# NETWORK TRAFFIC PREDICTION IN WIRELESS NETWORKS FOR IMPROVING QoS USING DEEP LEARNING TECHNIQUES

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**Abstract— Many mechanisms lying on bandwidth reservation, handoff mechanism is proposed in the literature to reduce the connection dropping probability for handoffs in wireless communications networks. The handoff actions occur at higher rate in a packet-switched wireless communication(5G) networks than in a traditional communication systems. Hence, an well-organized bandwidth reservation mechanism for a neighboring cells is critical in the process of handoff through the connection of multimedia calls. This mechanism avoids the undesired force termination and waste of limited bandwidth in fourth and fifth generation mobile communication networks, particularly when the mobility of the mobility device is high. In this paper, a phased solution of priority detection, mobility scheduling using deep learning techniques have been proposed. The motivation of the phases is to provide the Quality of Service (QoS) at regular communication and high mobility condition by considering the physical parameters. Meanwhile, a deep learning based service model is integrated to accommodate novel metrics used in handing out handoffs and task scheduling in wireless communication networks. This mechanism provides the more advantages in terms of choosing the tasks in a priority based scenario and providing un-interrupted service at the point of handoffs as well as an efficient way of utilizing the bandwidth.**

**Index Terms— Neural Network, Iterative Process, Bandwidth Estimation, Deep learning.**

## I. INTRODUCTION

Interest in providing the availability of routing through the internet and QoS, content distribution and file sharing services, enabling multicasting or protecting from Denial of Service (DoS) attacks have been addressed by different application layer overlay design proposals [1]. Recently, it has seen that the rise of the Internet as a means of content delivery [1] is due to the growing popularity of smart handheld devices as a means of content consumers. Available content includes software and smart-phone applications, music and video files available, and media streaming applications. Each type of contents is associated with a particular desired quality of service but low delays between request and reception is good for all types of content [2]. 4G networking frameworks have recently received a lot of attention on the research community, as they provide an efficient infrastructure to use available networking resources in a transparent, scalable and cost-effective way. 4G networks are initially designed and considered for huge content distribution across networks [3]. One of the trends in internet is that it is being applied to the transfer of massive content [4]. Increasing number of communication software such as Skype and Peer-Cast, the area of audio or video conferencing and streaming are built on distributed architectures based on the 4G/5G model.

1.1 Architecture :

Universal Mobile Telecommunication System (UMTS) is developed in terms of various applications, services and bandwidth. The development of UMTS network is mainly based on the GSM or GPRS network that can support different types of applications such as data, voice and video. UMTS network is able to efficiently interact with other networks [6]. This service ranges from legacy applications such as data transfer to voice and multimedia calls [7]. In order to satisfy the user requirements, proper end-to-end QoS must be provided to the application flows [8]. A 4G QoS architecture is required to provide resource guarantees that allow differentiation or prioritization of services, and to deploy the performance improvement. techniques that boost the performance by properly reallocating resources to users [9]. 4G (or) Next Generation Networks (NGN) allows connectivity anytime, anywhere with QoS and mobility functions [10]. The 4G network consists of internet protocols to facilitate the subscribers by enabling the selection of every application in any environment. In 4G cellular networks, a high bandwidth along with high data rate is required and also a quicker and optimized strategy of handover is required to make the clear and reliable communication. The 4G network system runs with the cooperation of 2G and 3G and imparts the IP based wireless communication. The main target in 4G is video streaming on IP based protocol, such as IP TV. If [11] 4G is deployed efficiently, it can solve many problems related to the speedy connections, performance, connectivity, and end user performance. These networks are helpful in reducing the Signal to Noise Ratio (SNR) at the receiver side along with the achievement of scalability and higher data rates.

1.2 Advantages and Disadvantages:

This new breed of systems creates an application level virtual network with their own overlay topology and routing protocols [12]. Overlay networks are used increasingly for network sensitive applications such as distributed web caching, content dissemination and stream processing [13]. A 4G network is a distributed network architecture in which participants

make a portion of their resources, such as processing power, disk storage or network bandwidth, directly available to other network participants without the need for central coordination instances such as servers or stable hosts. Peers are both suppliers and consumers of resources, in contrast to the traditional client-server model [14]. A 4G network is distributed, scalable, cost-effective, cooperative resource sharing and self-organizing network. It encourages Service Providers (SPs) to deploy many real-time applications over large scale heterogeneous networks.

