Implementation of Predictive Scheduler CapabilityTo Develop Future Channel Condition For BestEffort Traffic LTE Network

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***Abstract*—Long-Term Evolution (LTE) could be a common place for wireless broadband communication for mobile devices and data terminals, supported the GSM/EDGE and UMTS/HSPA technologies. It will increase the capability and speed using a completely different radio interface at the side of core network enhancements. The goals for LTE embody rising spectral potency, lowering prices, rising services, creating use of the spectrum and reformed spectrum opportunities, and higher integration with alternative open standards. LTE finds many real-time advantages such as high data rates, low delay access, hyperbolic spectrum potency and increased security to quality of services. Despite its advantages, there are few disadvantages such as increased delay and power consumption, battery issues. The delay is caused by different traffic LTE networks. There are Voice over IP model (VoIP), web browsing model and Video streaming, model File Transfer models. The video Streaming model and file transfer traffic model can be reduced to improve the LTE networks. There are delay constraints and rate constraints, average throughput the goals are achieved in LTE. This demerit can be reduced to improve in LTE networks. To reduce the web browsing traffic model to increase throughput performance, calculating jitter values. Short Range Version Connection-oriented (SRV-CO) algorithm used to improve the throughput performance and reduce delay, calculating jitter for web browsing traffic model. Hence LTE can be enhanced.**

***Index Terms*—LTE, QoS, Resource allocation, Energy Efficiency, delay**

I. Introduction

LTE may be the common place for wireless communication of the high-speed information for mobile phones and information terminals. In supported by the Global System for Mobile communication (GSM) and Universal Mobile Telecommunications System (UMTS) network technologies. It increases the capability and speed of the new modulation techniques [14]. It connected with the implementation of the Fourth Generation (4G) technology. LTE overall architecture as shown in figure 1. Three components using for LTE. They are User Equipment (UE) and Evolved UMTS Terrestrial Radio Access Network (E-UTRAN), Evolved Packet Core (EPC). UE is used to transfer the signal of E-UTRAN

It is used for Uu interface. In this interface is used for UE into E-UTRAN channel transformation. The E-UTRAN

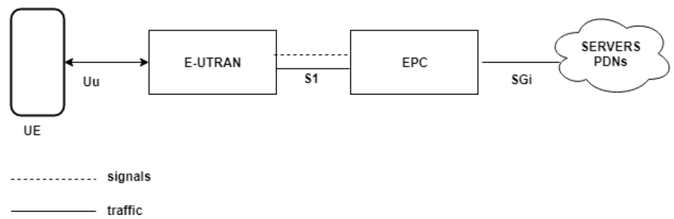

Fig. 1. LTE.

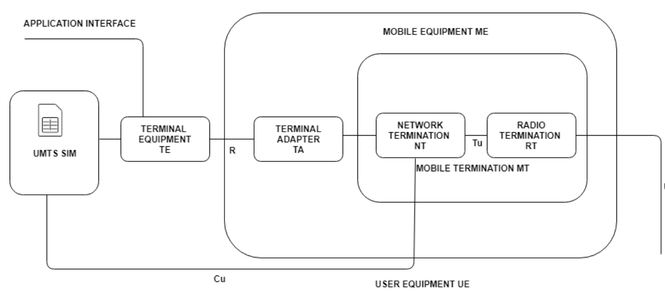

Fig. 2. UE.

has transferred the signal of EPC. EPC is sent a message by Servers Packet Data Network (PDN). They use for SGi interface. It will be enabled and exchanging in signal for packet gateway and PDN.

The mobile station is the UE as shown in figure 2. It is any devices used directly connected by end-user communication. The UE inside in the Mobile Equipment (ME), Mobile Termination (MT) and Terminal Adapter (TA). MT is handling all mobile communication functions. It includes Network Termination (NT) and Radio Termination (RT). It is using in Tu interface. This interface is using in the network termination and radio termination.

