

INVESTIGATING IMPACT OF HOM, TTT, HOR, RSRP DURING HANDOVER IN LTE SYSTEM

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ABSTRACT: This paper reviews the handover in LTE system. The factors that are influencing decision making are HOM, TTT, HOR, RSRP. The output and comparative analysis of research work indicates that Deep-Learning based model is capable to increase the network performance. Mean to say that this model reduces the handover and also enhances the system throughput. In addition to this, it is also efficient to decrease the system delay. Moreover some paper related to handover is also explained with their methodology. Finally scope of research work is also presented. But it has been observed that they have their own limitations. It is observed that the existing technique or modules are not efficient. These are time consuming and not enough.

Keywords: LTE, Handover, HOR, RSRP

[1] INTRODUCTION

Handover in LTE systems is discussed here along with its different influencing factors such as HOM, TTT, HOR, RSRP. This research work discusses the challenges related to call data transmission. This call data transfers from one channel to other associated channel within Basic network. It also consists of a proposal of an efficient and vast handover system in LTE systems. There are several researches in this field out of them some proposed fuzzy based handover estimation system. Techniques that are used to deal with handover such as Fuzzy, GA, etc are also discussed here. This work considers different influencing factors of handover in LTE systems such as HOM, TTT, HOR, and RSRP. The output and comparative analysis of this research work indicates that this proposed Deep-Learning based model is able to enhance the network performance. Mean to say that this model reduces the handover and also enhances the system throughput. In addition to this, it is also efficient to decrease the system delay.

HANDOVER

The terms “handover” stands for the process in which an incomplete call or data is delivered on the basis of one channel to other associated channel with core network. In satellite transmission, it has been known as a procedure to transfer the satellite control liability from one earth station to another. Here is not scope for loss and interruption in transmission.

Handover is also known as a process followed by radio access network to switch from radio transmitters or radio access mode to other. It is required for providing the bearer services, during the maintenance of specified bearer service QoS.

In addition to this, Handover is also found in mobile based devices in a Wireless Network. Vertical and horizontal, two types of handover are there. Horizontal handover takes place during the switching of Mobile device within one type of network technology that comes under one operator.

1.1 HANDOVER IN LTE SYSTEMS

Handover methods are a key capacity of LTE eNBs. They are expected to decrease interference time contrasted with the circuit-exchanged handover process in second Generation systems or devices.

Handover inside an E-UTRAN: The system for when a UE is leaving a phone oversea by the eNB and entering a phone oversea by a second eNB. LTE considers handover which is derived on the basis of X2 and S1 method. The handover which is derived on the basis of X2 method becomes easy. It is ordinarily utilized when a X2 interface situates among the source eNB and the considered eNB.

Delicate handover is conceivable in CDMA in light of the fact that contiguous cells can work on indistinguishable frequencies from long. These are utilized along with distinctive scrambling codes. This permits a UE to make transmission with the two cells at the time of handover which makes it a delicate handover. LTE depends on OFDMA, which is in a general sense a recurrence division strategy.

Vertical handover happens when the mobile gadget switch from one technology or administrators to another. For example, a mobile gadget changing from IEEE 802.11 Wi-Fi to 4G cell inclusion outlines a switch or change from one type of technology to another technology. A Mobile gadget wandering between administrators on a 4G Network, for instance from Rogers to Telus, outlines a vertical handover inside one innovation however across administrators. In a wide range of handover, there are techniques to lessen the vitality utilized during this procedure. Conventional arrangements don't regularly consider vitality proficiency, however rather center on making the handover smooth and consistent by saving associations.

1.2 DIFFERENT TECHNIQUE

There are different techniques which are used to deal with handover in LTE systems such as:

1.2.1 Fuzzy based handover Estimation System in LTE

Not required handovers results into wastage of system assets. The inappropriate system selection may provoke outrageous reduction in quality. In this work, a three-stage fuzzy-logic-based handover required estimation and target choice plan is utilized. It is developed for general heterogeneous models or systems. The output and results fuzzy based system demonstrates that PLR, number of handovers executed and throughput exhibitions of the proposed plot are prevalent. These are better than the ordinary and Fuzzy based multi-property dynamic (MADM) plans.

