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Effect of Power Adjustment on Handover in Communication Network

Prof. Tilottama Dhake[1], Eshika Jain[2], Pratik Kabra[3], Amir Khan[4], Chetna Joglekar[5]
[1, 2, 3, 4, 5]*Electronics and Telecommunication Department & K.J.Somaiya Institute OF Engineering & IT*

Abstract: As the mobile station moves in different areas i.e. urban and rural areas, tunnels, etc. It is difficult to analyze the environment in communication. Because of high-speed, it is difficult to analyze and design the handover procedure. Many systems explain that if transmitted power is raised then it can improve handover in a high-speed communication system, but it goes against the green design system.

To overcome this problem, we adopt DAS (DISTRIBUTED ANTENNA SYSTEM) cells which include the main BS (Base Station) and N number of RAUs (Remote Antenna Unit). Free space path loss, handover occurrence probability, handover failure probability, handover drop rate is explained. The behavior of power adjustment on handover in high-speed communication networks is evaluated by using simulation in MATLAB. The project aims to improve handover by power adjustment in high-speed communications.

In assessing and performing the handover process of a mobile user in high moving vehicles. In particular, the High-Speed Train scenario is recognized. On, design the system and on a simulation that takes into account the characteristic of the high-speed train. As in the high-speed train system, a two-hop communication link is practiced, i.e. performance of the BS-TRS communication link. As the channel between the TRS-BS communication link is good so the loss between TRS-BS can be ignored.

Keywords: Handover occurrence probability, handover failure probability, power adjustment, handover rate, RAUs, TRS.

I. INTRODUCTION

Telecommunication has been a very significant communication medium in our society. Since decades ago we use telephones for communication. And now the telecommunication technology is advancing day by day. Due to rapid change in technology the demand for better and faster cellular communication also increases. This growth in the field of cellular communication has led to increase intensive research toward and development toward the cellular system. The main reason for this growth is the new concept of mobile terminal and user mobility. The main characteristics of the cellular communication system offer the users maximum freedom of moment while using cell phones (mobiles).

As cellular phones and the high speed Internet are becoming more and more popular. Both the increase in the number of users and the increase in high data rate transfers from the Internet have produced a huge increase in traffic.

In the handover process, cellular networks automatically transfer a call from one radio channel to another radio channel while maintaining the quality of services (QoS) of a call. Handover mechanism is extremely important in mobile networks because of the cellular architecture employed to maximize spectrum utilization. Each handover requires network resources to route the call to the next base station.

If handover does not occur at the right time the QoS may be dropped below an adequate level and connection will be dropped. There are several different reasons needed to be known to determine whether a handover is required.

Among these scenarios wireless communications in high mobility environments have drawn increasing attention due to the significantly increasing demand.

For instance, the rapid development of high-speed railway (HSR) systems provide high convenience for people and thus more and more people prefer to select HSR for long-distance travel, which causes dramatic growth of the broadband wireless service demand in HSR systems.

A. Problem Statement

The handover is very important for mobile communication to maintain the existing call the handover cause a few problems such as:

1) The handover rate increases the signaling load in the mobile network, this causes reduction in QoS.
2) Handover requires a certain calculation in the MSC that reduces the computational power.

B. Reasons for Handover

The main reasons for HO can be summarized as below:

1) Signal strength is dropped below and it is not enough to maintain the call wherever the MS travels away from the BS.
2) All capacity of the BS is used up and there are more calls pending.
3) The channel is allocated to the call from the other BS in the range of overlapping.Area to free-up capacity for other calls which can only connect with this BS when the MS behaviour changes.
4) To prevent the interference, when a channel is utilized by the MS, it becomes interfered with other MS and it uses same channel in another cell.

C. Methodology

It proposes to conduct this research work in three stages:

1) *Stage 1:* Design an optimum algorithm to reduce the handover request, Handover drop Rate and blocked Calls. The algorithm also adjusts the power of the target and the Serving Station. So that the Handover is Successful and there is no effect on the environment due to radiations
2) *Stage 2:* The information about parameters such as Radius of the Cell, Users in each cell, path loss, RSS (Received Signal Strength), threshold value of power are calculated and measured
3) *Stage 3:* Using these parameters the handover is performed in different environment such as urban, rural and suburban. And with this Modeling, simulation and testing of the algorithm is done, using MATLAB simulation software.