NT is a device that connects the data. RT is using transmitter and receiver functions on the radio waves. ME is using in the TA. This function modulates and demodulates on analog and digital signal communication. TE is using device connects to the service users. Universal Integrated Circuit Card (UICC) is

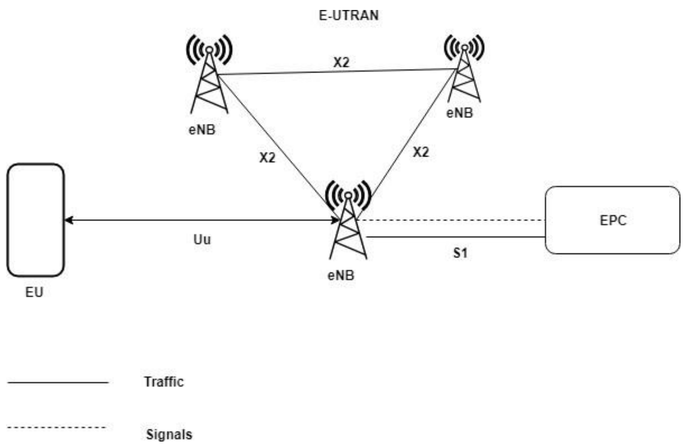

Fig. 3. E-UTRAN.

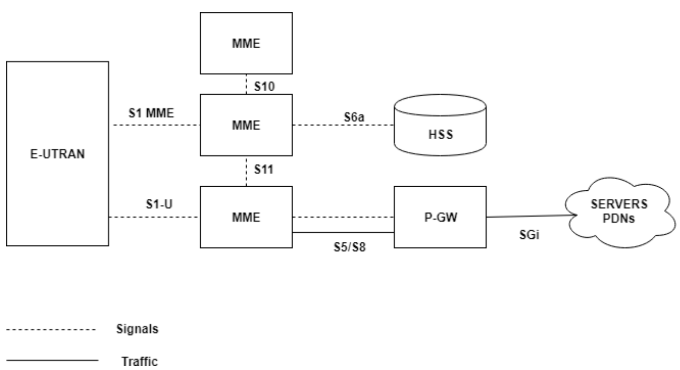

Fig. 4. EPC.

LTE Subcarrier Identity Module (SIM). This function runs on Universal Subcarrier Identity Module (USIM).

E-UTRAN handle the radio communication between the mobile and EPC. In this Base Station (BS) is called eNodeB or eNB. It controls mobiles one or more cells. The E-UTRAN as shown in figure 1.3. It sends and receives radio transmission to all mobile user.

It is using analog and digital signaling functions of the LTE air interfaces. The eNB controls in the low-level operations. Femtocell coverage area has handled in the Home eNB (HeNB). It belongs to a Closed Subscriber Group (CSG). The E-UTRAN is sent the signals into the EPC. It is a closed subscriber group.

It is a central database that contains information about all network operator. The Evolved Packet Core as shown in figure 1.4. Each packet data network identified by an Access Point Name (APN). The PDN gateway using in the GPRS support node (GGSN) and Serving Gateway (SGSN).

The Serving Gateway (S-GW) is using for data communication in a base station to PDN gateway. Mobility Management Equipment (MME) is using Bearer Management and Control Management. Bearer Management includes the establishment and maintenance, releases. Bearer management is handling the session layer in the Network-Attached Storage (NAS). Connection Management includes in the establishment of the connection and security. The Packet Gateway is an SGi interface used to transfer signal into Servers Packet Data Networks. These are operations maintain in LTE Networks. LTE design supports exhausting Quality of Services (QoS), with end-to-end quality of service and Granted Bit Rate (GBR) for radio bearers, even a Local Area Network (LAN) and therefore the web has different kinds of various applications [16]. Evolved Packet System (EPS) bearers give matched correspondence with Radio bearers and supply for Traffic Flow Templates (TFT). There are four types of EPS bearers are there. GBR Bearer resources for good allocated by admission management, Non-GBR no admission management and Dedicated Bearer related to specific TFT, Default Bearer Non-GBR, Catch all for unassigned [13]. Minimum bit rate and VoIP is GBR resource allocation models. Voice, Video streaming is non-GBR models. This traffics reduced to achieve best-effort traffic LTE Networks [15].

