Enhancement of Call Admission Control Schemes in LTE - Networks

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Abstract: *Call admission control (CAC) theme encompasses a major impact in reassuring QoS numerous users with various QoS Requirements in 4G networks. because of the massive users and their frequent demands, it's necessary to use the restricted network resources that guarantee the eminent customary quality of service (QoS). Recently, the reservation-based theme and information measure degradation schemes were planned with the aim to produce effective use of network resources and assure QoS necessities to admitted calls. Consequently, many schemes are planned to manage resources whereas making certain QoS to wireless applications. These algorithms square measure classified into CAC with Pre-emption, Resource Reservation (RR), Resource Degradation (RD), Delay Awareness (DA) or Channel Awareness (CA). Simulation results show that the planned theme considerably outperforms the reservation-based theme and information measure degradation schemes in terms of admitting several calls and guaranteeing QoS to any or all the traffic varieties within the network.*

Keywords: Call admission control(CAC), Quality of service(QoS), Resource Reservation (RR),Resource Degradation (RD), Delay Awareness (DA) or Channel Awareness(CA).

1. Introduction

The growing demand for network services, such as voice over Internet Protocol (VoIP), web browsing, video telephony and video streaming with time constraints and bandwidth(BW) requirements pose new challenges in the design of cellular networks for future generations. The Third Generation Partnership Project (3GPP) introduced Long Term Evolution (LTE) as a response to this need, with ambitious performance targets and defined an all-IP radio access. The Radio Resource Control (RRC) layer is the most important layer in the signaling process. This layer supports several key features between the user equipment (UE) and the evolved Node B (eNode B) such as the connection management. To simultaneously meet the bandwidth and QoS requirements, admission control mechanisms are used by network operators as a method for continuous supply of quality of service. The lack of an adequate admission control is partly responsible for the current difficulties in the telecommunications industry. In this section, we provide a state of the art of existing admission control mechanisms in LTE networks before presenting our own mechanism called Enhancement of Call Admission Control (ECAC). Basic Call Admission Control is a static admission control mechanism. The decision of the acceptance or rejection of the call is based only on the availability of radio resources. Its principle is to determine if there is sufficient bandwidth (BW) to accept this call. The unit of allocation in LTE networks is the Physical Resource Block (PRB).

2. Call Admission Control (CAC)

CAC schemes generally control the number of users in the LTE network and must be designed to guarantee the QoS requirements for both incoming and ongoing calls. It denotes the process of making a decision on a call request (new call or handover call) based on the available resources. CAC may be a method to make sure and maintain bound level of Quality of Service (QoS) for real time and non real time decision requests within the network. the most objective of CAC is to keep up the economical resource allocation and to observe the resource utilization within the high volume of traffic.
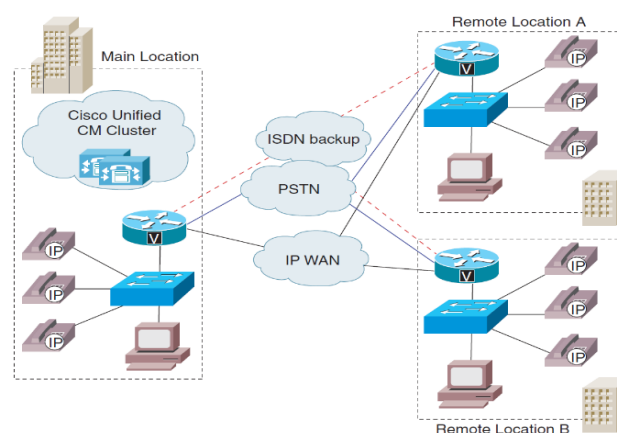

Figure 1: Call Admission Control in a Centralized System

Call Admission Control manages the overall information measure with reference to the quantity of decision request out there within the base station. The decision requests square measure classified into new decision and real time or non real time call request.