D. Hard Handover is Preferred in 4G

There are two known handover strategies in wireless mobile systems, i.e., soft handover and hard handover. In 3G systems, both handover were adopted to support the mobility of users. However, in 4G systems, soft handover was not employed anymore. The main reason is that in 4G systems OFDMA is adopted, where two neighboring cells are assigned with orthogonal sub channels, and one user is not allowed to listen to two different cells at the same time during the handover. As a result, only the hard handover is supported by LTE

II. SYSTEM MODEL

A. Two Way Communications In HSR

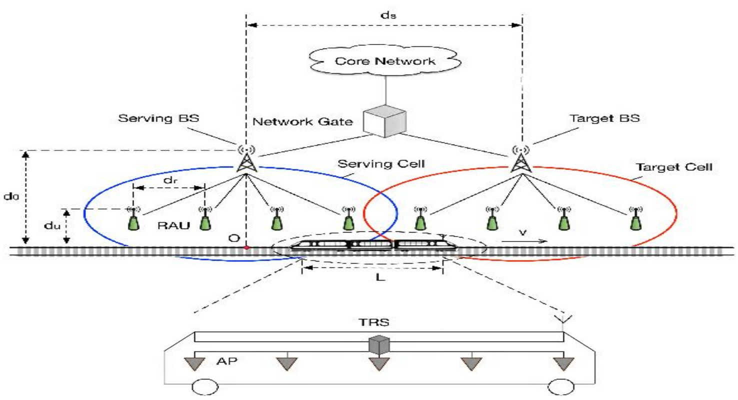

Fig1: Two Way Communication

Consider the HSRs system, in which the train moves from an overlapping region of the two neighbors (serving and target) cells. When the train passengers intend to access the internet through a base station is the two-hop communication architecture. First, the information from the passengers is collected by APs (Access Point) situated inside the train carriage and send to the base station with the help of TRS (Train Relay System). This process is known as uplink. And in a downlink, it sends the information from the base station to the TRS and then TRS sends it to the passengers through the APs. These uplinks and downlinks release the path loss between the base station and mobile station. Due to the two-hop communication architecture allows us to treat all the passengers as the big user. At the same time, the handover must be done effectively. As we have known that RSS plays a very vital role in the handover procedure. The poor channel and the Doppler effect degrade the RSS and fail the handover.

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Hence to improve handover we adopt DAS (Distributed Antenna System) with the RAUs (Remote antenna units). In the DAS system, there is one main base station and N numbers of RAUS. Each RAU is physically connected with the DAS by optical link fiber. Advantages of the optical link fiber to provide a low loss, low error bit rate, and high broadband. Thus, the path loss associated between RUAs and DAS is eliminated and they consider only the path loss which is associated between RAUs and TRS. From this path, loss is tiny which can be neglected and hence the RSS becomes strong. It improves the handover procedure.

III. POWER ADJUSTMENT ASSISTED HANDOVER

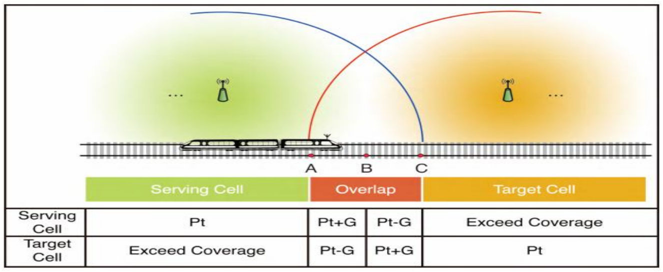

Fig2: Power Adjustment assisted handover

The overlap region can be divided into two sub regions as shown in Figure. The first sub region is from A to B and the second sub region is from B to C, where A and C are the starting point and the ending point of the overlap region, 2 respectively, and B is the middle point of two neighboring cells.

The power adjustment is described as follows.