II. Related works

Previous work on LTE Network is different scheduler used to solve the QoS metrics are studied and analyzed to better understand concept and methods of real-time application.

Karim Hammad et al. [15] discussed improve the UEs Energy Efficiency subject to throughput requirements and the fair distribution of the cell throughput among multiple users, with less strict packet delay constraints. Energy-efficient radio resource allocation for battery-limited devices in the OFDMA system has considered the packet delay jitter as a target QoS metric for real-time traffic flows. To propose an optimal packet scheduling framework for improving the UEs Energy Efficiency and the delay jitter performance for real-time traffic flows in the presence of heterogeneous traffic requirements for the downlink of LTE networks. The resource allocation problem is formulated as a multi-objective integer linear programming. The Predictive scheduling deals with different traffic types which belong to best-effort and rate-constrained, delay-constrained QoS classes. To propose the best effort traffic LTE networks.

Knitem Ben Ali et al. [13] discussed High data rates and good quality of service to support multimedia streaming at high accuracy levels have been achieved. The main contribution of their paper is a novel mechanism to improve resource management in Next Generation Wireless Networks (NGWNs). The vertical handover process for radio resource management has been used to improve system utilization. They have also implemented the optimized vertical handover process. The Key technique used by them was Media Independent Handover (MIH). The MIH protocol has been used to achieve seamless handover between heterogeneous technologies to enhance vertical handover process and to improve the overall network performance such as network load, fairness index, packet loss rate and call blocking probability rate.

Yupeng Li et al. [30] discussed for improve spectrum efficiency. Constant Envelope- Orthogonal Frequency Division

Multiple Access (CE-OFDMA) is using for seamless communication and improve spectrum efficiency. In case some disadvantages occur. They are packet loss, delay. To reduce packet loss and delay. These demerits are reduced to improve seamless communication and improve spectrum efficiency.

Dionysia Triantafyllopoulua et al. [4] to be discussed about enhance the QoS and increase the Energy Efficiency of uplink LTE systems. In this method has used to single LTE microcell and several user requirement devices. The continues resource allocation of a user using localized SC-FDMA. The algorithm has been respective procedures in order to assess whether a user is a need to uplink resources. Efficient resource management algorithm is used to avoid the collision for resource allocation of users. The algorithm used to reduce delay constraints and improve QoS provision. In this problem has NP-hard as well. Therefore, a suboptimal resource allocation algorithm has proposed to improve energy efficiency and QoS. There is the process implemented in a single cell. So, in this paper addressed in future work include the extension of the proposed solution to a multicell scenario, also considering interference avoidance features.

Gokhan Secinti et al. [9] to discussed about to reduce Power Consumption. Novel EEC is used to improve Energy efficiency. It included Carrier-to-Inference Radio is used to reduce power consumption. EEC is analysing the maximize and minimize energy Consumption for single traffic Networks. It also improves energy efficiency for low-utilized networks. Resource auction module is used to optimized energy efficiency. Multi-Level Branch and Bound (MLBB) is two terms. This algorithm used to manipulate for end-user communication. The First phase is the aggressive approach to reduces transmission power. A Second phase is a moderate approach to improve energy efficiency. The queuing theory approach is used to analyse performance. This paper concluded to improve energy efficiency and to optimize the process. Future work can be done by implementing mobility models to the proposed framework.

Romain Favraud et al. [27] discussed to improve the energy efficiency and QoS. The Resource scheduling algorithm is using for improving energy efficiency and throughput performance. The Hierarchical resource scheduling algorithm is used for real-time traffic and maximizes the throughput for elastic flows. This algorithm is some complexity occurs. The proposed scheduling algorithm evaluates the performance efficiency, adaptability and reduces the time complexity. To improve the scheduler algorithms, achieve in the reduce the complexity.