1.2.2 Q learning based handover optimization in LTE

Another handover advancement method dependent on Q-learning strategy is there to amplify the all out framework throughput. It also limits the quantity of handovers. In this system, the streamlined handover parameters are considered under three distinct paces (10, 60, 120 km/hr) situations. The streamlining procedure becomes essential in the determination of long term evolution handover. It will determine handover technique in situation where accompanying circumstances are present. In comparison to serving station, objective station which makes reference signal strong is considered more important in addition to specific handover edge (HOM). Its length must be more prominent, equivalent an opportunity in the direction of activation (TTT).

1.2.3 Genetic Algorithm based different purpose Long Term Evolution programmer

In the absence of polynomial time method, Genetic Algorithm (GA) is an amazing algorithm to accomplish an ideal arrangement. The downward direction of long term evolution programmer which is derived on the basis of genetic algorithm can be utilized to improve the administration nature of video gushing. At the time of advancement procedure, programmer which is derived on the basis of Genetic Algorithm considered production capability in addition to reasonableness. It can allot radio assets to the clients as indicated by the authoritatively characterized destinations. With the help of different methods wellness capacity becomes characterized. These are production capability restrictive and reasonableness contingent. When the restricted method of production

capability emerges through system executive, the principal goal connected with wellness work will be accomplish the objective throughput. It becomes possible for arrangements which have higher production capability esteems in comparison to predefined limit. To improve reasonableness in the middle of the arrangements becomes the subsequent goal. This clarity in working fulfils the objective related to throughput. Along these lines, the Fitness Functions work guarantees the best reasonableness among the arrangements fulfilling the objective throughput or the most elevated throughput.

[2]LITERATURE REVIEW

In 2019, S. L. Su, et al[1] proposed a brand new distribution methodology. Due to this method, distribution of burden in LTE networks where the networks are assorted becomes highly flexible. The intricacy which occurs at the time of load distribution was located in this research. On the basis of these proposes intricacy a latest distribution method was put forward. This method regulates cell-individual-offset (CIO) in a very appropriate manner on the basis of separate and standard cell loading. In addition to this , a machine was also put in to place for the very first time for the monitoring of accessibility. This machine was used in situations where the network was fully packed to solve the problems related the resource deficiency. It has been come in to notice from the grades of model that the anticipated research can considerably improve CDR in comparison to the works which were done in the past.

In 2018, M. T. Nguyen, et al[2] made a research in order to improve the strength of adaptability for decreasing the malfunctioning of distribution in small-Cell related to long term evolution systems . In this work, they propose a separated and resilience system. This system is very healthy and upgraded. With the help of this system the problems related to malfunctioning of distribution are reduced. These malfunctioning in distribution occurred due to the breakdown of radio link. This breakdown occurred because of time-to-trigger and offset parameters. From the resuts of model, it has been highlighted that the system proposed by them improves the parameters. It also hammers the methods which were previously available in different mobile environments.

In 2018, A. Alhammadi, et al[3] considered vibrant factors for the management of transmission in support of LTE-A/5G Mobile Communications. Energetic HCPs in HetNets (LTE-A and mm-wave networks) was put in to place for the very first time by them in this research work. These energetic HCPs were put in to place in the company of solid small cells. A comparison was made between this future algorithm and various settings of HCPs on behalf of different user mobile speed scenarios. It has been come in to notice from the grades of model that the future system can considerably minimizes the probability of pillar to post transmission and radio link failure. As a result, the efficiency of network will be improved.

In 2018, Z. Alireza et al[4] did consider and examine the procedure of distribution in long term evolution System and make it better. For this purpose, the impact of outer noise was made minimum. Due to this, the efficiency of network becomes secure. Findings: The ratio of signal noise given to user was considered along its data transfer speed. It was considered whenever a customer goes to the next network. After that, the percentage of transmission breakdown was examined. It was done in order to create and improve the network. It has been found from experimental results that the efficiency in the network will be improved. The efficiency improves if a careful distance were maintained in the middle of systems that run in the closest band. The shielding space is decreased in the middle of two networks when the power received from the neighbouring band has been

controlled and soothe. This power was controlled by using the suitable filters in the transmitter and receiver. As a result of this a user can get an improved ratio of signal noise.

In 2010, A. Ulvan, et al[5] wrote on the situation of renounce and its method inside A LONG TERM EVOLUTION on the basis of Femtocell networks. The situation of renounce and its method in femtocell network was examined in this scholarly work. The procedure is based on 3GPP LTE specification. Three types of distribution procedures: hand-in, hand-out and inter-FAP are considered and analysed. It was possible to realize a perfect system. For this purpose, the assessment guidelines of distribution of is put in to place and anticipated. These guidelines were based on the forecasting of movement.

