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6G Network Access and Edge-Assisted Congestion Rule Mechanism using Software-Defined Networking

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Abstract

Now-a-days there is a wide usage of internet ongoing due to which the users face internet traffic and low speed surfing resulting in traffic congestion. The analysts are now looking at the potential 6G technology after 5G network becomes a major commercial success. To cope up with the internet traffic we have introduced network congestion avoiding mechanism and avoiding jamming of congestion in communication. The system will take Real time data for avoiding buffering of traffic flow. The results of the evaluation of this proposed mechanism suggest that it can improve the efficiency of network. Another concern is network security as there is need for unified security architecture protecting the authenticity of the data over the network. There is a need for security as the users send and communicate so there is higher risk of data malign or piracy. Network Slicing is another mechanism where there is virtual slicing of network to avoid slow broadband speed, where individual should not be hampered due to broadband speed. The system proposes slice admission control scheme for network slicing. The proposed system also compares the internet speed using transmission technique for understanding the 6G network functioning.

Keywords: *Congestion mechanism, unified security architecture, transmission technique, network slicing.*

1. INTRODUCTION

In the virtual world there is need for wireless communication for each and every aspect. Now-a-days there are multiple dependencies for each aspect being it shopping, payments, bookings etc. To overcome such dependence users, need proper security for the safety of their information and no tracing of their activities. Security is a critical issue prompting as there are many hackers involving in malpractices for data malign. There is a need to update the security architecture of 6G networks to meet the implementation scenarios and new requirements. To overcome this, we propose MIMO technique for physical security. Network slicing allows the virtual slicing of the network among its users. In 6G networks, network slicing is identified as a core component. Existing approaches for network slicing are not enough. Virtual switches can be used to cut the network. Mobile network operators may build various "slices" of network resources, including radio resources, infrastructure resources and virtual network resource scrapping. Such slices are often sold to completely different network operators, such as virtual mobile network operators (MNVOs) or service providers, so that each locator can provide their own services to end customers on a theoretically autonomous virtual network. The required slice shall be produced and issued to the tenant upon agreement. It will eventually be liberated after its period specified in the Service Level Agreement (SLA) or at the customer's request, once the slice is provided it will be continually sustained and guaranteed through SLA.

In the purpose network congestion control mechanism, the main idea is to postpone the delivery of material until the time-limit expires. This process is driven by two contextual factors below: i) differentiation of data traffic (i.e. data traffic obstruction- indulgent) and network state (i.e. abrupt traffic crest). Research and Development (R&D) is progressing at a rapid pace throughout the world to standardize 6th Generation (6G) networking technologies.

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The paper focuses on avoiding Network congestion for users to provide the transmission strategy with the network slicing solution along with network security.

2. LITERATURE SURVEY

For the analysis of upcoming 6G Technology some previous research work was studied as mentioned below: -

Pingzhi Fan et al [1] identified 5G mobile communications network issues and specifications in high mobility conditions and provided probable solutions to technical challenges. An overview of 5G network HMWC techniques is provided including transceiver framework capable of exploiting the holdings of high mobility background based on correct evaluation of fast time-varying channels; signal processing techniques capable of harnessing benefits and mitigating impairments in high mobility environment; efficient maintenance of the convergence and new network architectures.

Fang Hui et al [2] introduced Unified 5G wireless security infrastructure to meet increasing security requirements. The security issues of current mobile networks were investigated and the risks posed by both WLAN and mobile access equipment for new 5 G standards were addressed. For 5G network designers, the designed security architecture is a positive reference. It is capable of providing both the entire infrastructure and certain critical components with a general security scheme without adding overheads.

Mona Jaber et al [3] analysed the 5G backhaul issues, discusses proposed clarifications and sets out concrete guidance for readjusting the backhaul, solving the discrete 5G scanter while presenting an integrated perception of a complex, scalable and adaptive 5G backhaul system. In addition, there is an identical exercise among the performance metrics needed and accessible from the compiled data, shedding light on the effect of different RAN features on restricting backhaul choices, and vice versa and joint RAN/backhaul perspective providing various combinations of possible RAN architectures and backhaul approaches, providing a detailed trade-off investigation of the achievement and deprivation suffered from each.

Theodore S.Rappaport et al [4] presented new cellular mm-wave systems, technology, measuring equipment and a range of measuring conclusion displaying 38 and 28 GHz frequencies that can be used on base stations and mobile devices when using steerable steering antennae.

