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WI-MAX Requirements and Its Properties

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Abstract- The problem undertaken Quality Of Services is considered as the information travelling on the network, and what kind of services are provided when data is travelling from host to network. It is very important to have congestion free network to have the high bandwidth, less jitter and delay. In the case of WI-Max, it is, done with airwaves or satellite transmission, which provides error prone network. The basic issue is how quality of services can improve. This means how the packet will be send from base station. The issues like bandwidth, jitter, delay, transmission, routing, scheduling are important factors in transmission of packets from sender to destination. Depending on these factors, the results will vary with different parameters like load, mobility, number of hops etc. It is very important to concentrate on design issues of the protocol, because protocol designing covers issues related to scheduling of the packets. It is important that the protocol, which is designed, should concentrate on which layer the quality of services can be improved.

Keywords: Routing, Scheduling, Admission-Control, Bandwidth

I. INTRODUCTION

The problem of QOS has been an extremely active research area for many years and many algorithms are, introduced in the area of packet scheduling and queue management. Different methods can be, deployed on QOS in consideration to cost and complexity. A key aspect of QOS is time-scale at which data flow control mechanism operates**.** The different strategies for WI-MAX standard is high-speed transaction oriented applications, non-line-of-sight fixed wireless links, might now overcome this problem. However, an important remaining challenge is to provide rate and delay guarantees for customer connections similar to wired connections. Several schemes provided for performing admission control for connections with Quality of services requirements over a multi-hop wireless backhaul [1]. The basic purpose of admission control algorithms is to construct appropriate topologies with database connecting wireless backhaul nodes to a wired gateway and then admit the asset of connections in relation to their requirements. A number of approaches may serve as solutions, one straightforward approach is to remove regulation entirely or expand the unlicensed bands. The unlicensed bands are those frequencies, which do not require any kind of licensing that is remote controls etc.

However, the approach may not be feasible and it is difficult to maintain Quality of Service **(QOS)** and Quality of Experience **(QOE).** A second approach is the cognitive radio based spectrum trading in which the band is divided into frequencies and spectrum provided. It is on a long-term basis and needs more operational maintenance between service providers. An entire physical layer hardware upgrade and core network replacement is required to realize the cognitive radio implementation. However, as an availability of enabling ubiquitous services are promised, network convergence presents a series of technical challenges in order to provide [9] Quality of Service.

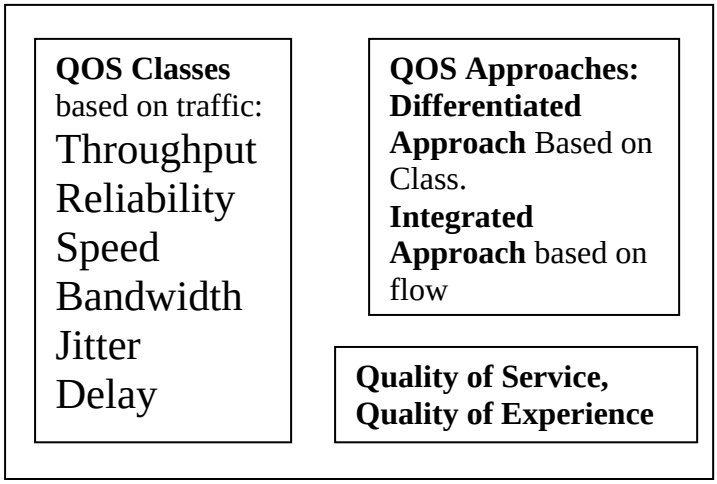

Figure. 1 GENERIC QOS REQUIREMENTS [2]

II. REQUIREMENTS OF QUALITY OF SERVICES

- ***a. Throughput:*** It is, defined as the output in the means of service provided and how many packet are, delivered from source to destination [8].
- ***b. Routing:*** It is very important to consider different routing algorithms to transfer data from one place to another.
- ***c. Scheduling:*** QOS must ensure the scheduling of packets according to arrival and departure time of the packets
- ***d. Bandwidth:*** Different mechanism and operations performed to increase the bandwidth of the network; it should have peer-to-peer connectivity.
- ***e. Delay:*** It is, distinguished into local (at the resource) and global (end-to-end) delay [2].
- ***f. Jitter:*** It is, defined as the maximum variance in the arrival of data at the destination [2].

g. ***Loss-Rate:*** It focuses on parametrizing respectively triggering the employed error detection and/or correction Mechanisms [2].

h. ***Reliability:*** Each workflow task structure has an initial state, an execution state, and two distinct terminating states. Different reliability models can be, proposed to measure the reliability of task with number of failures [2].

