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QoS Analysis using Traffic Pattern Forecasting of 5g SDN Cellular Networks

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Abstract: *Traffic modeling and prediction are at the focal point of the assessment of the performance of tele communications network. In spite of the fact that the research carried on traffic prediction is a built up field, most existing works have been completed on conventional wired broadband systems and once in a while shed light on Software Defined Networks. Notwithstanding, with the violently developing demand for SDN, there is a dire need to design traffic-aware energy-efficient network architecture. Keeping in mind the end goal to acknowledge such a plan, it turns out to be progressively vital to show the traffic predictability theoretically and talk about the traffic-aware systems administration hone in fact. These days, as the center system engineering is developing toward programming characterized systems (SDNs) the anticipated traffic could fundamentally add to network architecture in this future design. In this work, we propose using software-defined networking technologies for optimal traffic engineering in cellular networks with service chaining. We study the case in which software defined services are used to support network services and each flow requires multiple network services. To minimize the maximum load of virtual machines and guarantee that the sum rate of admitted flows is large enough, the main purpose of this dissertation is to avoid traffic in LTE networks. In this dissertation we discuss how the proposed technique affects the high delivery ratio and high performance with reduced delay and relative speed. The next result we get is low control overhead and high throughput when compared with the existing routing protocol. Detailed simulations are to be used to evaluate the performance of the proposed traffic based routing schemes. The simulation results show that the proposed scheme can result insubstantial improvement in the packet delivery. The results analyzed from our traffic Aware and Flexible Routing scheme in LTE Networks we are concluding that we are getting far better performance as compare to the existing routing. As the simulation results show we achieved the number of Mobile Nodes in case of Performance, Relative Speed and Control Overhead. It means we are increasing the message overhead and traffic as well but our new protocol, is taking less time in all cases.*

Keywords: 5G LTE, Traffic, Additive increase and Multiplicative decrease (AIMD), Taxation

I. INTRODUCTION

Mobile communication and wireless networks have advanced phenomenally during the last decade. The constantly developing increment in the interest for resources, particularly for multimedia information, with high quality of service (QoS) necessities, has advanced the improvement of 3G and 4G wireless networks. Nevertheless, the achievements of the development in technology cannot fulfill the proper satisfaction. Therefore, the idea of 5G networks that represent networks beyond 4G has become the need of the hour. 5G networks have appeared inferable from the various difficulties confronting 4G networks, for example, requirement for higher information rate and limit, lower cost, lower end-to-end latency, and massive inter-device connectivity. . However, a comprehensive analysis of future networks or next generation networks of information systems that discusses in related forums and standardization is really challenging. The enabling technologies for next generation mobile systems and networking have been surveyed in this paper, which provides readers a clear vision of the current status. NGN, an extraordinary issue for the internet protocol-(IP-) based future of mobile network foundation, is considered as a merging of correspondence networks which tries to diminish cost and offers incorporated services by means of a center backbone network. It inherits three different advantages of various networking technologies, namely, layered structure, standard interfaces and multiple services, and functions that can be implemented in several layers ranging from MAC to application. With the increase in the number of Internet users and QoS requirements, NGN has become a moving trend for deployment. It established convergence of user access and integrated communication network services with IP technology. The motivation behind the migration of networking systems from the traditional telecommunication network to NGN has been developed based on the advantages of backbone cost reduction, possibility of fast and new service deployment, controllable QoS, compatibility between fixed and wireless networks, network management centralization, and so on. Existing network services based multimedia application such as voice, data, and video transmission at high speeds will be offered as an important outcome of NGN deployment for the fixed and mobile service integration topology.