Mahsa Derakhani et al. [21] explained to improve spectrum efficiency in LTE networks. Time Division Multiple Access (TDMA) technology is used for fastest access data transmission in the wireless networks. TDMA also controlled the high-level network entity. Complementary Generic Programming is using to improving energy efficiency and optimization. It also decreases power consumption by increases spectrum efficiency. In this algorithm is transaction delay are there. Future works reduce delay and improve energy efficiency.

Karim Hammad et al. [14] discussed to improve the energy efficiency in LTE networks. VoLTE is using to increase the data rates in LTE networks. Optimal Packet Scheduling framework is used to improving EE in UE. In this scheduling algorithm, energy efficiency is achieved but, some complexity occurs. UEs energy efficiency optimization has achieved by increasing bits-per-joule metrics. Future works reduce the complexity and to improve the energy efficiency in LTE networks.

Ying Wang et al. [29] discussed to improve the energy efficiency of LTE networks. Orthogonal Frequency Division Multiple Access Scheduling is using for joint optimization of resource allocation. It is used to improve the bandwidth efficiency of LTE networks. OFDMA scheduling is the framework of Medium Access Control (MAC) is used to improve energy efficiency. It is time complexity in these algorithms. It can be reduced to improve the energy efficiency of LTE networks.

Aleksandar Damnjanovic et al. [2] explained to improve throughput and reduce delay. Transmission Time Interval (TTI) is used to a reduction of the latency operations in LTE Networks. It also increases the capacity of the traffic channel. It enables Short Channel State Information (CSI) and Hybrid Automatic Repeat reQuest (HARQ) feedback lines. This is more accurate rate control and improves energy efficiency in LTE networks. TTI is both uplink and downlink of latency reduction leads to faster downloads and faster data in the networks. In future problem is addressed in this paper air interface delays are there. It can reduce air interface delays.

Sreekanth et al. [10] discussed to improve energy efficiency. Traffic-based resource allocation algorithm is used in the resource block. The number of the resource block is presented allocated resource block and the required number of resource allocation is calculated. The Energy-aware rate control scheduling algorithm is used to achieve energy efficiency.

Mahdi Ben Ghorbel et al. [20] discussed to improve spectrum efficiency and throughput performance. Cross-layer and energy-aware scheduling are using to improve the spectrum efficiency for multi-channel access. It can also improve throughput performance. This algorithm can achieve metrics of multichannel capability for best performance access in the adaptive power allocation. This algorithm achieves in the optimality and scalability, robustness.

Cheong Yui Wong et al. [3] discussed to improve throughput performance, better power allocation of LTE networks. Bit allocation algorithm is using for subdividing in each resource. Orthogonal Frequency Division Multiplexing is used to improve the transmission power. TDMA is used to improve power consumption. FDMA is using to improve spectrum efficiency. This is technique is used to achieve throughput, reduce delay bit error rate.

K. Hammad et al. [18] explained to improve energy efficiency and QoS. Predictive Scheduler algorithm used to improve energy efficiency. It is some time complexity occur, so introducing in the ray tracing algorithm is used to improve energy efficiency and optimization. The heuristic algorithm using to improve the QoS. These are algorithm implementing in the achieve energy efficiency and QoS. Despite some disadvantages occurs using these algorithms, slow performance and delay. This disadvantage can be reduced to improve performance access.

Taha Touzri et al. [28] discussed to improve energy efficiency. Green resource allocation is using to calculate the communication system for renewal and Non-renewal resources. Branch Bound algorithm used to analyze the performances for renewable energy resources. The Sub-optimal algorithm is used to optimize resource allocation and improve energy efficiency. It will increase energy efficiency, in spite of slow performance access. Further, to improve performance access for LTE networks.

Cheong Yui Wong et al. [3] discussed to improve energy consumption. To minimize the overall transmit power by allocating the subcarriers to the users and by determining the number of bits and the power level transmitted on each subcarrier based on the instantaneous fading characteristics of all users. FDMA is used to improve data rates. TDMA is used to minimize the total transmit power. In this technique using for some disadvantages occur. There is a transmission delay, so to reduce transmission for a single channel. In this paper mentioned in the future work is to improve energy efficiency without delay.