Thomas Wirth et al [5] They provided performance results on a 5 G network incorporating physical (PHY) and medium-access layer (MAC) principle that met strict communication requirements. The system is based on an efficient, radio-defined software (SDR) signal processing architecture using a novel, latency-scalable radio frame structure that can achieve end-to-end delays of less than 1ms over a wireless connection. Additionally, to classify short delays under reliability constraints based on latency percentiles validation implementation concept based on statistics collected from transferred data packets in real indoor over-air tests.

Tarik Taleb et al [6] implemented the MEC survey concentrating on the major technological enablers. It allows MEC orchestration, taking into account both particular assistance and a network of MEC networks to allow flexibility, sheds focus on the various implementation alternatives for the orchestration. The MEC reference architecture and major scans for implementation that backs multi-tenancy for contents providers, software developers and third parties was investigated. An overview of the current developments in standardization, and further elaborates on open research issues was provided.

Dan Wu et al [7] provided a more comprehensive OFDM report using prior study. More information on f-OFDM is explored in their study including the design and implementation of filters with significant prototyping performance. The development of the territorial analysis indicated that f-OFDM provides a reduced spectrum leakage that improves spectrum efficiency compared to the traditional OFDM used in 4 G LTE networks, also validated is the ability to support multiple asynchronous sub-band transmissions of filtered-OFDM where the loss of performance due to overlapping but asynchronous transmissions is recorded to be negligible.

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Meysam Nasimi et al [8] Planned a Mechanism for congestion control which could operate within the Multi-Access Edge Computing (MEC) framework. The proposed mechanism aimed to make decisions on selective traffic buffering in real time while taking into account the condition of the network and the quality of service (QoS). To support a MEC-assisted system, the MEC server is required to cache delay-tolerant data traffic locally until the stoppage conditions expire, thus enabling the network to have better control over the provision of above priority data through radio resources.

Xi Zhang et al [9] introduced a new versatile waveform enabler called filtered-OFDM (f-OFDM), with subband-based splitting and filtering. Separate OFDM systems are tightly confined within the allotted bandwidth, and f-OFDM is then able to overcome OFDM's limitations while retaining its advantages. The global synchronization criterion is relaxed with the sub-band.

3. EXISTING SYSTEM

Table 1. Basic Comparison between Mobile Generations [10]

Feature	2G	3G	4G	5G
Deployment	1990	2001	2010	2020
Frequency Band	900MHz	2100MHz	2600MHz	3-90GHz
Speed	64 kbps	2 Mbps	1 Gbps	Higher than 1 Gbps
Technology	Digital Cellular	Universal Mobile Telecommunications Structure, Code Division multiple access.	Wi-Fi, Long Term evolution Advanced	Wi-Gig, Multi-radio access technology, Wi-Fi
Services	Low-rate data, Digital voice, packet (General Packet Radio Service), SMS.	Higher quality audio and video calls, mobile broadband	Wearable devices, High data rate.	Internet of things, Very high data rate to fulfill extreme user demands, device-to-device, machine-to-machine.
Multiplexing	Time division multiple access	Code division multiple access	Orthogonal frequency division multiple access	Filter bank multicarrier, Orthogonal frequency-division multiplexing, non-orthogonal multiple access.
Handover	Horizontal	Horizontal	Vertical / Horizontal	Horizontal/Vertical
Switching	Packet /Circuit.	Packet	All packet	All packet
Core Network	Public switched telephone network	Packet network	Internet	Internet

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In the existing system, a framework for congestion management is used to reduce RAN congestion in the sense of MEC. The key idea is to postpone the production of delay tolerant information until the terms of delay expire. The f-OFDM structure is more versatile and accommodates various types of applicability in various sub-bands. A heterogeneous mobile network managed by a fully integrated SDN system with MEC. For e-MBB, it focuses on the f-OFDM system security measures. In contrast to the OFDM system, the f-OFDM system is more versatile and accommodates various types of services in different sub-bands. An encryption scheme was provided using main streams. A congestion management edge assisted scheme aimed at alleviating network congestion in the 5G network environment. To overcome all such problems a system is proposed to avoid network congestion with unified security architecture along with network slicing with the transmission technique. A basic Comparison between existing technology generations is shown in table 1[10].

