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UMTS FTP Performance Enhancement Using Admission Control Algorithm

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Abstract: *The Universal Mobile Telecommunication systems are one of the very important cellular phone technologies which are known as the 3G systems. It support the high speed data transfer, speech, web browsing, email, video telephony, multimedia and the audio streaming. The expected growth in real time application requires efficient spectrum usage. In UMTS, users share the same frequency. Thus, one user will cause interference for other users in the system. New users will only be granted access to the network if they do not cause too much interference for already active users. The idea is that it is much better to block the access of a user to the network than having to drop already active users. Such decisions are made by the admission control. In this paper, applying Admission control algorithm are studied in multiples scenarios with three levels of load, low load, medium load and high load compared. The aim is to compare the efficiency of the admission control algorithm to demonstrate the alternative, FTP performance via admission control algorithm and compare its performance against the performance of the default algorithm of the network. The scenarios implemented in the OPNET Modeler 14.5. Based on the obtained result, the throughput -based admission control algorithm performed better than the default admission control algorithm for the given network and configuration ,in the terms of application traffic throughput and application response time.*

I. Introduction

The world of mobile communications is rapidly changing. New technologies emerge at the market with increasing pace, both from standardization bodies within the telecommunication community like the International Telecommunication Union (ITU) as well as on the initiative of the computer and chip industry.

While the former wants to evolve existing third generation (3G) telecommunication standards like the Universal Mobile Telecommunication System (UMTS), the latter have the possibility to design completely new systems from scratch, The driving force behind these activities is the Internet. Mobile telecommunication operators must react on the great success of disruptive technologies like peer-to-peer communication and Web 2.0 applications. Users demand ubiquitous access to these new communication platforms. This requires more bandwidth and an optimized system design. Concurrently, considerable efforts are made to establish packet-switched communication with the Internet Protocol (IP) as a universal principle of end-to-end communication. IP-based vertical integration promises new opportunities to extend classical services like voice and to establish new services on the telecommunication market. A well known manifestation of these efforts is IP-television (IPTV), which is promoted by fixed-network operators for some time. A further impulse is generated by the technological progress of the mobile device manufacturers. Up-to-date cellular phones integrate various devices in one, like a photo and video camera, a music player, or a GPS navigation system.

Furthermore, smart phones blur the line between traditional cellular phones and computers. The increased capabilities of these new devices in terms of media, memory and computing power enables new services. However, the data volume created by applications like for example video recording requires higher bandwidths for a satisfying service quality. 3G communication systems like UMTS provide considerable support for IP traffic, but are designed and optimized for circuit-switched data like voice or video telephony. This prevents an efficient usage of radio resources and obstructs the development and deployment of new services.

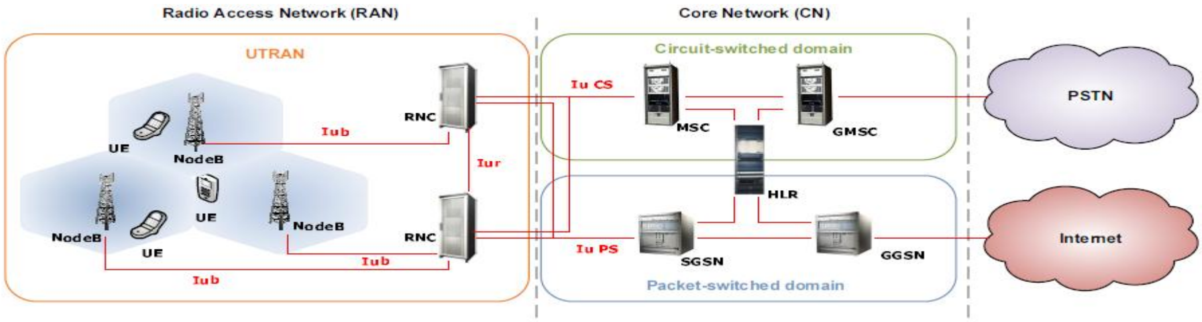
In the UMTS domain, the 3G partnership project (3GPP) specified the High Speed Packet Access (HSPA) family, consisting of High Speed Downlink Packet Access (HSDPA) and its counterpart High Speed Uplink Packet Access (HSUPA) or Enhanced Uplink. The focus of this monograph is on HSPA systems, although the operation principles of other 3.5G systems are similar. we take UMTS FTP admission control algorithm as an application scenario to analyze and evaluate UMTS FTP Performance enhancement using two different Values and scalable load for UMTS RNC admission control Parameters, parameters not affected by the service type., This analysis will help identify the UMTS throughput based - in terms of admission control algorithm and can guide the operators to choose the best admission control algorithm. I have designed and implemented UMTS simulation module in OPNET and carried out extensive simulations to analyze traffic throughput and response time . Our simulation results show that the UMTS throughput -based admission control algorithm performed better than the default admission algorithm for the given network and configuration in terms of application traffic throughput and application response time. The rest of the paper is organized as follows Section II briefly gives background UMTS . Section III deals with the simulation setup used in OPNET for UMTS .Section IV evaluates and analyzes the Simulation results throughput-based admission control running on UMTS. Section V discusses the related work. Finally In Section VI we conclude this paper.