3. Quality of Service (QoS)

Quality of Service (QoS) refers to the capability of a network to provide better service to selected network traffic over various technologies, including Frame Relay, Asynchronous Transfer Mode (ATM), Ethernet and 802.1 networks, SONET, and IP-routed networks that may use any or all of these underlying technologies. The primary goal of QoS is to provide priority including dedicated bandwidth, controlled jitter and latency (required by some real-time and interactive traffic), and improved loss

characteristics. Also important is making sure that providing priority for one or more flows does not make other flows fail. QoS technologies provide the elemental building blocks that will be used for future business applications in campus, WAN, and service provider networks.

4. Resource Reservation (RR)

RSVP (Resource Reservation Protocol) is a set of communication rules that allows channels or paths on the Internet to be reserved for the multicast (one source to many receivers) transmission of video and other high-bandwidth messages. RSVP is part of the Internet Integrated Service (IIS) model, which ensures best-effort service, real-time service, and controlled link-sharing. The basic through RSVP, applications that receive time period traffic inform networks of their desires, whereas applications that send time period traffic inform the receivers concerning their traffic characteristics. RSVP is that the sign protocol that installs and maintains reservation state data at every router on the trail of a stream. RSVP transfers reservation knowledge as opaque data; it may also transport policy management and traffic control messages. RSVP operates on prime of information processing (both version four and version 6), and it's involved solely with the standard of service (QoS) of the packets forwarded according to routing. The term session are used throughout the chapter, since RSVP operates on a per-session basis. Within the context of RSVP within the net, associate degree RSVP session could be a simplex knowledge stream from a causing application to a collection of receiving applications, usually outlined by the triple (Dest address, protocol id [Dst port]). Dest Address the information processing destination address of the info packets and should be a unicast or multicast address. Protocol ID is that the information processing protocol symbol. The elective Dst port parameter could be outlined by a UDP/TCP destination port field, by identical field in another transport protocol, or by some application-specific data.
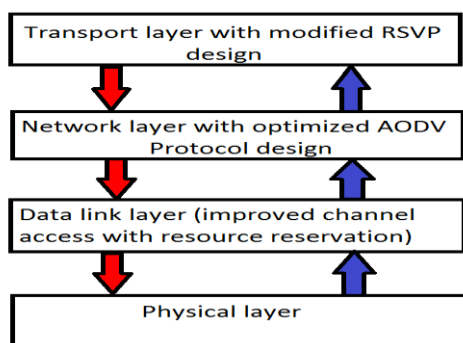

Figure 2: QoS platform with Resource Reservation

5. Resource Degradation(RD)

Resource degradation refers to a decrease in property and response speed throughout a given network. Analysis and destination of this sort of degradation is usually necessary for those maintaining knowledge structures or alternative network-supported models,

likewise as for network practicality normally, causes of network degradation will embrace propagation delays, that involves physically transporting knowledge across associate degree LTE design, and issues with routing. Aspects of associate degree LTE system that modify or work on knowledge also can cause completely different styles of delays. End-point issues, wherever terminals or workstations acting as knowledge destinations could expertise delays due to deficient memory or process capability, square measure another drawback, as square measure alternative sorts of degradation that occur as a result of malware or spyware. Whereas issues with individual hardware devices don't sometimes depress practicality through a whole network, alternative issues are network-wide. As an example, issues with fragmentation of knowledge packets will have an effect on network performance. Additionally, those analyzing network degradation could consider the impact of denial service (DoS) attacks or varied different kinds of outdoor hacking which will impact a network.

6. Delay Awareness (DA)

The speedy development of underwater technology has opened new potentialities and introduced new challenges for raincoat and protocol styles. The packet delay reduction becomes vital problems in sensing element networks (USNs) since the propagation speed of water is very slow compared with radio waves.
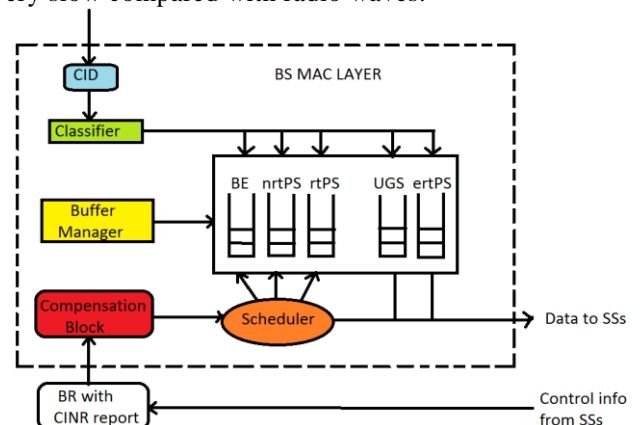