Flooding-based systems do not scale due to the bandwidth and processing requirements that are imposed on the network. It does not provide guarantees to lookup time or content accessibility [1]. The simple pileup of hardware on servers is not sufficient to meet the rapidly increasing user demands. The dynamic boosting of network connections occurs commonly during a popular live streaming program. Freeloading is identified as a problem for peer-to-peer systems because many earlier peer-to-peer protocols allowed nonexcludable access to overlay resources [13]. In systems, all mobile device requests were served indistinguishably, regardless of the amount and quality of the contributions that the requesting peer had made to the overlay [16]. Without authentication, adversary nodes can spoof the identity and falsify the messages in the overlay. As a result, a malicious node launches man-in-themiddle or denial-of service attacks.

1.3 Factors Affecting QoS in 4G network:

**Latency:** It is also known as time to delivery. Latency is defined as the time from which a publisher publishes an event and a subscriber to that event receives notification that is available. The overlay network must effectively reduce the overall latency of event notifications. The latency can also be defined as delay.

**Bandwidth:** Bandwidth represents the resources available across a path during event transfer. It is denoted by the number of events transferred between the publisher and subscriber per unit time. If a subscriber doesn't specify the requirement, then the broker network assumes the default values, which provide the maximum possible bandwidth available along a path.

**Reliability:** Reliability plays an important role in peer to peer networks. It can be defined as the frequency of error occurred on the network [18].

**Packet-loss:** Packet transmission is done by the sender but it is not received by the destination. This is called packet loss [24].

At the time of data transmission, we should be aware of the following: Buffer cache ratio- [13] Buffer cache ratio plays a vital role in transmission when a data packet is transmitted through another node.

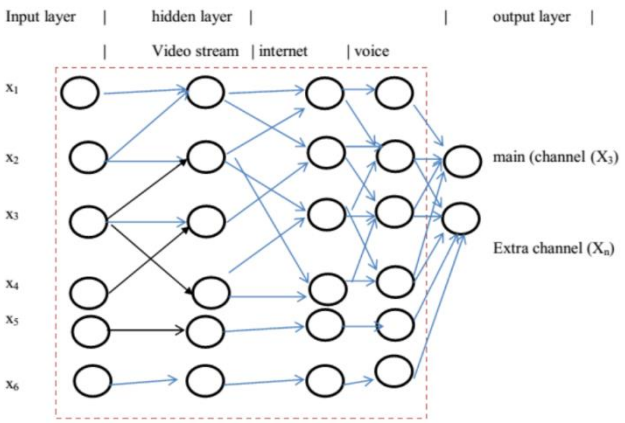
**Available capacity-** [12] Availability capacity is directly related to the bandwidth. As bandwidth determines the availability of the number of channels at the time of data transmission so it plays a vital role in the content awareness.

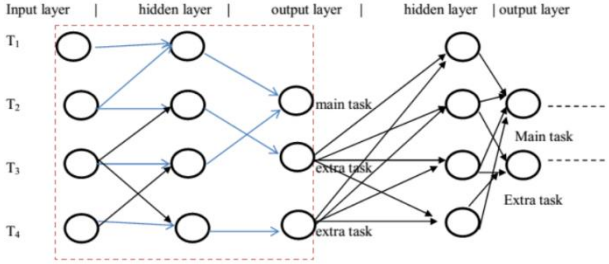
**CPU speed-** CPU processing speed is a major issue in the data transmission since it controls the traffic factors at different time.

**Memory size-** Buffer cache ratio is a factor of memory that is present at different nodes. It plays a significant role in the time delay and heavy traffic.

1.4 Basics of Neural Network

The term neural network was traditionally referred to a network or circuit of biological neurons. The modern usage of the term often refers to the artificial neural networks, which are composed of artificial neurons or nodes. Thus the term may either refer to biological neural networks,

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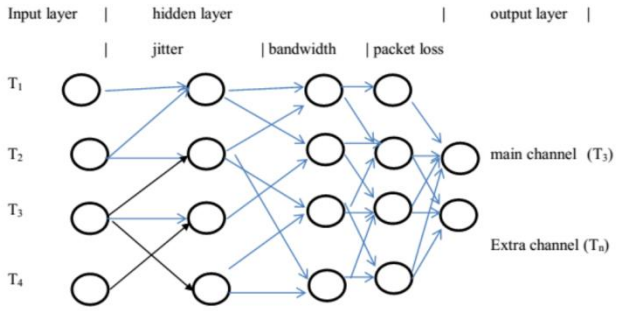


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The SI unit for magnetic field strength $H$ is A/m. However, if you wish to use units of T, either refer to magnetic flux density $B$ or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "A·m$^2$."

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Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]–[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] shows ... ." Number footnotes separately in superscripts (Insert | Footnote).[1] Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference list (endnotes). Use letters for table footnotes (see Table I).