II. UMTS

UMTS has been adopted by the International Telecommunication Union (ITU) in the course of the IMT1-2000 initiative. The goal of the initiative was the development of a global common standard for wireless mobile communications of the third generation as successor for GSM (Global System for Mobile Communication) and GPRS (General Packet Radio System). Several proposals which met the requirements of the initiative have been filed in to the ITU, one of them was UMTS, developed by the 3rd Generation Partnership Project (3GPP). The goal of the 3GPP standardization body was to evolve the existing GSM to enable services like video conferencing or streaming. Consequently, the first releases of the UMTS standard maintained a large part of the GSM architecture, but specified new air interface standards which provide higher data rates and lower latencies.

III. UMTS Architecture

The UMTS architecture is derived from its predecessors GSM and GPRS, which allows operators to reuse and update their existing network infrastructure without the requirement to invest in a completely new network from scratch. The largest difference can naturally found in the radio access network (RAN), while the core network (CN) part is more or less inherited from GSM and GPRS. Figure outlines the logical and functional elements of a UMTS network.



. **Figure 1 Architecture of a UMTS-Network**

VI. Topology and configuration

The deployed topology for the simulation environment is shown in Figure 2 . The network topology shows the networking elements used along with their interconnections. The model as in figure 2 comprises user equipments, node B and Radio Network Controller(RNC) which is connected to the packet switched network via Serving GPRS Support Node (SGSN) and Gateway GPRS Support Node (GGSN) which in turn is connected to the IP Network ten users were used. FTP-Server was used to download low load, medium load and high load multi scenarios were deployed one for Default network and other scenario for admission control algorithm to compare its performance against the default value .

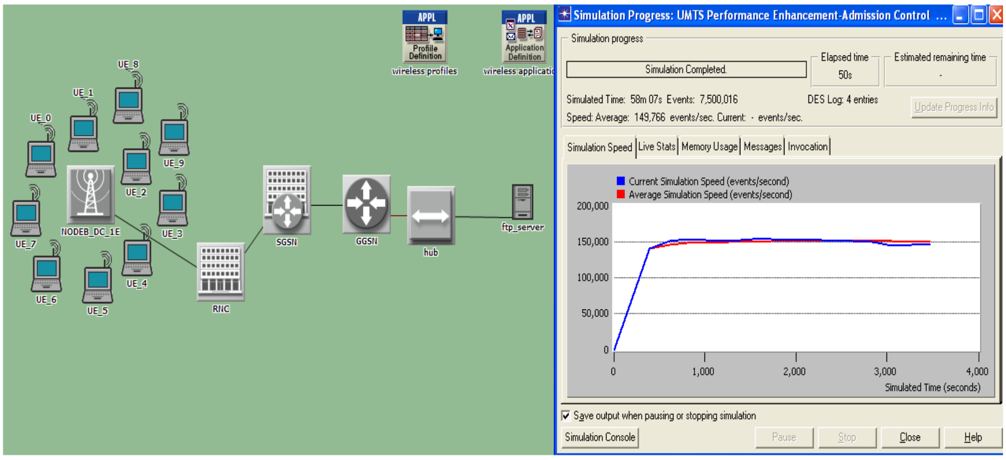


Figure 2 : UMTS Model

V. Results and Analysis

In this paper same attributes and same simulation environment ,but with different admission control algorithm , admission control algorithm: throughput-Based default value 0.75 for uplink loading factor and downlink loading factor in the first scenario while in the second scenario used admission control algorithm-based value 1.5 for uplink loading factor and downlink loading factor. The result that performance of each scenario is evaluated in the network model depending on the application traffic throughput and application response time. The simulation was run for two different scenarios to collect performance related statistics as discussed each scenario based statistics were for the admission control parameters used to configure the respective scenario. The collected statistics are presented in the following discussion in a compare contrast fashion to facilitate the understanding of the implications of a single factor or parameter on different values.