In 2019, T. Coqueiro, et al[6] stated a Fuzzy Logic System in support of Vertical Handover . This system maximize the duration of battery in various Wireless Multimedia Networks. This research work proposes A design was introduced in this research. On the basis of Fuzzy Logic, this design gives an intellectual administrative support system. This system cut down the power of portable equipments inside incorporated LTE along with wireless internet access .

In2019, A. Abdelmohsen, et al[7] considered how the long term evolution renounce factors were improved by means of Q-learning technique. The system which was put for the future work carries out its activities by analysing the various values of HOM and TTT. After that, the resulting performance related to the amount of these factors was determined. Once the output was determined, the values which give better efficiency have been ultimately selected. A comparison was made between this work and the work which was carried out in past..

In2016, L. Aparna et al[8] proposed a superior method in support of transmission which was based on Reference Signals Received Power (RSRP) in the circumstances of long term evolution.. For the development of this particular method two philosophies which are connected with the organization of handover are taken in to account. Out of these two philosophies the primary one is late handover. It is used for the prevention of ping-pong result. Second one is the early handover. It is used for the management of instantaneous services. A support is provided in the favour of late handover by rejecting handover before the TTT window expires. Where as a support is provided in the favour of early handover until the window expires in situation where the strength connected with signal changes with a very high rate

In 2016, K. L. Tsai, et al[9] used fuzzy logic for the reduction of ping-pong handover impact inside a long term evolution networks. A quick and uncomplicated handover decision system was put in to place by them. This system is formed on the basis of fuzzy-logic-based. It is named in the form of a unclear handover system which has low scale effect. It will decrease impact of scale inside a long term evolution network. In the FPEHS, various factors are entered to the fuzzy logic unit for the creation of handover decision. These factors are existing ratio of signal noise, recognized the ratio of signal noise in addition to traffic capacity of helpful and marked eNB. It also determined the outstanding strength of the primary user hardware.

In 2015, D. Gupta et al[10] discussed valuable network Handovers. For this purpose they use fuzzy Inference in favour of various mobility management. In this piece of research it has been found, how efficiently Fuzzy Logic defeated doubtful and incompatible metrics. The handover administrative system which was created here on the basis of Fuzzy Logic is highly impending. It provides improve quality of facilities in the direction of users in future wireless broadband communications. When a comparison is made between this scheme and the schemes

which were available in the past it has been come in to notice from experimental result that the efficiency of these scheme in terms of execution time and power consumption is better in comparison to the existing scheme. In2014, X. Chen, et al[11] provided different integrated Handover Algorithm in the company of triple T window. It was provided in favour of systems which have been created on the basis of long term evolution. Its efficiency examined on the basis of good, put for every cell, standard packet interruption, quantity of handovers in each second and signal noise ratio. After examination this efficiency is compared in the middle of different handover methods which are already accepted. The imitation in the company of long term evolution sim highlighted that this scheme considerably improved the good put. It will decrease packet delay and superfluous handover.

In 2014, Ö. F. Gemici, et al[12] wrote on multiple purposes long term evolution programmer. This programmer was created on the basis of genetic algorithm. In the proposed scheme, a network manager specifies complex network guidelines. For this purpose he set the active form in the direction of throughput along with a desired limit in support of particular form. Programmer which was introduced here rapidly adjusts its decisions. Due to this, it is sure that the best level of equality has been provided in the middle of programme. It fills intended degree of efficiency or maximum degree of efficiency in situations where no programme gets required degree of efficiency. On the basis of C# a simulation tool was introduced by them. By altering the parameters of long term evolution and genetic algorithm they established trade-off in the middle of convergence speed and the standard of solution.

In 2014, C. Technologies[13] analyzed the efficiency of long term evolution handover on the basis of strength of handover method. The subject matter connected with work is “Long Term Evolution Handover Performance Evaluation Based on strength of handover method”. It mainly kept various form of HOM and triple T standards in mind. It was done in order to examine the efficiency of handover based Reference Signal strength arrived within certain operational situation, such as different speed of user equipment, asset utilization and cell sizes.