Mathias Bohge et al. [22] discussed to improve spectrum efficiency. The cross-layer algorithm is used to improve spectrum efficiency and analyses the system capacity of LTE networks. The Water filling algorithm is using to solve the optimization and to achieve the quality of services. There are lower transmit power, low bit error rate, higher throughput performance. In this technique, some delay is there. The future work is complete optimization models that include a real-world scenario of LTE networks.

Bader Al-Mantharis et al. [2] discussed to improve the QoS. Packet Scheduler is using to improve the QoS. In this algorithm has different traffic occurs. To reduce the delay and improve QoS. It also to increase data rates for traffic network. Finally, calculate data rates in video traffic and VoIP. In this algorithm is packet delay and transmission delay occur. So, it is reduced to improve the QoS. Future work is mentioned in this paper to calculate for class level and call level of LTE Networks.

Feng-Seng Chu et al. [6] discussed to reduce UE energy consumption. The Non-linear optimization algorithm used to minimize the total receiving energy and calculate energy consumption. In this algorithm is some complexity occurs. Further, to reduce time complexity to improve energy efficiency. The future work is total energy consumption used to advanced cellular networks.

Arunagiri et al. [25] discussed to improve the QoS. Discontinues reception mechanism (DRX) is used to improve battery life and reduce latency. In this problem solved in the Markova mathematical proof. The UE monitors the Physical Downlink Control Channel for any data to send downlink transmission. The Discontinuous reception is a mechanism to reduce the power loss incurred in the system and at the same time extended the battery life. The DRX mechanism used to Power saving in ON/OFF time. The sleep period is classified. There are light sleep and deep sleep to employ effective power saving. It achieves the QoS in LTE networks.

Dan J. Dechene et al. [4] discussed to improve energy efficiency. The SC-FDMA is used to improve capacity and energy efficiency. Another technique is the Hybrid automatic repeat request (HARQ). In this method, some delay occurs. So, it is a reduced delay and improves energy efficiency. Sub-optimal resource allocation algorithm is used to reduce delay. This algorithm is time complexity occurs. To reduce time complexity and improve energy efficiency. The future work is mentioned in this paper improve the energy efficiency for intercell inference framework.

Mohamad Kalil et al. [23] discussed to minimize the total transmit power for all user. Energy-aware resource allocation is using for improving energy efficiency. In this algorithm in some delay occurs. Propositional fair scheduling is used to reduce delay. In this algorithm also achieves for continues allocation for transmitting power. In spite of some complexity occur. To reduce time complexity and to improve energy consumption.

Atri Mukhopadhyay et al. [1] discussed to increase data rates. Novel Prediction based jitter reduction algorithm using for improving the data rates. The different traffic is there. To increase data rates and improve best-effort services for video traffic. It calculated in jitter function in video traffic. Further, it can reduce delay and calculate in delay function for video traffic connection.

Jiyan Wu et al. [10] discussed to improve energy efficiency. The Stream control transmission protocol is a transport layer solution to implement concurrent multipath transfer over heterogeneous wireless networks. The Joint forward error correction coding and rate allocation scheme used to minimize energy consumption. It also achieves energy conservation and goodput, video peak signal-to-noise ratio. These are metrics achieved to improve energy efficiency. Despite some delay occurs. To reduce delay and to improve energy efficiency.

Hamza Umit Soku et al. [29] discussed to improve energy efficiency. The Semi-definite relaxation-based algorithm is using to improve energy efficiency. In this algorithm using to improve energy efficiency but some complexity occurs. The future work is to reduce the complexity and improve energy efficiency for downlink LTE networks.

Nasim Ferdosian et al. [28] discussed to improve energy efficiency and Quality of Services. The Multiservice resource scheduling algorithm is Fair QoS Broker (FQB). It is used to achieve throughput maximization. It has available resources. It applies to the game theory model to provide per-class fairness among all services classes. The resource class distribution is greedy knapsack to produce an efficient resource scheduling algorithm. This algorithm used to improve energy efficiency and QoS. In this paper, some a traffic delay occurs. So, reduce traffic delay and improve energy efficiency.