1) Within the first sub region (A, B), the train is closer to the serving cell and farther away from the target cell, so the pathloss from the target cell remain serious, which means that R2 (x) < T is true with high probability. In this case, we should try the best to avoid the occurrence of R2 (x) − R1 (x) > H caused by a sudden fading on the RSS from the serving cell (method 1). To this end, within this sub region, we need to increase the transmit power of the serving cell and decrease the transmit power of the target. Within the second sub region (B,C), the train is closer to the target cell and farther away from the serving cell, so the pathloss from the serving cell to the train is more serious, which means that R2 (x) − R1 (x) > H is true with high probability. In this case, we should try the best to guarantee R2 (x) > T.

2) To this end, we increase the transmit power of the target cell and decrease the transmit power of the serving cell. With the power adjustment, within the first sub region (A, B), the handover failure probability can be reduced by not letting the handover be triggered, and within the second sub region (B,C), the handover failure probability can be reduced by avoiding the communication interruption when handover is triggered. As a result, the handover is likely triggered in the second sub region (B,C), where the train is closer to the target cell and the RSS is expected to be better than that from the serving cell due to the smaller pathloss, so the handover failure probability could be reduced intuitively.

To keep the total energy consumption of each cell unchanged within the overlap region, one can first increase/decrease the transmit power and then decrease/ increase that by accurate power allocation. However, it requires the instantaneous channel information from the train, which is quite hard to achieve at each BS. Fortunately, for HSRCs, we can estimate the channel information based on the position of the train approximately. Therefore, to make the considered power adjustment practical, we adopt a simple power adjustment with a parameter.

IV. PATHLOSS MODELS

Path Loss Models analyses of five different models which have been proposed by the researchers at the operating frequency of 3.5 GHz [1-4]. We consider free space path loss model which is most commonly used idealistic model. We take it as our reference model; so that it can be realized how much path loss occurred by the others proposed models. The different type of model is:-

A. Okumura Hata Model
B. FSL model
C. ECC-33 model
D. Cost 231 Hata model
E. SUI model
F. ERICSSON model

V. FUZZY ALGORITHM

There are different types of algorithm used in vertical handoff from such type there is the best one which is fuzzy algorithm method. In these methods first the algorithm starts calculating the RSS threshold from the entire signal which is received by the mobile station. From these fuzzy algorithm takes the best one who's RSS is high and it prepares the handover execution step so the handover process gets completed.