VII. throughput (Bits/Sec)

Figure 3and Figure 4 illustrated the collected statistics as drawn show that the result throughput compared default network and admission control which was performed bitter than the default for the given network and configuration. which was refer to the acceptable performance.

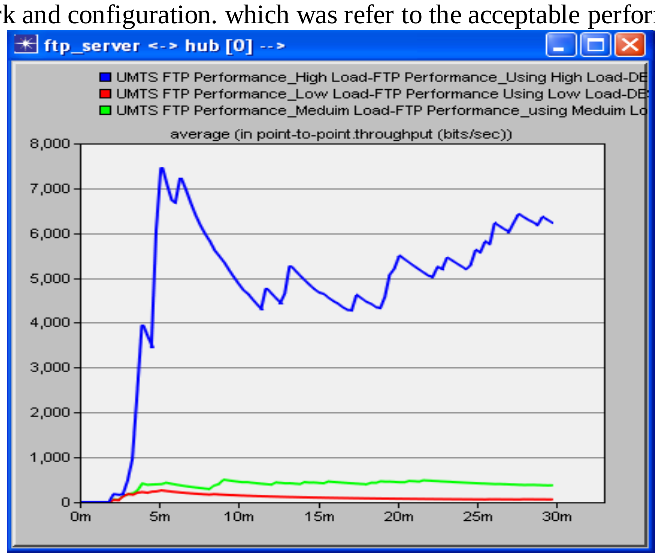


Figure 3 : FTP Throughput-Default

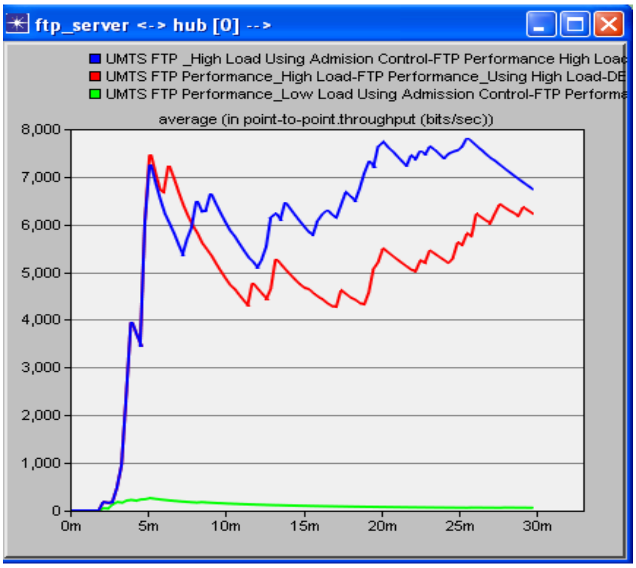


Figure 4 : FTP Throughput-Admission Control

VII. Response time

Figure 5 and Figure 6 portrays the response time of the FTP application which used to be the sample application for the multiple scenarios . The result indicated admission control algorithm had a lowest response time than the default network value which was the highest response time.