Jiyan Wu et al. [12] discussed to improve energy efficiency for video traffic. It implements in the mathematical framework to analysis the frame-level energy quality for video communication. The had proposed scheduling algorithm is used to achieve video quality with minimum device energy consumption. In this, some disadvantage is an end to end delay occurs. The future work is a trade-off between energy consumption the Quality of Experience (QoE) means to optimize multipath video transport. To implement Energy Video aware multIpath tranSport (EVIS) to evaluate and optimize performance over real wireless networks. To develop a system model for improving energy efficiency and quality of Dynamic Adaptive Streaming over HTTP (DASH) by using scheduling algorithms

Naveen Mysore Balasubramanian et al. [27] discussed to improve energy efficiency. DRX is incorporate with Quick Sleeping Indicator (QSI). In this algorithm is used to improve energy efficiency, simple and low complexity, low mobility Machine Type Communication (MTC) UE. The future work is an improvement in computational savings. Such as is not modelled in this paper. It can be improving in computational complexity.

III. Proposed Work

LTE has different traffic channels and it is difficult to handle those traffic problems. There are problems in the existing system and certain problems are solved by using the proposed work technique. The identified problems can be handled by improving the energy efficiency, improving best effort class and rate, reducing delay by introducing delay constraints in real-time heterogeneous traffic networks and by improving throughput performance in real-time traffic LTE networks.

Resource allocation

Packet Scheduler

Controller

Ray tracing

The Proposed Packet scheduler is implemented different resource allocations for real-time connection and non-real time connections. The real-time connections are VoIP and Non-real-time connections are Video Streaming and FTP, Web browsing. The jitter Efficient Packet Scheduler is directly applied for real-time traffic and non-real-time traffic applications. The First function is continued resource allocation for LTE networks. It reduces average delay for LTE networks. The second function for the Packet Scheduler. This Packet scheduler is continued resource allocation for different traffic LTE networks. The packet is sent without delay. The Packet scheduler is used to schedule the memory, port number, CPU and Performance. The Controlled has control operations on the network. It is controlled and configures in the Packets. It also controller to enhance system performance. The CSI for each UE is predicted using a single processing thread from the pool of shared Ray Tracing (RT) engines available in the cloud. The RT engine is capable of accurately pre-estimating the UEs propagation features by just knowing information description of the broadcast environment and the UEs location. This frame structure is FDD. This implements downlink is LTE networks

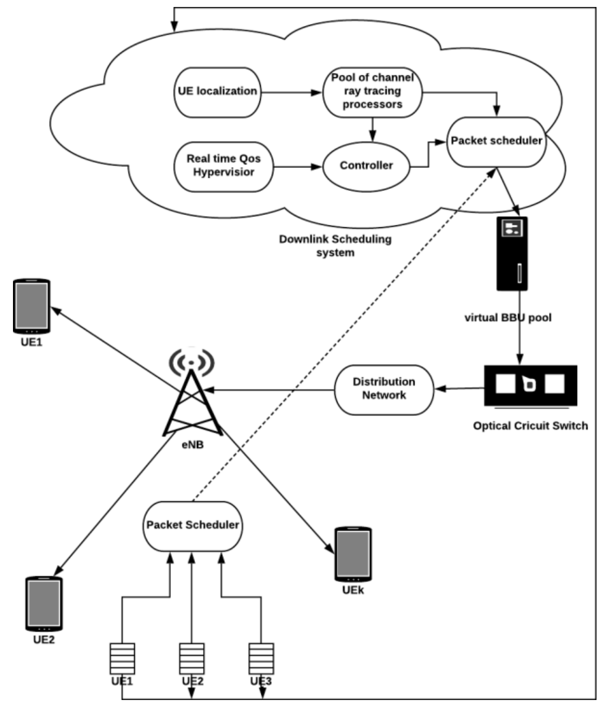

Fig. 5. System model.

for eNB. Uplink data transformation compare to downlink is greater the frame duration.