Furthermore, NGN provides low-cost service at high data rates. The concept of the future network can also be the fifth-generation mobile system, 5G. Over the course of the long history of mobile communication systems from the first generation to 4G LTE-A (Long Term Evolution Advanced), the mobile communications industry has achieved enormous advances in data communication. The next generation can be a revolution in mobile networks that will achieve the best performance in terms of coverage capability, energy consumption, data speeds of 1 Gbps, and better security and energy efficiency over spectral compared to previous networking systems. However, the next generation wireless communication network has not been defined and characterized exactly. Research on 5G has been initiated by many projects, organizations, and standardization forums. Such research on 5G might be directed by the limitations of current technologies. The key requirements of 5G are real wireless communication with no limitation of coverage edge, access policy, and density zone. Secondly, the network should be able to support high-resolution multimedia (HD) broadcasting service. Thirdly, it should have faster data speeds than the previous generations. Finally, it should support new services based on wearable devices. In addition, the NGN is expected to have massive interdevice connections, which can be termed as Connection of Things. The research on 5G is different from that on previous-generation networks because of the limitations of resources in the RF band. The 5G wireless network will mainly focus on new spectrum, multiple-input-multiple-output (MIMO) diversity, transmission access, and new architecture for capacity and connection time [1].

II. LITERATURE SURVEY

A. Pirinen, Pekka et al. (2014)

This paper diagrams the guideline exercises toward 5G remote correspondence systems. Emphasis is paid on the program and venture exercises and furthermore on the current writing. A more basic look to a broad assortment of European Union 5G related undertakings is driven. Composing review is restricted to IEEE Communications Magazine 5G issues and relevant white papers from different sources. The considered references show that despite cutoff boosting headways 5G needs to offer, e.g., low latency, ultra-dependable correspondences, and gigantic network. Along these lines, the most requesting part in 5G change will be the blueprint of adequately versatile structure thought organize that grants compelling consolidation and organization of various specific advances redesigned for different utilize cases.

B. Dong, Wang En, et al (2013)

In this paper, with the advancement of cloud computing, various fundamental applications have been maintained to give many key services in the cloud computing. So the availability of cloud computing services swings to be progressively raised. Since resources of cloud computing are distributed, dynamic and heterogeneous, standard research on accessibility can't regard adjust to the cloud computing new parts. This paper researches on QoS-masterminded cloud computing resources openness. Beginning, a checking model of cloud computing resources openness is made. By at that point, as exhibited by the dynamic technique for the cloud computing association, the openness of cloud computing resources is destitute down from QoS of a particular cloud resource center point which is portrayed by general attribution and exceptional attribution to QoS of some cloud resources which are connected by plan model, parallel model and mix model to give benefit. As appeared by the three models and the examination of the single cloud resource advantage, the accessibility of cloud computing organization is viewed.

C. Eitan Altman, Chadi Barakat, Vi'ctor M.Ramos R. (2005)

The throughput of AIMD protocols when in doubt and of TCP particularly, has been figured in many existing works by exhibiting the round-trip time as a relentless and thus supplanting it by its desire. There are however various circumstances in which the delays of packets move, causing an assortment of the round-trip time. Many common circumstances occur in remote likewise, adaptable networks. In this paper a logical model that records for the inconstancy of delay, while handling the throughput of an AIMD protocol is proposed. A close edge expression for the throughput, that speaks to the impact of delay changeability is construed from it. By examination and reenactment, that a development in the changeability of delay improves the execution of an AIMD protocol. Along these lines, a symptomatic model that lone considers the typical delay could criticize the execution of an AIMD tradition in circumstances where delay is variable.

D. Xia, Wenfeng, et al. (2015)

In this paper, rising very large designs (e.g., versatile, social, cloud, and colossal data) in information and communication technologies (ICT)[5] are instructing new troubles to future Internet, for which all inclusive accessibility, high transfer speed, and dynamic organization are basic. In this way, SDN is arranged to give more powerful setup, better execution, and higher flexibility to suit imaginative system traces. This paper diagrams latest enhancements in this powerful research scope of SDN. At first an overall recognized definition for SDN with the beforehand specified two trademark parts and potential points of interest of SDN is

described. Then its three-layer engineering, including an establishment layer, a control layer, and an application layer, and each layer is substantiated with existing examination attempts and its related research zones. After that an outline of the veritable SDN utilize (i.e., OpenFlow). At last, this review paper is closed with some endorsed open research challenges.