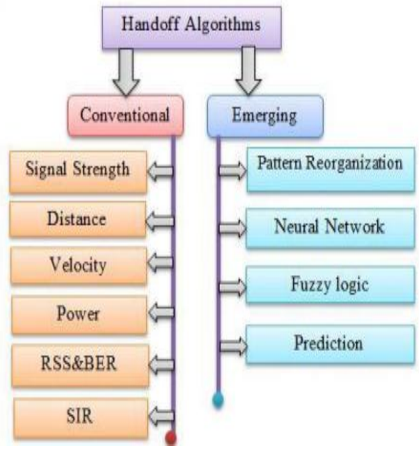

Fig3: Handover Algorithm

VI. RESULT

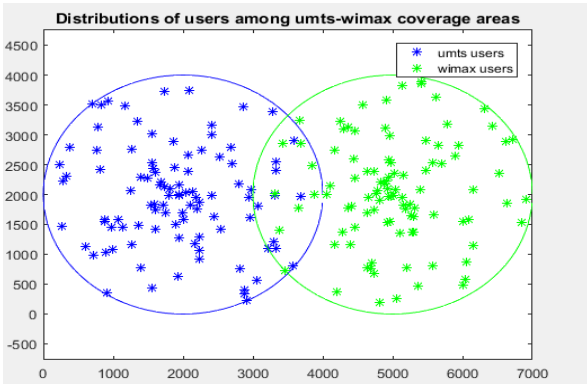

Fig4: Heterogeneous network

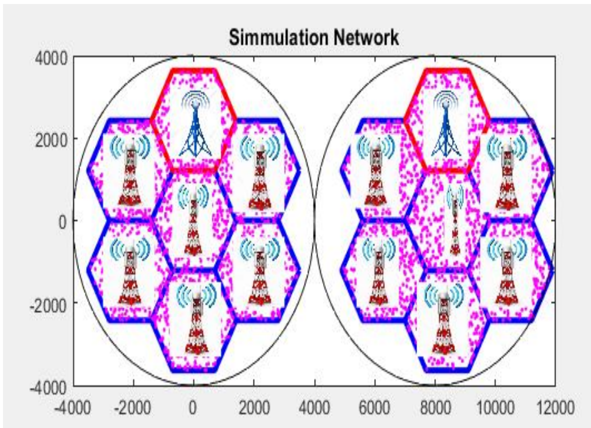

Fig5: Simulation Network

It shows that the first circle is for UMTS and other one is WiMAX. It shows the two cells in which the red one is the main base station and the blue one is the distributed antenna system

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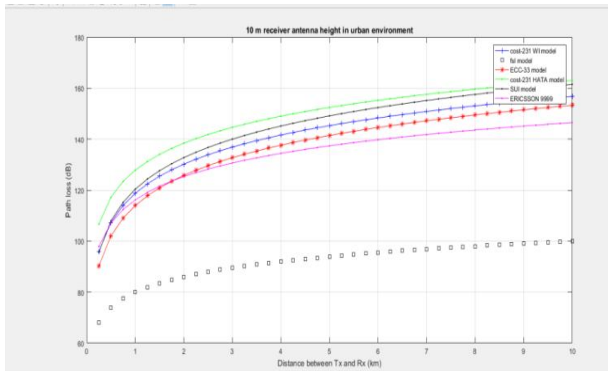

Fig6: Path loss in Urban Environment

Figure 6 shows the path loss of signal in urban environment, with all possible path loss models.

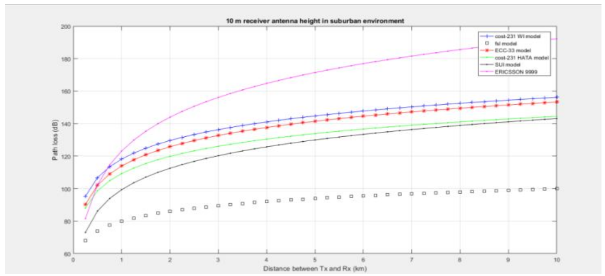

Fig7: Path loss in Suburban Environment

Figure 6 shows the path loss of signal in suburban environment, with all possible path loss models.

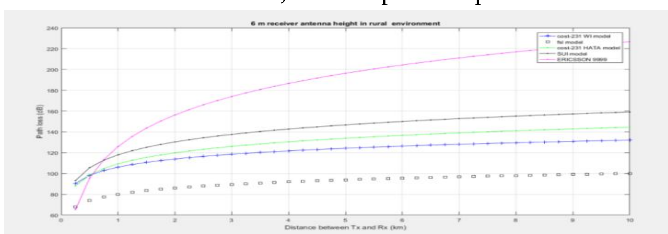

Fig8: Path loss in Rural Environment

Figure 7 shows the path loss of signal in rural environment, with all possible path loss models.

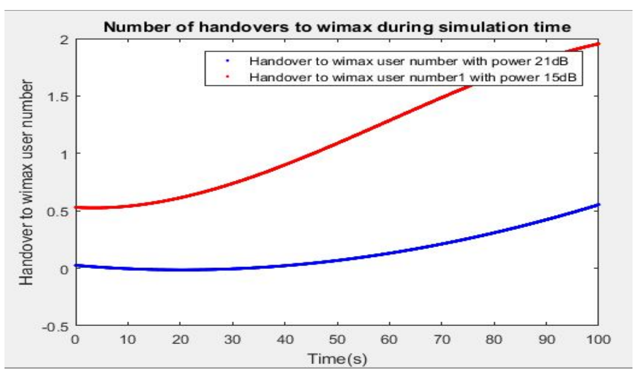

Fig9: Handover success rate for WiMAX

Figure 8 shows the handover success rate of WiMAX, the red one shows the handover at power adjusted and the blue one gives us handover without power adjustment. And the handover success rate of power adjustment is more as compare to the without power adjustment.