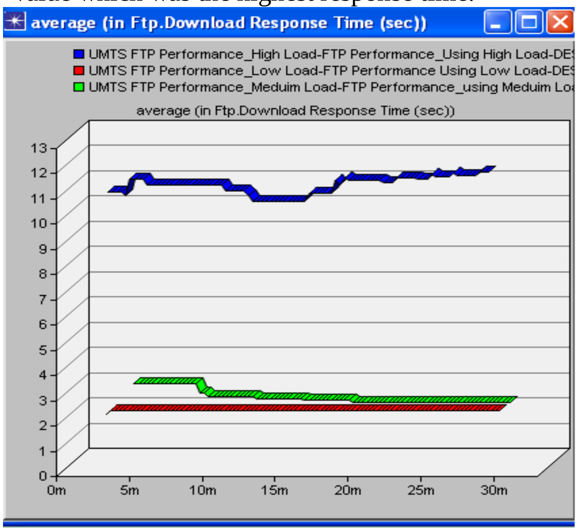


Figure 5 : Response Time Default

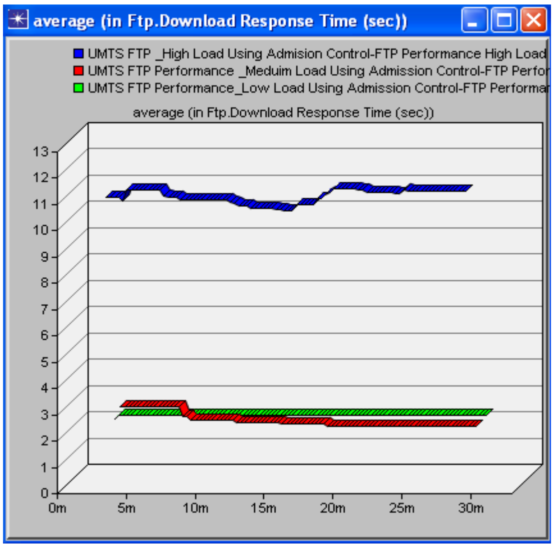


Figure 6 : Response Time Admission Control

VIII. Traffic Sent and Received:

As shown in the Figure 7,8,9 and 10 the traffic sent and received in default network not affected while in admission control there were loss due to retransmitted and admission control policy.