E. Nunes, Bruno Astuto An., et al. (2014)

In this paper, it is shown that the likelihood of programmable systems has starting late re-expanded broad drive on account of the improvement of the Software-Defined Networking (SDN) perspective. SDN, consistently suggested as a "radical new idea in frameworks organization", that certifications to enhance arrange organization and engage advancement through framework programmability. An important perspective of programmable systems from early considerations to late upgrades is given. At that point the SDN engineering and the OpenFlow standard specifically is displayed, momentum options for usage and testing of SDN-based conventions and administrations are talked about, ebb and flow and future SDN applications, are analyzed and promising examination headings in light of the SDN worldview are investigated.

F. Horvath, Raphael, et al. (2015)

Network advancements have dependably been a vital piece of progress for advances like distributed computing. In any case, because of the dillydallying improvement of a versatile IT framework, this can prompt issues in its aggressiveness. With SDN, overseers have the likelihood to digest the basic system foundation for applications and system administrations. This paper demonstrates results of an efficient writing survey on difficulties and impacts of SDN. Impacts of SDN are talked about by characterizing one of a kind of elements of SDN like Network control is specifically programmable in light of the fact that it is decoupled from sending capacities. SDN moreover influences the administration of the system, incorporating changes in sending of strategies, the programmability of the system.

G. Akyildiz, Ian F., et al. (2015)

In this paper, one of the essential building pieces and genuine challenges for 5G cell structures is the arrangement of adaptable framework design which can be recognized by the item portrayed sorting out perspective. Another item portrayed engineering, called SoftAir, for people to come (5G) remote structures, is displayed in this paper. Specifically, the cunning thoughts of framework limit cloudification and framework virtualization are abused to give a adaptable and solid framework designing. Additionally, the principal advances to support and manage the proposed designing are analyzed in consistent components, including fine-grained base station breaking down, reliable joining of Openflow, flexibility careful control action modifying, resource capable framework virtualization, and scattered and communitarian development course of action. In like manner the huge points of interest of SoftAir outline with its engaging headways are shown by introducing programming portrayed movement building courses of action. The testing issues for recognizing SoftAir are in like manner discussed in points of interest.

H. Jasem, Zukarnain., et al. (2008)

Congestion control is one of the essential issues in computer networks. Without fitting congestion control parts there is the probability of inefficient utilization of resources, finally provoking network fall. Therefore congestion control is a push to modify the execution of a network to changes in the activity stack without ominously affecting customers utilities. AIMD (Additive Increase Multiplicative Decrease) is the best algorithm among the plan of different algorithms since it reflects awesome capability and also extraordinary reasonableness. Our control show relies upon the supposition of the principal AIMD algorithm; we create the impression that both viability and conventionality of AIMD can be made progress. We call our approach is New AIMD. An exploratory results of TCP that match the yearning of hypothetical examination is given.

I. McKeown, Nick, et al. (2008)

This paper proposes OpenFlow which depends on an Ethernet switch, with an inner stream table, and an institutionalized interface to include and expel stream passages. The fundamental objective is to urge organizing merchants to add OpenFlow to switch items for sending in school grounds spines and wiring storage rooms. It is trusted that OpenFlow is a practical trade off: scientists run investigates heterogeneous switches consistently at line-rate and with high port-thickness on one hand; while then again, the inner workings of their changes require not to be uncovered by sellers. Likewise OpenFlow could fill in as an important grounds part in proposed vast scale testbeds like GENI.