III. QUALITY OF SERVICES MODEL

QOS model described as end-to-end delivery of packets with constraints. It's not easy to deliver the packet from one station to another, so always some parameters are considered in the terms of Time, Transparency, Reliability, Scalability, Cost, Fidelity, Accessibility, Throughput.
The parameters are:

a. ***Time:*** The time can be, expressed as how much duration of time taken to deliver packets. In the case of quality of services, the time-taken, as most important issue because it varies on number of hopes and load [4].

b. ***Transparency:*** It should be transparent to monitor and control the traffic for controlling congestion, the network should be transparent in any case of distortions. For real-time traffic, delay can be negligible, even small amount of data loss is tolerable [8].

c. ***Accessibility:*** In the case of admission control, it is very important to consider the incoming and blocked packets on the networks, whether the packets, which are available, are accessible or not [8].

d. ***Cost:*** Cost can be, described in the terms of initialization of task, and completion of task [4].

e. ***Fidelity:*** It reflects how well a product is; produced and how well a service is being rendered. Fidelity is often difficult to define and measure because it is subjective to judgments and perceptions [4].

IV. QUALITY OF SERVICES PROCESS

The WI-MAX model process is having input which contains set of customer locations I along with gateway G to Internet. The location connected through gateway via the multi-hop wireless networks. The demands for each customer can be specified as a set of connection Ω (I), each connection in Ω (I) has packets travelling from both sides that is uplink and downlink [1]. Uplink packets will transfer from I to G and downlink packets will transfer from G to I. Therefore, it all depends on their connection requirements. It is very important that a service provider should provide strict QOS. Therefore, for transferring packets it must generate a topology for multi-hop that connects all customers to internet gateway and then admit some demands of the customers [1].

A. Existing Method

Many of the delay scheduling algorithm are proposed but the most prominent of these are weighted fair queuing (WFQ) also known as Packet-by-Packet Generalized Processor Sharing(PGPS) and Coordinated EDF (CEDF) According to the connection rate, maximum burst size, packet size and number of hops, both algorithms provide guaranteed upper bounds on the end-to-end delay experienced by individual packets. Algorithms presented for connection admission control on a single GPS server for connections with delay requirements. A measurement-based admission control algorithm for multi-hop wired networks that increases network utilization by allowing occasional delay violations was, presented in admission control algorithms [1].

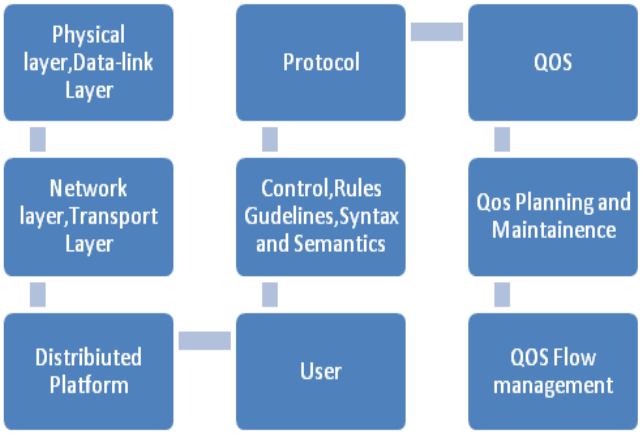

Figure. 2 QOS PROTOCOL STACK [7]

B. Proposed Method:

The main objective is to transfer the packets, so it is very important to increase the performance issues, it is important to increase the network bandwidth, data rate, efficiency, flexibility, and availability. Data link layer aims at checking of errors and then correcting them, on the other hand-side network layer aims at the formation of the packets and sending the packets from one station to another. For this, the topology should be, created in such a manner where the networks have full utilization of resources, and fully shared. Similar to that there should be some approaches to accept and reject the request of customers. It's very important to concentrate on whose demands can be fulfilled at the same-time, when other customer also placing the request for admission of the packet, **The Denial of Service** also play a major role in this field, so as to eliminate and fulfills the request on regular period of intervals. There should be balance in between the incoming traffic from both links; the congestion should be controlled in such a manner that the packets should not collapse with each other if the request which is coming from both sides is fulfilled simultaneously.