In2013, A. R. Reserved et al[14] presents copyrighted long term evolution X2 Sequence Diagram for message delivery. On the basis of user equipment quality of RRC signal in downwards and upwards direction is measured at eNodeB. It shall take a decision to start an X2 handover. It picks credentials of marked cell in support of handover. Beginning of X2 handover take place when marked and current cell are operated through equivalent MME. Details related to the situation of user equipment are present in the message. It determines situation of user equipment on the boundary line of S1AP. The message contained factors which are related with safety.

In 2012, M. Sharma[15] evaluated Based a Handover resolution scheme. These schemes were created on the basis of Fuzzy Logic. Lots of wireless networks have been provided due to the constantly expansion of wireless communication technology. A handoff assessment method was introduced in this piece of research. This method chose the appropriate network and fuzzy logic is used to arrange the indefinite information of some criteria and user preference.

TABLE 1 LITERATURE REVIEW

S no.	Year	Name	Topic	Objective	Benefits	Limitations
1	2019	S. L. Su, T. H. Chih, and S. B. Wu	Proposed a brand new distribution methodology, makes distribution of burden in LTE networks highly flexible	Load balancing in LTE	Useful heterogeneous network	for Ignores handover failure reduction
2	2018	M. T. Nguyen, S. Kwon, and H. Kim	Improve the strength of adaptability for decreasing the malfunctioning of distribution in long term evolution (LTE) Small-Cell Networks	Handover Failure Reduction inside a long term evolution	Robust and optimized system	Ignores load balancing
3	2018	A. Alhammadi, M. Roslee, M. Y. Alias, I. Shayea, and S. Alraih	Considered vibrant factors for the management of transmission in support of LTE-A/5G Mobile Communications	Performing Handover Control Parameters in case of LTE-A/5G	Dynamic and flexible approach has been used.	Complex to implement in real life.
4	2018	Z. Alireza and H. Sara	Consider and examine the procedure of distribution in long term evolution System and make it better.	To improve of Handover Process in LTE System	Suitable to enhance handover process	Research lack the technical implementation.
5	2010	A. Ulvan, R. Bestak, and M. Ulvan	On the basis of Femtocell networks put situation of renounce and its method inside a long term evolution	To put handover method inside a long term evolution	System becomes suitable for long term evolution based femtocell networks	There is lack of dynamic approach
6	2019	T. Coqueiro, J. Jailton, T. Carvalho, and R. Francês	stated a Fuzzy Logic System in support of Vertical Handover for maximize the duration of battery in various Wireless Multimedia Networks.	To maximize battery lifetime in heterogeneous networks.	Research played significant role to perform handover in Wireless Multimedia Networks	Neuro fuzzy logic could play better role as compare to fuzzy logic.
7	2019	A. Abdelmohsen, M. Abdelwaha b, M. Adel, M. Saeed Darweesh, and H. Mostafa	Considered The manner in which long term evolution renounce factors were improved by means of Q-learning technique	Performing parameter optimization.	Q-learning technique has played significant role in optimization.	Hybrid optimization could introduce more dynamic approach.
8	2016	L. Aparna and A. Martin	On the basis of reference signals received power put a	Using RSRP to implement Handover	Approach used has enhanced performance during handover	Research has not considered load balancing.

			superior method in support of transmission in LTE Scenario			
9	2016	K. L. Tsai, H. Y. Liu, and Y. W. Liu	Used fuzzy logic for the reduction of ping-pong handover impact inside a long term evolution networks	Reducing ping-pong handover	Fuzzy logic played significant role to achieve objective.	Neural network system could be used to provide flexible approach.
10	2015	D. Gupta and S. Deswal	Discussed valuable system transmission rate using fuzzy Inference in favour of various mobility management	To provide Network Handovers for heterogeneous mobility management.	Model is proven effective.	Need to use optimization techniques for best solutions.
11	2014	X. Chen, K. T. Kim, B. Lee, and H. Y. Youn	Provide different integration method in the company of triple T window	To use different integration transmission method	Triple T window in support of long term evolution becomes an energetic method.	Need to introduce load balancing and hand over failure reduction.
12	2014	Ö. F. Gemici, I. Hokelek, and H. A. Çirpan	On the basis of genetic algorithm put down a multiple purposes long term evolution programmer in written form	Proposing multi-objective LTE scheduler	Genetic Algorithm are playing significant role during scheduling.	System is suffering from limitation of genetic algorithm.
13	2014	C. Technologies	On the basis of power budget transmission method analyzed the efficiency of long term evolution handover	To examine transmission efficiency	A significant contribution is done by power budget Handover method.	Need to introduce flexible approach.
14	2013	A. R. Reserved	Presents copyrighted long term evolution X2 Sequence Diagram for message delivery	Implementing Handover messaging	Use of handover sequence diagram is proven better approach.	Need of highly experienced person for implementation.
15	2012	M. Sharma	On basis of Fuzzy Logic evaluate a scheme in support of Handover resolution	Proposing handover decision system.	Efficient decision making by fuzzy logic.	Neuro fuzzy logic need to be integrate