The proposed system architecture as shown in the figure. 4.1. Multiple network connection is connected based on Cloud Radio Access Network (CRAN). In figure 4.1, proposed downlink scheduling system is represented. LTE has a different channel are there. In this model target is the improved energy efficiency. It can achieve the target metrics are a rate and delay, jitter, average throughput. The real-time interface controller for inbound and outbound traffics, which is responsible for monitoring the QoS level of each UE connection in a strict and timely manner, the packet scheduler is configured using a scheduler controller.

The controller is used to set the appropriate resource allocation algorithm. The proposed resource allocation is real-time connections for VoIP and non-realtime connections for Video Streaming and FTP. This Packet Scheduler algorithm is used to improve the throughput performance. These are a function used by the system model. Jitter Efficient Packet Scheduler as shown in figure 4.2. This algorithm is used to improve energy efficiency. The delay is reduced to improve energy efficiency. To calculate the delay in real-time heterogeneous traffic LTE networks. To provide the best channel condition for LTE networks. In figure 4.1, UE1, UE2 up to k UEs are found. It is the VoIP, FTP, Video, Web browsing traffic models are there. These are the traffics can be reduced to improve better channel condition for heterogeneous traffic LTE networks. The SRV scheduler to solve the optimization problem in LTE. In

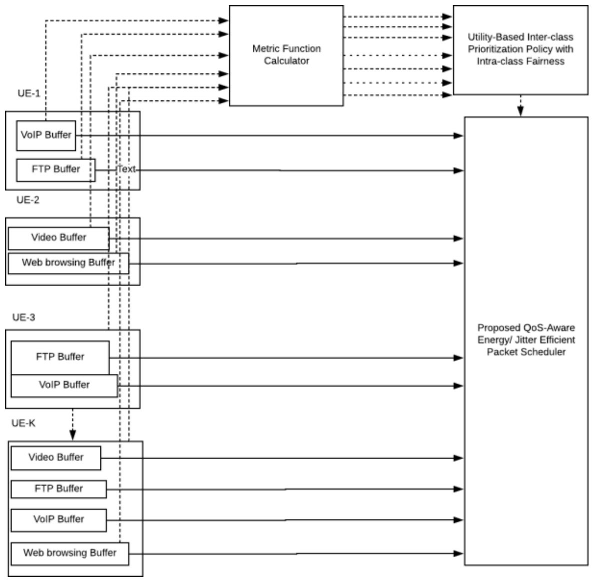

Fig. 6. Jitter Efficient Packet Scheduler.

this algorithm used in a single frame time horizon (M=10). In every frame consider in the arrival time and departure time, UE Buffering status. Each packet arrives at a UE connection buffer within a specific frame and gets stored in the scheduler list of buffered packets, still the end of the same arriving frame. Each packet becomes relocated from the buffered list to the scheduling list to arrival and departure. They used in the Short-Range Version- Connection Oriented (SRV-CO) and ShortRange Version-Packet Oriented (SRV-PO) algorithm. The algorithm used for list of symbols shown in table 5.1.

IV. ALGORITHM

Input : K, Hk, M, N
Output : Delay calculation in LTE traffic networks
Variable: K- The resource block, Hk traffic connection, M interval, N- no of UEs.