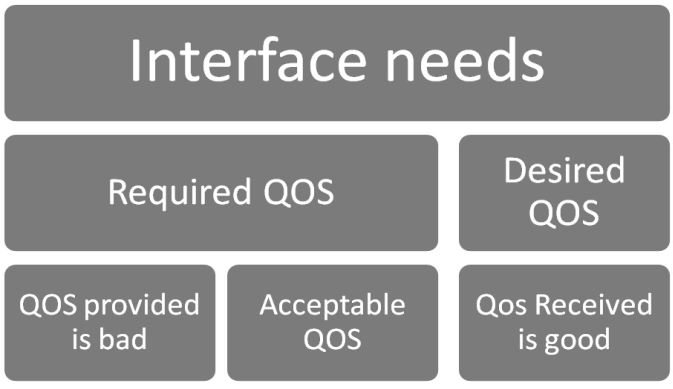

Figure. 3 The acceptable QOS Interval [2]

V. MAJOR ISSUES AND SCOPE

a. ***Admission Control:*** The admission control is not to be confused with policy control, which is, performed at the edge of the network to ensure that hosts do not violate their traffic characteristics and which is, considered part of the packet scheduler. Admission control deals with which packet is to be, admitted and which will eliminate. The different policies can enforce on admission control for the sake of reservation of resources before in coming of the packets [2].

b. ***Packet Scheduler:*** Packets should be, classified according to the incoming request. Large numbers of queues are, maintained with constraint to timers. In order to achieve the desired QOS provision, the basic function of the scheduler is to reorder these queues, in the simplest case according to a priority scheme [5].

c. ***Packet Classifier:*** The packet classifier performs a mapping of incoming packets into classes, which are, characterized by the fact that all packets of the same class get the same treatment from the packet scheduler [2].

VI. MODELS FOR WI-MAX WORLDWIDE

For every real time application, there are models for its representation. The models are the building blocks for any application to implement them and have the results. The WI-max stands "A standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL. WI-MAX in its fixed form is, seen as a possible alternative to expensive cable and fibre deployment. It is faster to deploy and less expensive and it also offers operators more flexibility in terms of deployment time frame and possible installation areas.3G or other cellular network operators could see this as a potential substitute or as a complement to their cellular product[6].

Based on IEEE 802.16 WI-MAX, in fact, comes in two forms, a so called:

a. ***Fixed WI-MAX:*** The fixed model introduced in the IEEE 802.16-2004 standards. It is, referred as fixed model because a mounted antenna is, used at the user's site. It is a complete wireless solution for fixed broadband Internet access
.

b. ***Mobile WI-MAX:*** The IEEE 802.16e standard is, counted as an enhancement of the 802.16- 2004 base specification, which targets the mobile market by allowing mobile clients with adapters to connect directly to the WI-MAX network. It uses the techniques referred as Orthogonal Frequency Division Multiple Access (OFDMA), which is similar to OFDM in that it divides the carriers into multiple subcarriers but it operates at different speed levels [6].

VII. PERFORMANCE JUDGEMENT FACTORS

This section is devoted to performance evaluation of the QOS model. In order to evaluate the existing model, several simulation scenarios implemented to test QOS using distinct network topologies. The results can be obtained using performance metrics, such as packet loss, latency, jitter and bandwidth usage, and make use of differentiated traffic sources for each service class. It is very important to have the security, to have no loss of packets over multimedia networks. As in the case of distributed environment, the different requirements for the data is that it should be confidential, integrated, available, and non-repudiate, but they are more prone to attacks. For that, different countermeasures should be, provided for the security of the packets for the unethical hackers. [10]

Table.1: WI-Max Security Requirements [10]

Requirement	Type of Attack	Description
Availability	Interruption	An asset of system becomes unavailable or destroyed.
Confidentiality	Interception	An unauthorized party gains access to asset
Modification	Integrity	Unauthorized user gains access also and tampers.
Fabrication	Authenticity	Inserting counterfeit objects into the system

VIII. CONCLUSION

The prime challenges are the selection of an optimal service delivery network, distribute (redistribute) of the traffic loads among networks and mobility issues in the presence of multiple access interfaces. It is also, seen as a difficult task especially under varying conditions. A selection algorithm and protocol with implementation is required to determine automatically the best candidate that fulfils the user's requirements instantly. On the other hand, the decision making process is also influenced by several factors related to wireless network availability, flow characteristics, user profiles, network capabilities and service conditions. The Quality of services and Quality of experience parameter selection should comprise bandwidth, delay, response time, jitter, Bit Error Rate **(BER),** security, packet loss, and even cost. Another obvious challenge is to find mobility, decision delivery mechanism so various radio resources can efficiently balanced under such an environment.

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