[3]PROBLEM STATEMENT

However there are several researches related to Handover optimization in LTE systems. A lot of techniques are there which are used in LTE systems. But it has been observed that they have their own limitations. It is observed that the existing technique or modules are not efficient. These are time consuming and not enough. Therefore, it is essential to propose an innovative

and efficient handover optimization model in LTE to resolve the existing issues in this field. There is need to introduce load balancing and hand over failure reduction in several researches.

[4]NEED OF RESEARCH

The need of this research has been confirmed after studying the existing researches on handover in LTE systems. Loopholes and limitations of traditional techniques used to deal with handover in

LTE systems were detected. There is need to propose a better deep-learning based model for maximizing the throughput of system and reducing the number of handovers and system delay.

Research is supposed to consider the different influences factors such as HOM, TTT, HOR, RSRP etc. Research need to focus on performing comparative analysis of tradition work with proposed work in order to represent how proposed model is better than previous. Research would conclude and discuss the scope of research according to results and discussion.

[5]TOOLS AND TECHNOLOGY

DEEP LEARNING

Deep Learning has been considered as AI function. It replaces the effort of user to process the data. It creates patterns for usage in decision making. It has been referred as deep neural learning or deep neural network.

This is well known deep structured learning. It is also termed as hierarchical learning. This has been considered as a portion of broader family of machine learning mechanism. These mechanisms are dependent over simulated edgy system.

It is possible to gain education either in controlled or partially controlled way. In some situations un controlled methods are also used for providing knowledge. In the arrangement of deep learning intense edgy system are put in to consideration. They are based on deep belief networks. They also consider recurrent neural networks. Convolution neural networks are frequently implemented in such areas. They are including computer vision along with speech recognition.

Deep thinking and quick learning are significant for viable artificial intelligence. Several research works has reviewed the current constraints in specific famous learning techniques. Such techniques may be reinforcement learning.

5.2.1 DEEP LEARNING ALGORITHM

The efficient working of Deep learning algorithms is directly related to large datasets. There is requirement of infrastructure for their training in reasonable time. With this, there is requirement of more experience under deep learning algorithms. Locating a neural network by using deep learning algorithms is more tedious. Comparatively it is hard to apply random forests and SVMs. While in contrast, deep learning always proves better when there are complex problems like natural language processing, image classification and recognition of speech.

[6] RESEARCH METHODOLOGY

It is a systematic as well as scientific approach. Here researcher modifies one or more variables. They control and check any modification in different variables. It is a research where trails tend to executed to withdraw the results. The results of such results are supposed to be correct.

Case study method:

It is deep and intensive study of particular social unit. This research considered small number of cases but it focuses all aspects of social unit.

In present research work the experimental research method has been used. In order to perform simulation the module has been developed in MATLAB.

[7]CONCLUSION

Research is considering handover in LTE systems that would be beneficial to propose a better and efficient solution to resolve the existing issues. This research work discusses the challenges that are faced during call transmission from one channel to other connected to the Basic network. It also consists of a proposal of an efficient and vast handover system in LTE systems. Techniques that are used to deal with handover such as Fuzzy, GA, etc are also discussed here. This work considers

different influencing factors of handover in LTE systems such as HOM, TTT, HOR, RSRP etc.

Proposed Deep learning based handover model would be beneficial because it considers different factors such as HOM, TTT HOR, RSRP etc. This work would be helpful as it provides comparative analysis of proposed system's results with General LTE handover algorithm. In this comparison, several UE speed scenarios are considered. The output and comparative analysis is indicating that this proposed deep-learning based model is able to enhance the network performance. Mean to say that this model reduces the handover and also enhances the system throughput. In addition to this, it is also efficient to decrease the system delay. This work would be preferred as it also provides a brief review on handover in LTE systems. In this work, there is a section in which the issues and problem of existing research are discussed which would be very helpful for researcher who wants to propose a better solution in this field.

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