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$$\int_0^{r_2} F(r,\varphi)\, dr\, d\varphi = [\sigma r_2 / (2\mu_0)] \cdot \int_0^{\infty} \exp(-\lambda\,|\,z_j - z_i\,|)\,\lambda^{-1}\, J_1(\lambda r_2)\, J_0(\lambda r_i)\, d\lambda\,. \tag{1}$$

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but T is the unit tesla). Refer to "(1)," not "Eq. (1)" or "equation (1)," except at the beginning of a sentence: "Equation (1) is ... ."

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Use one space after periods and colons. Hyphenate complex modifiers: "zero-field-cooled magnetization." Avoid dangling participles, such as, "Using (1), the potential was calculated." [It is not clear who or what used (1).] Write instead, "The potential was calculated by using (1)," or "Using (1), we calculated the potential."

Use a zero before decimal points: "0.25," not ".25." Use "$cm^3$," not "cc." Indicate sample dimensions as "0.1 cm × 0.2 cm," not "0.1 × 0.2 $cm^2$." The abbreviation for "seconds" is "s," not "sec." Do not mix complete spellings and abbreviations of units: use "$Wb/m^2$" or "webers per square meter," not "webers/$m^2$." When expressing a range of values, write "7 to 9" or "7-9," not "7~9."

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The word "data" is plural, not singular. The subscript for the permeability of vacuum $\mu_0$ is zero, not a lowercase letter "o." The term for residual magnetization is "remanence"; the adjective is "remanent"; do not write "remnance" or "remnant." Use the word "micrometer" instead of "micron." A graph within a graph is an "inset," not an "insert." The word "alternatively" is preferred to the word "alternately" (unless you really mean something that alternates). Use the word "whereas" instead of "while" (unless you are referring to simultaneous events). Do not use the word "essentially" to mean "approximately" or "effectively." Do not use the word "issue" as a euphemism for "problem." When compositions are not specified, separate chemical symbols by en-dashes; for example, "NiMn" indicates the intermetallic compound $Ni_{0.5}Mn_{0.5}$ whereas "Ni–Mn" indicates an alloy of some composition $Ni_xMn_{1-x}$.

Be aware of the different meanings of the homophones "affect" (usually a verb) and "effect" (usually a noun), "complement" and "compliment," "discreet" and "discrete," "principal" (e.g., "principal investigator") and "principle" (e.g., "principle of measurement"). Do not confuse "imply" and "infer."

Prefixes such as "non," "sub," "micro," "multi," and ""ultra" are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the "et" in the Latin abbreviation "*et al.*" (it is also italicized). The abbreviation "i.e.," means "that is," and the abbreviation "e.g.," means "for example" (these abbreviations are not italicized).

An excellent style manual and source of information for science writers is [9].

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## CONCLUSION

This paper described a neural network based solution on 4G network and bandwidth estimation. The research is done in three phases. The first phase was used to attain high mobility of the mobile device and the solution was provided for the fast handoff in 4G network. The second phase included neural network for detecting the job's priority. The third phase had been provided the better bandwidth to the all the present service. An effective bandwidth calculation made more resources available in the network. The iterative neural network method has been scheduled the jobs according to the priority. As the solution is timely based, the paper is more effective in terms of current scenario. The main issue of quality of service is degradation at the time of handoff, whose amount is more in 4G networks as they have high mobility. The future work should focus on the costeffectiveness in terms of bandwidth and time. There should be some distributed system to be developed so that no dependency on the base station will be presented