4. PURPOSED SYSTEM

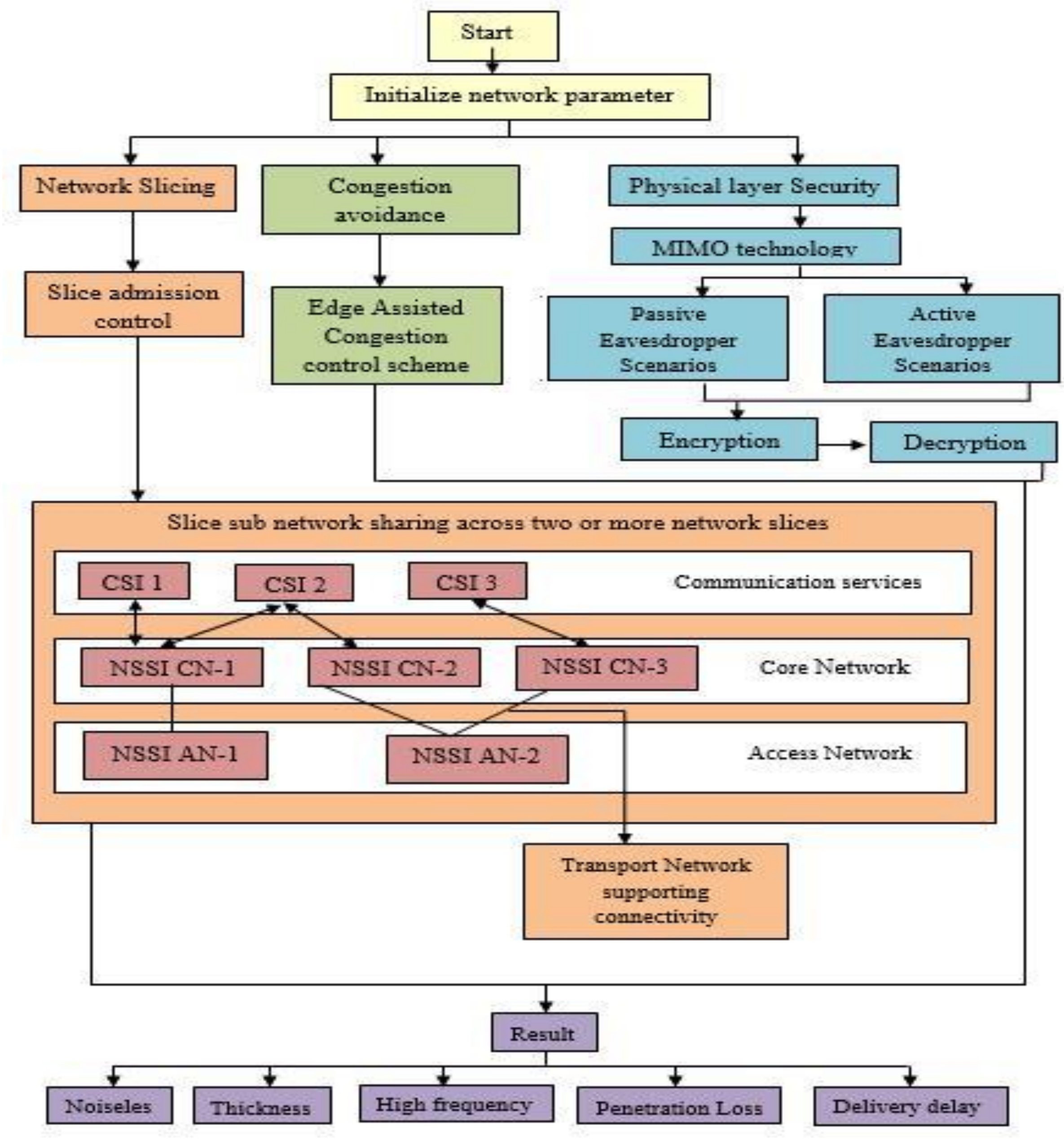

Figure1. Architecture Diagram

In the Purposed System firstly the network parameters are initialized and then various techniques are used. The techniques are: 1. Network slicing 2. Avoiding Congestion 3.Physical Layer Security

In Network Slicing Technique the network is sub-sliced into more networks called as Slice admission Control which has three functions such as: a. communication services b. core network c. access network that work accordingly. These three functions will provide the results.