J. López, Lorena Isabel Barona et al. (2015)

SDN decouples the control plane from the information plane permitting the fast development and the presentation of new administrations in a simple way. Then again, at present restrictive apparatuses, for example, stack balancers and firewalls are

executed in equipment, NFV[10] expects to change these system capacities to an open programming condition utilizing virtualisation and cloud advances. This implies a decrease of use in the supply and administration of telecom administrations. SDN and NFV are two unique ideas yet these can coincide and assist each other. In this review, the creators display a study of SDN and NFV centering in virtualisation ventures and the utilization situations where a cooperative energy between these advances is conceivable. This review incorporates the fundamental ideas of system virtualisation, NFV and SDN, flow examine and the connection between both advancements.

K. Le, Nam Tuan et al. (2016)

In this paper, as an upgrade of cell networks, the future-generation 5G system can be viewed as a ultra-fast innovation. Therefore, new models and administration plans for various utilizations of the rising advancements should be prescribed to explain issues identified with information movement limit, high information rate, and unwavering quality for guaranteeing QoS. Cloud-based administrations give adaptable and proficient answers for data and correspondences innovation by lessening the cost of putting resources into and overseeing data innovation foundation. IoT consolidates distributed computing and SDN to accomplish more prominent efficiency for developing advancements in 5G by encouraging connection between the physical and human world. The significant target of this review gives a rebellious vision on far reaching works identified with empowering innovations for the next generation of versatile frameworks and networks, essentially concentrating on 5G portable correspondences.

III. PROBLEM FORMULATION

Big public events are notorious for overwhelming cell-phone networks with surges of traffic. Indeed, even on normal days in current networks as often as possible display similar side effects. The issue happens when huge quantities of individuals utilize their advanced mobile phones in the same time to make calls, send photographs, download video, or post updates to Facebook. But it's not just one-time events can swamp network capacity; bandwidth demand is surging just about everywhere thanks to the leap in smart-phone subscriptions and the introduction of new applications such as videoconferencing.[12]

The Predictive models must not simply look at how much traffic a network carries. They must also examine whether the traffic is being routed efficiently. They might find, for instance, that one equipment node is operating at only 30 percent capacity, while another is at 90 percent. Too little capacity and you drop calls and alienate customers. Too much and you're wasting money.

Predictive modelers anticipate future traffic demands and help telecommunications carriers plan accordingly. They start by collecting a carrier's data to understand what has gone on in a network and what it would seem that now how much activity is transmitted, what rate is voice or video or text, what way it takes through the network. Then they run simulations to assess the impact if, for instance, a carrier starts selling the iPhone, or changes its marketing plan, or moves from SDN services. But now there's worry that the models aren't looking far enough into the future. "The traffic forecast is becoming the most important factor in providing the quality of service to the end user," What maybe was true the month before may not be true the month after.

IV.CONCLUSION

The main purpose of this dissertation is to avoid traffic in LTE networks. In this dissertation we discuss how the proposed technique affects the high delivery ratio and high performance with reduced delay and relative speed. The next result we get is low control overhead and high throughput when compared with the existing routing protocol. Detailed simulations are to be used to evaluate the performance of the proposed traffic based routing schemes. The simulation results show that the proposed scheme can result insubstantial improvement in the packet delivery. The results analyzed from our traffic Aware and Flexible Routing scheme in LTE Networks we are concluding that we are getting far better performance as compare to the existing routing. we are increasing the number of Mobile Nodes in case of Performance, Relative Speed and Control Overhead. It means we are increasing the message overhead and traffic as well but our new protocol, is taking less time in all cases.

V.FUTURE SCOPE

The proposed system can be enhanced in future by other researchers in the following ways:

- A. We can add the energy parameter, such as how much energy is consumed by proposed protocol when it increases the gate size.
- B. Topology management in LTE networks is the issue of changing the transmission control at network Mobile Nodes with a specific end goal to accomplish the ideal topology that amplifies network performance. This future plan can accomplish better execution by utilizing a consistent transmission control.
- C. We can add new components to the execution in the simulation, for example, support of ECN to give extra data to the sender to distinguish network condition and to alter the sending rate in like manner.

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