## REFERENCES

[1] Jaime Galán-Jiménez and Alfonso GazoCervero," Overview and Challenges of Overlay Networks: A Survey", International Journal of Computer Science & Engineering Survey (IJCSES) Vol.2, No.1, Feb 2011
[2] Mubashar Mushtaq and Toufik Ahmed," Hybrid Overlay Networks Management for Real-Time Multimedia Streaming over P2P Networks", IFIP International Federation for Information Processing 2007
[3] Seung Chul Han and Ye Xia," Network LoadAware Content Distribution in Overlay Networks"2008
[4] Thierry Rakotoarivelo, Patrick Senac, Aruna Seneviratne‡, Michel Diaz," A Peer-to-Peer Scheme to Discover and Select QoS Enhanced Alternate Paths", 2007
[5] Al-Imran, Ajayi Oluwafemi Samuel " Evaluation of Video Quality of Service in 3G/UMTS Wireless Networks, as Succor for B3G/4G Wireless Network" Master Thesis in Electrical Engineering with Emphasis on Telecommunications Thesis no:MEE10:42 September, 2010
[6] Disserta¸c˜ao, realizada sob "QoS Abstraction Layer in 4G Access Networks", Porto, Novembro de 2005
[7] Susana Sargento, Vitor Jesus, Gustavo Carneiro," Integration of Mobility and QoS in 4G Scenarios", Q2SWinet'07, October 22, 2007, Chania, Crete Island, Greece.
[8] Rui Prior1, Susana Sargento2, Janusz Gozdecki3, Rui Aguiar," providing endto-end qos in 4g networks", 2005
[9] M.Bhuvaneswari, P.Seethalakshmi" A Survey on QoS Enhancement in Mobile Multimedia Services using Cross-Layer Design in 4G Wireless Networks" International Journal of Computer Applications (0975 – 8887) Volume 19– No.4, April 2011
[10] Muhammad Amir Latif, Abid Aziz Khan," Quality of Service during Vertical Handover In 3G/4G Wireless Networks", Feb 2009.
[11] Aaqif Afzaal Abbasi, Javaid Iqbal, Akhtar Nawaz Malik," A Novel QoS Optimization Architecture for 4G Networks", World Academy of Science, Engineering and Technology 38 2010
[12] Peter Pietzuch, Jonathan Ledlie, Michael Mitzenmacher, Margo Seltzer," Network-Aware Overlays with Network Coordinates", 2007
[13] Ayyasamy Sellappan and Sivanandam Natarajan," A Robust Byzantine Fault-Tolerant Replication Technique for Peer-to-Peer Content Distribution", Journal of Computer Science 7 (2): 159-166, 2011
[14] Shruti P. Mahambre, Madhu Kumar S.D., and Umesh Bellur," A Taxonomy of QoSAware, Adaptive Event- Dissemination Middleware", August, IEEE, 2007
[15] S. Ayyasamy and S.N. Sivanandam," Trust Based Content Distribution for Peer-To-Peer Overlay Networks", International Journal of Network Security & Its Applications (IJNSA), Volume 2, Number 2, April 2010
[16] Yuan He, Tao GU, Jiang GU, Jingyao Dai," KQStream: Kindred-Based QoS-Aware Live Media Streaming in Heterogeneous Peer-to-Peer Environments", 2008
[17] Ra´ UL Leonardo Landa Gamiochipi," Incentive-Driven Qos In Peer-To-Peer Overlays Engineering Resource Allocation Techniques For Live, Peer-To-Peer Streaming", 2010.
[18] Dr. G.Srinivasa Rao, .Dr.G.Appa Rao, . S.Venkata Lakshmi, .D.Veerabadhra Rao 5,D.Rajani "Enhanced Developments in Wireless Mobile Networks (4G Technologies)", International Journal of Latest Trends in Computing (E-ISSN: 2045-5364) 29 Volume 1, Issue 2, December 2010
[19] Gordana Gardaševic Milojko Jevtovic Philip Constantinou," Optimization of Application QoS Protocols for 3G/4G Mobile Networks", WSEAS Transactions on Communications, Issue 9, Volume 7, September 2008
[20] P. Kavitha Rani," A Modern Approach for Improving Quality of Service in 4G Wireless Networks", International Conference on Computing and Control Engineering (ICCCE 2012), 12 & 13 April, 2012
[21] S.Arun Rajesh, Dr.M.Lakshmi, S.Arun Kumar , " Improving Quality of Service For 4G Devices Using Multipath Routing on Ad-Hoc Network", International Journal of Computer Science & Engineering Technology (IJCSET), Vol. 4 No. 01 Jan 2013
[22] Upkar Varshney and Radhika Jain," Issues in Emerging 4G Wireless Networks", IEEE, 2011
[23] Chenn-Jung Huang a,*, Yi-Ta Chuang a, Wei Kuang Lai b, Yu-Hang Sun b, Chih-Tai Guan," Adaptive resource reservation schemes for proportional DiffServ enabled fourth-generation mobile communications system" Computer Communications 30 (2007) 1613–1623
[24] Melinda Barabas, Georgeta Boanea, Andrei B. Rus, Virgil Dobrota, Jordi Domingo-Pascual," Evaluation of Network Traffic rediction Based on Neural Networks with Multi-task Learning and Multiresolution Decomposition, 2011
[25] Mohan R. Akella, Rajan Batta, Eric M. Delmelle, Peter A. Rogerson, Alan Blatt, and Glenn Wilson, " Base Station Location and Channel Allocation in a Cellular Network with Emergency Coverage Requirements", 2003
[27] Network Simulator, http://www.isi.edu/nsnam/ns