The purpose of the suggested congestion control mechanism is to alleviate congestion in the network that makes better use of available network resources. The proposed congestion control scheme with edge support is aimed at reducing network congestion in the evolving 6G network environment to avoid the interruption in network traffic and smoothly process the data in the network.

Physical layer security is provided in the network using MIMO technology. In this system will keep a check of current security threats and large MIMO technology countermeasures based on passive and active eavesdropper scenarios respectively. For securely processing data in the network encryption and decryption is used where the data is processed on end-to-end delivery services.

Each parameter of the result will be taken into consideration. The parameters are Noiseless, Thickness, High frequency, Penetration Loss (dB), Delivery delay, High Speed and Latency.

5. EXPECTED RESULTS

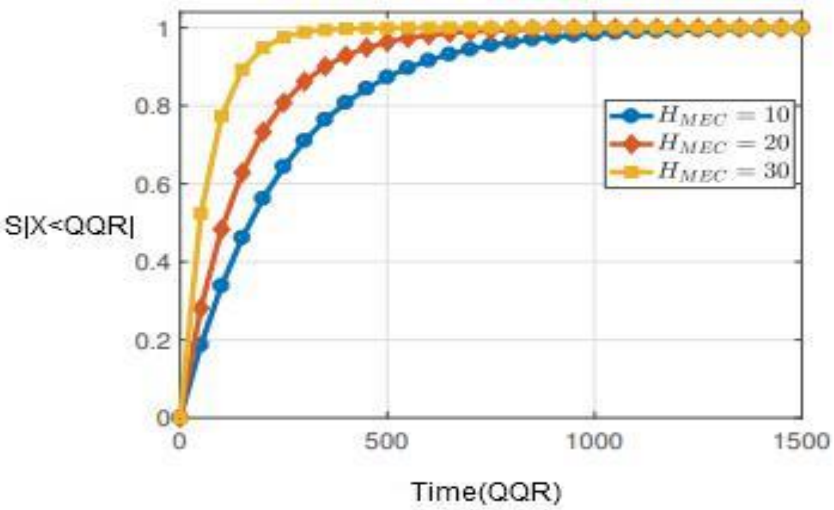

Figure 2. Delivery Probability S|X<QQR| over time QQR U(0)=50.

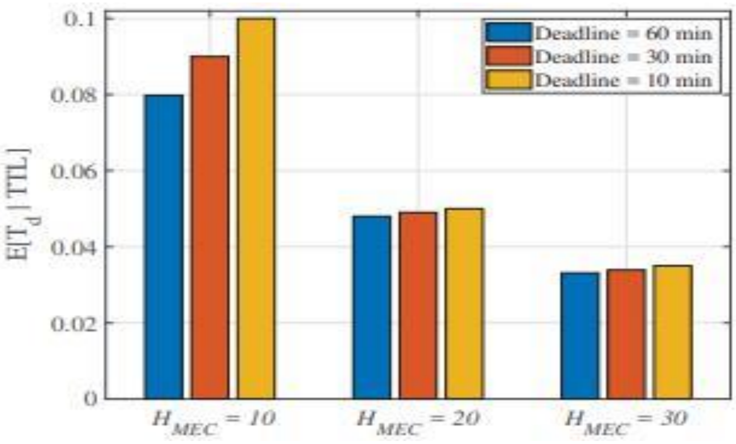

Figure 3. Expected delivery delay E{Td |TTL} for different deadlines.

The conduct of the network congestion occurred in the network can be evaluated and can be solved using the proposed system by improvising the existing techniques [8]. Slicing technique will help in proper virtual slicing of the network with the slice admission technique. Security to the network architecture is provided using MIMO technique having two parameters such as active eavesdropping scenario and passive eavesdropping scenario where the data is sent in the form of encryption and decryption.

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6. CONCLUSION

This paper reviewed the network slicing scenario that has been taken into account as one of the most critical technical challenges for 6G mobile networking infrastructure and summarized preliminary research efforts to allow end-to-end network slicing for 6G mobile networking which helps in congestion avoidance. The explosion in data traffic has presented major congestion and delay challenges for the existing networks. In order to meet these two challenges, the proposed system set up an advanced congestion control system to reduce network congestion in the emerging 6G network environment and proposed hierarchical security architecture for the 6G network.

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