1. Initialize empty resource block matrix R, iter =1
2. While (is empty (R) AND Ak h 0, k,h) do
3. Calculate Uk h (Xk h(iter)) k,h
4. [Idk, Idh] = sort (Uk h(Xk h(iter)), ascend)
5. For i=1 to Hk k k=1 do
6. Set k= Idk(i), h = Idh(i)
7. Find N*, M* to satisfy FCFS
8. Update N*, M* based on Dk,h max
9. SortEE(N*)
10. If hk D* then
11. Calculate (k,h A (a 1,a)), (k,h D (a 1,a)), a Ak,h
12. If length((Ak,n) == 0 then
13. Find k,h a (m,n), a = HOLk,h, nN*, mM*
14. Update R, Ak,h
15. Else
16. Calculate k,h A (Ak,h —last, a)
17. Calculate k,h D (Ak,h —last, a)
18. Calculatek,h A (Ak,h —last, a) - k,h D (Ak,h —last,a)
19. Sort delay (N*)
20. Update M*
21. Find k,h a (m,n), a = HOLk,h, nN*, mM*
22. Update R, Ak,h
23. End if
24. Else
25. Find k,h a (m,n), a = HOLk,h, nN*, mM*
26. Update R, Ak,h
27. End if
28. End for
29. Set iter=iter+1
30. End while

The above mentioned algorithm is SRV-CO algorithm. This algorithm initializes in empty RB allocation matrix represent in the R. The size of the matrix is the number of resource block per TTI and number TTI within scheduling interval (N * M). In each iteration of a sequence resource block access start to the end of UE each connection. In Line 3 is calculating in the Utility function for each UEs connection. In Line 4 is updating utility values in sorting ascending order. Line 5 is a condition for loop in calculating traffic type connection-oriented. In Line 6, set value in ascending order and in Line 7 is frequency, time in resource allocation indexes from the R matrix. The value is representing in the First Come First Served (FCFS). The new values updated in line 8. In Line 9 is energy efficient scheduler value calculates an update in line 11. Line 10 is a condition for loop number active connection for UE traffic and a set of the index variables for a traffic delay. In Line 11 calculate in the arrival time and departure time. Line 13 is Binary decision variable which denotes the allocation decision for RB n during TTI m for each packet connection h of UE k. Line 14 is updating the resource allocation values in Head Of Line (HOL). In Line 16, 17 calculated in packet arrival time and departure time in video traffic only. In line 18 is calculated in delay value from video traffic. In line 20 is updated resource block value in M*. The same procedure is followed to calculate in packet delay in each iteration. The resource allocation is re-allocating and updating in each iteration. Line 28 is to set value values iteration value and exiting iteration value added in one. This algorithm used to calculate in video traffic connection and control delay Packets. The arrival time and departure time for downlink LTE Networks. If the arrival times of packets a and a-1 are equal to t () and , (a-1). To calculating inter arrival time and inter departure time in web traffic networks.

$$tk(a-1, a) = kA(a-1, a) - kD(a-1, a)$$

(1.1) The equation 1.1 as shows in packet inter arrival time and departure time. is used to calculate in inter departure time and inter arrival time for different traffic LTE Networks. To achieve QoS. The QoS Parameter is taken for this projects Delay, Jitter, Throughput. Energy efficiency is increased and achieves the QoS parameters,

Delay

Jitter

Throughput

It is the difference between in time when a packet is arrival time and Departure time of the packet. Packet delay calculation as shows in equation 1.2.

$$PacketDelay = Arrivaltime - Departuretime..(1.2)$$

This equation is used to calculate in packet delay for LTE networks

Mean delay is the difference between delay sum and receiving a packet. Mean delay is a variance of delay function. The Mean delay is calculating in equation 1.3.

$$Meandelay : delay = delaysumrxPackets..(1.3)$$

This equation is used to calculate in mean delay. It is achieve QoS for mean delay value 0.01142.

Mean jitter is the difference between jitter sum and receiving a packet minus one. Mean jitter is a variance of delay function. The Mean jitter is as shows in equation 5.4

$$MeanJitter : jtter = jittersumrxPackets - 1..(1.4)$$

The network is the amount of data successfully delivered from the sender to receiver in a given time period. Data transfer rate for the networks is measured in terms of throughput. Throughputs are measured in Kilobits per seconds (Kbps), Megabits per second (Mbps) and Gigabits per second (Gbps). LTE throughput represents in equation 1.5

$$Throughput = NumberofRRBs1000NoofAntennas10^6..(1.5)$$

Finally, calculate in the delay, jitter, throughput. These are metrics are calculated in LTE traffic Networks. Enhanced in LTE Networks.

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