly increases with the increase in the number of SS..

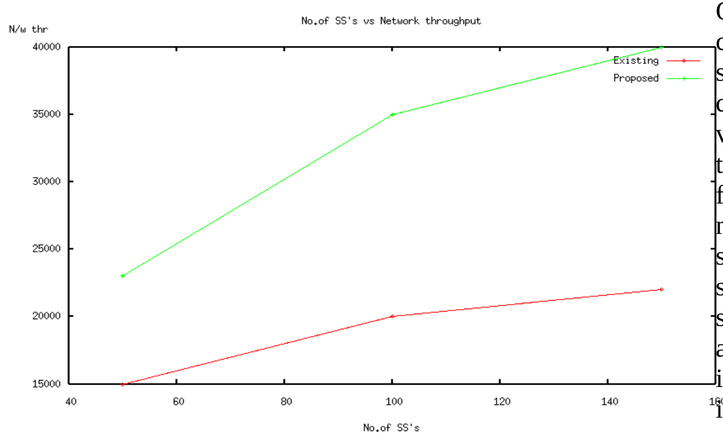

Fig-5: The number of SS to the network throughput

Thus from the Fig-5 we are able to deduce that the proposed system is highly scalable.

The final performance analysis involves in plotting a graph between the numbers of SS network through put to the Bandwidth consumption ratio.

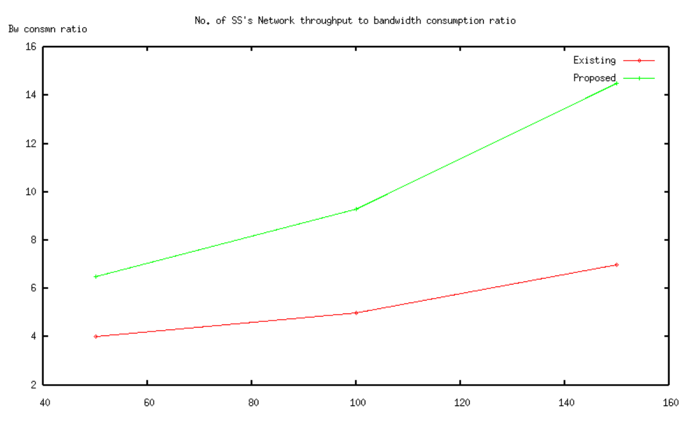

Fig-6: Number of SS network throughput versus the Bandwidth consumption ratio

The Fig-6 shows the performance analysis between the number of SS network through put to the Bandwidth consumption ratio. From the Fig-6 it is clear that the number of SS network throughput increase gradually with the Bandwidth consumption ratio in case of the existing system. But on the contrary the performances of the Number of SS network throughput increase gradually but after a particular limits this value start to increase drastically with the Bandwidth consumption ratio for the proposed system. From this we can clearly deduce that the proposed system is far better the existing system in terms of performance, scalability and reliability.

V. Conclusion and Future Enhancement

WiMAX is equipped with mechanisms to deliver guaranteed QoS, and CAC is an important part of WiMAX design that contributes to improve QoS. Existing CAC schemes are more suitable for fixed WiMAX as they do not consider the dynamic channel condition caused by mobility at high vehicular speed. In this paper, we proposed a CAC scheme, the first of its kind, that estimates the usable channel capacity for various vehicular speeds and use this information while making a CAC decision. The benefit is clearly evident in the simulation results that confirm that dropping rate improves significantly in the proposed CAC schemes. The proposed schemes perform comparably in terms of call blocking rate and channel utilization.The future Enhancement are discussed in the following ,We propose a novel routing scheme. Our idea is to figure out the maximum possible value of each variable in the optimum LP solution to estimate the aforementioned randomness.Unlike other Routing scheme we consider two major factors for routing decisions, the value of each variable in the LP solution and the maximum possible utility gain given by this variable.

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