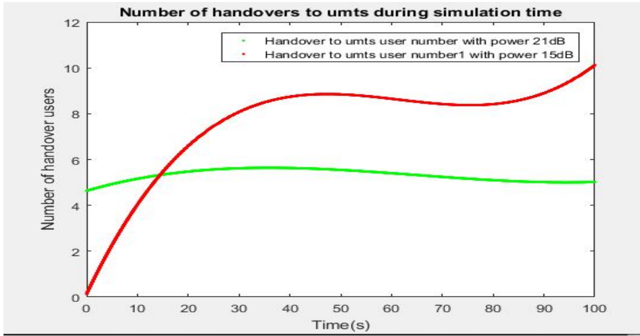

Fig10: Handover success rate for UMTS

Figure 9 shows the handover success rate of UMTS, the red one shows the handover at power adjusted and the blue one gives us handover without power adjustment. And the handover success rate of power adjustment is more as compare to the without power adjustment.

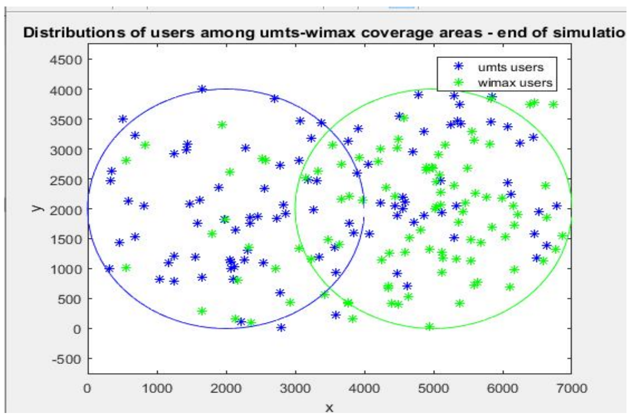

Fig11: Distribution of Users among UMTS and WiMAX at the End of Simulation

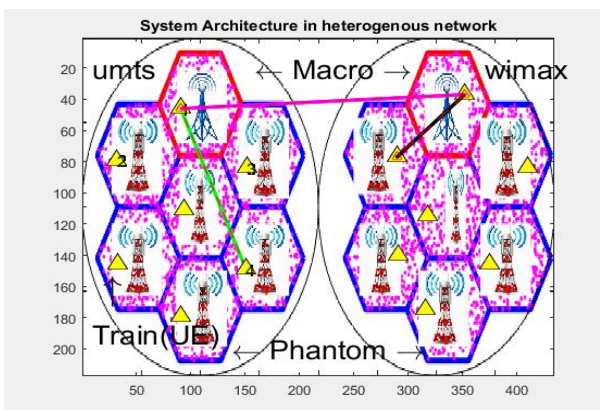

Fig12: End of Simulation

Figure 12 shows the end of simulation i.e. the distribution of users among UMTS-WiMAX coverage areas.

VII. CONCLUSION

To overcome the problem of handover in a high mobility scenario, we adopt the DAS system along with N number of RAUs. The main aim of this project is to improve handover occurrence probability without increasing the transmitted power or going against the green system design. So, to degrade the handover failure probability we allow the handover to take place only when the RSS is strong and avoiding handover when RSS is weak. So, to degrade the handover failure probability we allow the handover to take place only when the RSS is strong and avoiding handover when RSS is weak. We use the Fuzzy algorithm method in order to avoid the handover drop rate.