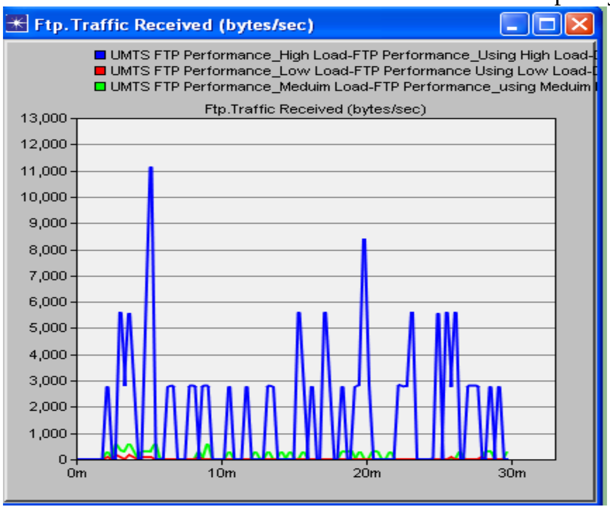


Figure 7 : Traffic Sent Default

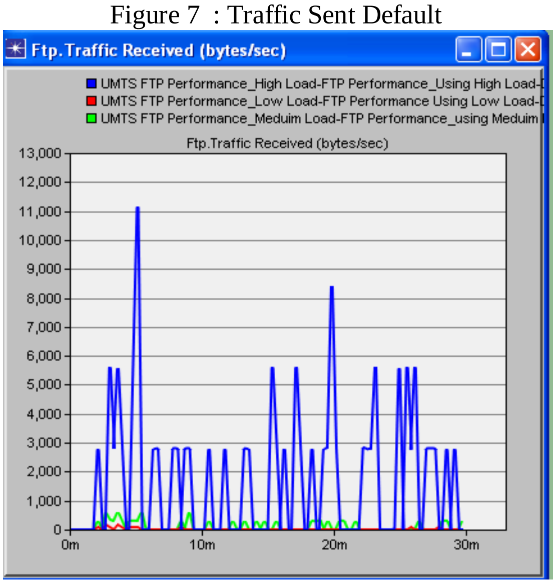


Figure 8 : Traffic Received Default

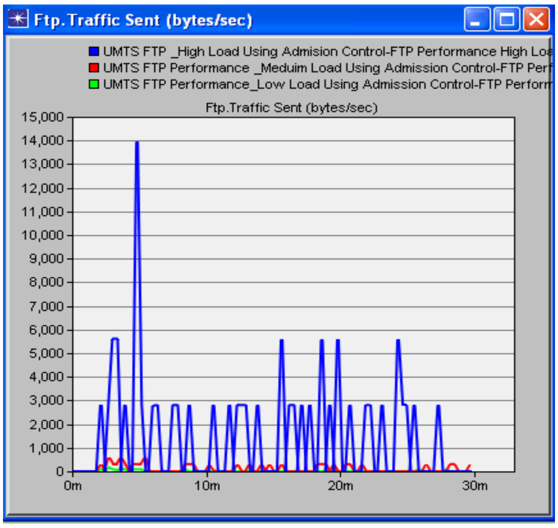


Figure 9 : Traffic Sent Admission Control

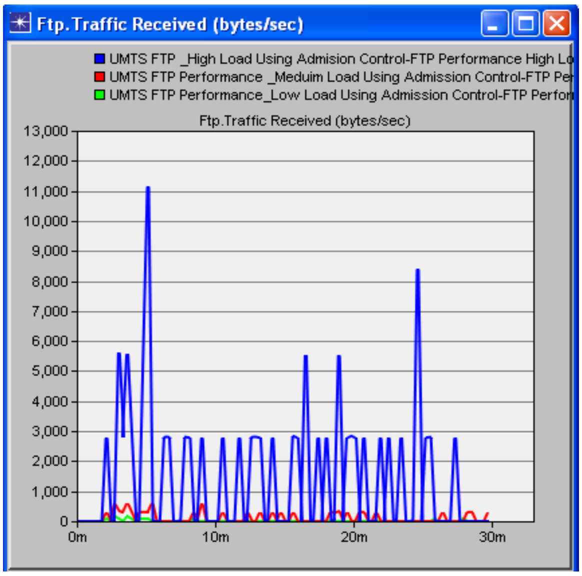


Figure 10 : Traffic Received Admission Control

IX. Delay:

As shown in the Figure 11 and 12 the delay of default network is less compared with admission control algorithm, Here in admission control algorithm more users are blocked .

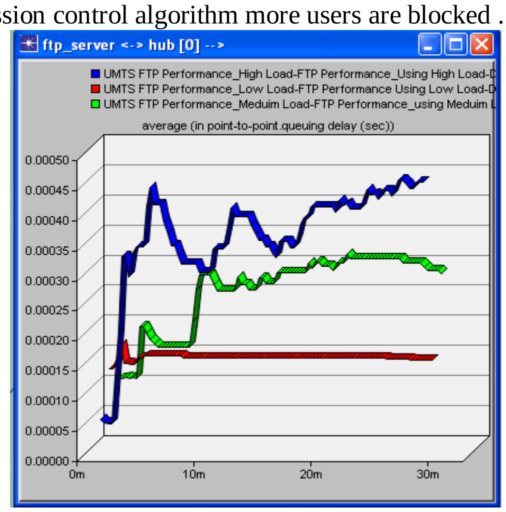


Figure 11 Delay Default

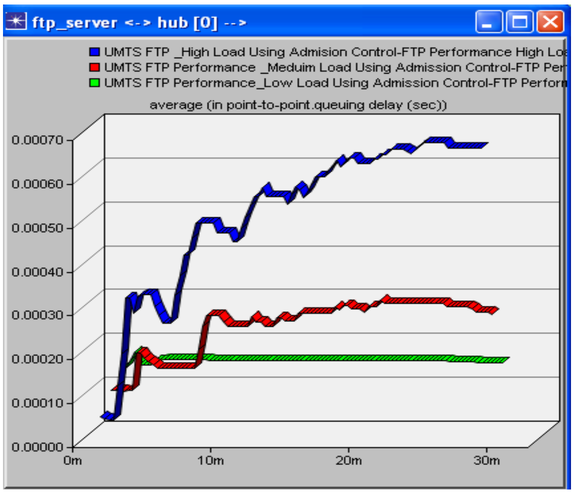


Figure 12 Delay Admission Control

X. Discussion of Results

The consequences eventuated from the simulation results are summarized which is a comparative throughput performance enhancement using default Network and admission control algorithm in UMTS-FTP application. The difference in admission control algorithm for the UMTS throughput had varying level of efficiency. When we chose default network had the lowest throughput and highest response time if compared to the admission control algorithm ,The results from this paper showed that the admission control algorithm were capable of performing fairly well in UMTS throughput -based scenarios.

XI. Conclusion and Future Work

From the simulation result we can consider throughput Performance of different admission control algorithm in UMTS is evaluated and analyzed using the OPNET Modeler. A variety of simulations are carried out to get the most effective and efficient results. On the basis of results attained, conclusion for the selection admission control algorithm in UMTS is made. Depending on the results it is concluded that in UMTS network the best Throughput is given while using admission control algorithm .Hence it can be used in all the networks depending on the environment and users density. The conclusions will be helpful and useful for the network planners and operators and also for the beginner researchers to further work on these issues. The UMTS Performance enhancement will be the main focus of the future work.

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