Figure 3: Delay Awareness

In addition, thanks to the property of intermittent link property in underwater, the present message-based and synchronization-based approaches can't meet packet delivery necessities. During this paper, a tailored multi hop routing protocol is meant for transmission delay reduction while not packet exchanges and re-transmissions. The observation of delivery analysis with different link qualities provides insights on relay nodes choice for lower delivery loss rate to stop excessive redundant packets, this work includes a technique of adjusting the quantity of packet biological research dynamically between every hop.

7. Literature Review

S.No.	Title	Author	Year	Contents Discussed
1	An Adaptive Call Admission Control With Bandwidth Reservation for Downlink LTE Networks	Maharazu, Mamman , Zurina Mohd Hanapi , Azizol Abdullah, and Abdullah Muhammed	June 8, 2017	A novel CAC scheme to provide effective use of network resources and avoid the starvation of BE traffic. reservation and degradation approach to admit many users when there is a limited number of bandwidth, which also achieved effective utilization of network resources.
2	Flexible Call Admission Control with Preemption in LTE Networks	Aymen Belghith, Nesrine Turki, Bernard Cousin, and Mohammad S. Obaidat	May 2016	This paper introduces a new call admission control (CAC) mechanism for Long Term Evolution (LTE) networks supporting multimedia services with different classes of traffic.
3	Call Admission Control in 3GPP LTE Systems at High VehicularCommunications	Rajeshkumar RAMRAJ, Daryoush HABIBI, Iftekhar AHMAD	March3,2014	This research is to develop an admission control algorithm to reduce call block and call drop.
4	A fuzzy approach for call admission control in LTE networks	C B Tokpo Ovengalt, K Djouani, A Kurien	2014	A model is proposed to effectively manage real-time traffic via the deployment of a Type-1 Fuzzy Logic Controllers (FLCs). Compared to the Quality Index based approach, the obtained results present notable improvements regarding the call rejection and call blocking probabilities in a 4G LTE Network.
5	Users' classification-based call admission control with adaptive resource reservation for LTE-A networks	Salman Ali AlQahtani	Dec 31,2015	we introduce the user's privileges and traffic maximum delay tolerance as additional dimensions in the call admission control processes to efficiently control the utilization of LTE-A network resources.
6	Hybrid Adaptive Call Admission Control Mechanism for Ensuring QoS in 3GPP: LTE Networks	J Vijay Franklin, K Paramasivam	March 2012	proposed method reduces the handoff blocking probability in LTE wireless networks. Hybrid Adaptive call admission control scheme performs the QoS operation based on the priority at the time of call admission.
7	Call Admission Control Schemes in LTE Networks	Muhammad Aminu Lawal; 2 Ibrahim Saidu; 3 Yusra Sade Abdullahi	Aug 4,2017	The Radio Resource Management (RRM) techniques such as Call Admission Control Schemes play an important role in providing such guarantees. Consequently, several schemes have been proposed to manage resources while ensuring QoS to wireless applications.

8. Conclusion

In this paper, we've proposed associate adaptational decision Admission management schemes in LTE networks to stop starvation of user traffic and improve the effective usage of network resources in LTE networks. The new theme introduced CAC criteria to avoid starvation of under traffic. The standards use information measure degradation admit several users once there area unit insufficient network resources to accommodate new users. The projected theme additionally to its information measure degradation enclosed associate adaptional threshold price that adjusted the network conditions to change efficient used of network resources. This additional indicates that the projected theme achieves higher resource utilization and provides effective QoS assurance for downlink LTE networks.

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