VIII. ACKNOWLEDGMENT

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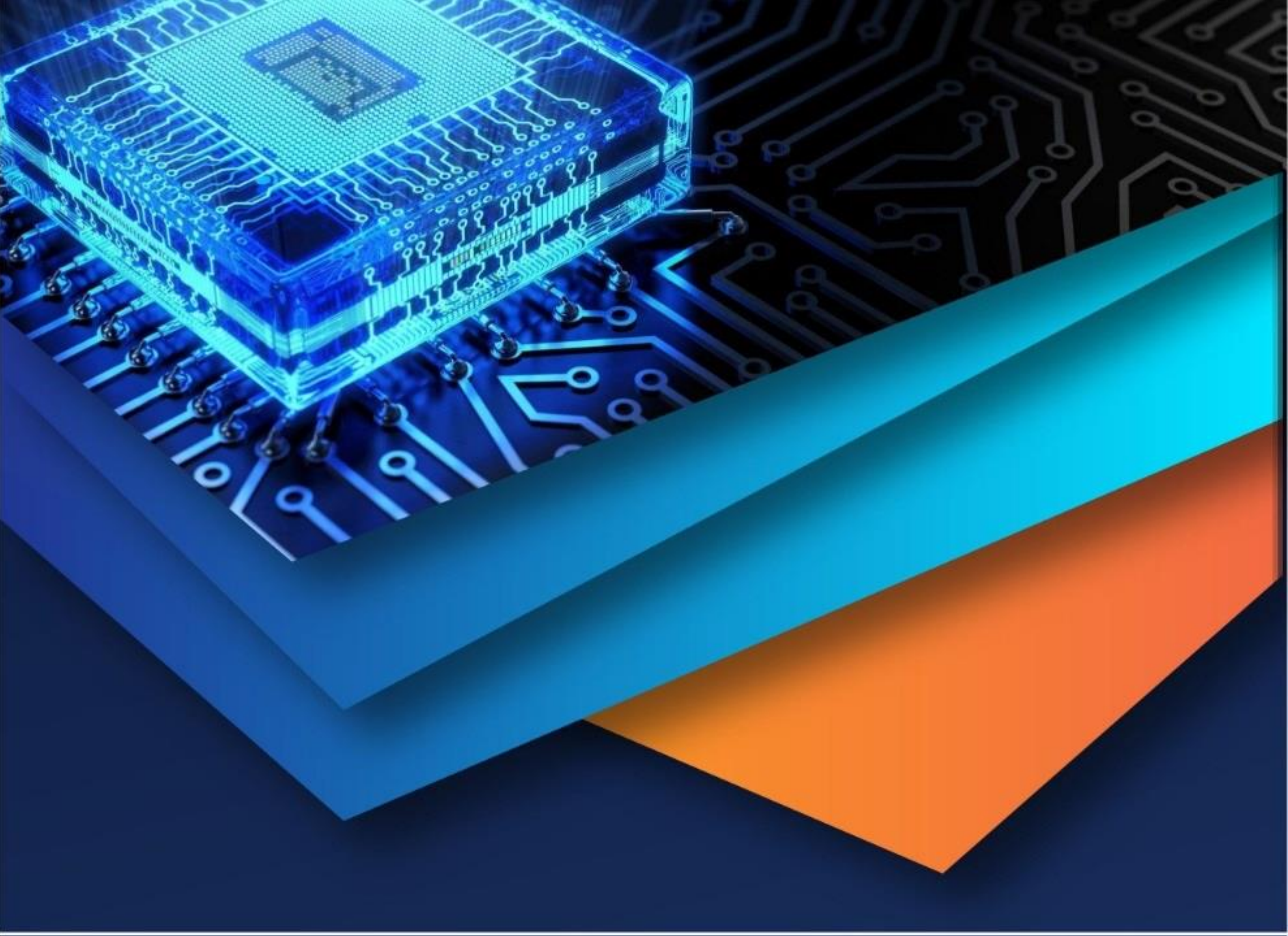
REFERENCES

[1] Y. Rui, P. Cheng, et al, " Carrier Aggregation for LTE-Advanced:Uplink Multiple Access and Transmission Enhancement Features," IEEE Wireless Communications, vol.20, no.4, p.101-108, Aug.2013.
[2] H. Ishii, Y. Kishiyama, et al, " A Novel Architecture for LTE-B," IEEE Globecom Workshops (GC Wkshps), Dec.2012.
[3] 3GPP TS 36.331, " A Radio Resource Control (RRC) Protocol Specification," v10.0.0, Mar.2013.
[4] L. Lei and Z. Zhong, "Operator Controlled Device-to-Device Communication in LTE-Advanced Networks," IEEE Wireless Communication,vol.19, no.3, pp.96-104, Jun.2012.



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