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Performance Analysis of Handovers Using TDD and FDD in Long Term Evolution

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ABSTRACT

In Long Term Evolution Advanced Technology Handovers is the basic criteria of mobility of the user in cellular networks in Time Division Duplex and Frequency Division Duplex. Handover is one of the essential elements that can affect the Quality of Service (QoS) and Capacity of Mobile Broadband Networks. In the cellular network communication systems, a limited shared resource (spectrum) needs to be shared with all users so full duplex communication is possible. This paper involves studying the different Hand over delay parameters and also focusing on reducing "Hard Handover delay" by reducing interruption time, activation time, wireless channel access time and the wireless link transmission delay. An efficient handover is implemented by post optimization in order to reduce the handover delay time in Time Division Duplex network and it also reduces the wireless channel access time and the wireless link transmission delay. By analyzing the handover parameters with different air cell selection, cluster areas, signal strength and post optimization improvement in the Quality of service can be achieved. The future work on hard handover may be by applying different handover strategies to get better performance and Quality of service in Time Division Duplex and Frequency division Duplex mobile network.

Key words: QoS Quality of Service, TDD Time division duplex, FDD Frequency division duplex.

I. INTRODUCTION

Handover or Handoff is a process in telecommunication and mobile communication in which a connected cellular cell or data session is transferred from one cell site (base station) to another without disconnecting the session. Handover has become a mainstay in cellular wireless networks as it allows User Equipment to be mobile without losing Connectivity. Although handover allows one to maintain continuous connection, it also involves a lot of overhead and causes delay for the packets to be delivered to the destination User Equipment. Time division duplex is a technique widely used in two way digital communications systems where the two directions of traffic (up and down) of one channel are carried on the same carrier frequency but in discrete time intervals in a time divided way. These time intervals are often of fixed duration with equal time allocated for up- and down-link directions. TDD uses a single frequency to transmit signals in both the downstream and upstream directions. In fixed wireless allocation through time slots to downstream transmission intervals than upstream. This is upstream directions. TDD

IJARSE
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operates by toggling transmission directions over a time signals in both the downstream and single frequency channel is used to transmit point- to-point systems that use TDD, between downstream transmission and the upstream transmission. handled dynamically. The TX/RX Transition Gap (TTG) is a gap mix of both traffic types. The relative band) between transmit and receive streams. Capacity of the downstream and upstream require a guard time (instead of a guard links can be altered in favor of one direction over the other. This is accomplished by giving a greater time interval. This toggling receives large information payloads downstream. In contrast, TDD systems take place very rapidly and are imperceptible to the user. Thus, TDD can support voice and for this technique is Internet access in which a user enters a short message upstream and other symmetrical communication services as well as asymmetric data services. TDD also can processes characterized by unbalanced information flow. An obvious application asymmetry is useful for communication.

II. TIME DIVISION DUPLEX

TDD uses a single frequency to transmit signals in both the downstream and upstream directions. In fixed wireless point-to-point systems that use TDD, a single frequency channel is used to transmit signals in both the downstream and upstream directions. TDD operates by toggling transmission directions over a time interval. This toggling takes place very rapidly and is imperceptible to the user. Thus, TDD can support voice and other symmetrical communication services as well as asymmetric data services. TDD also can handle a dynamic mix of both traffic types. The relative capacity of the downstream and upstream links can be altered in favor of one direction over the other. This is accomplished by giving a greater time allocation through time slots to downstream transmission intervals than upstream. This asymmetry is useful for communication processes characterized by unbalanced information flow. An obvious application for this technique is Internet access in which a user enters a short message upstream and receives large information payloads downstream. In contrast, TDD systems require a guard time (instead of a guard band) between transmit and receive streams. The TX/RX Transition Gap (TTG) is a gap between downstream transmission and the upstream transmission.

This gap allows time for the base station to switch from transmit mode to receive mode and subscribers to switch from receive mode to transmit mode. The TDD frame structure is shown in below fig2.3 which consists of uplink and downlink frequencies.

TDD systems use the same frequency for transmission and reception, and the transmitted and received signals are separated in the time-domain. This contrasts with FDD, where each transceiver transmits and receives on two different frequencies, separated by the duplex spacing as defined in various CEPT recommendations. CEPT recommended channel arrangements for both point-to-point and point-to-multipoint make little explicit reference to duplex method although those arrangements which incorporate paired frequencies clearly are able to accommodate FDD systems but do not necessarily preclude TDD systems. However Regulators often overlook the P-MP possibilities offered by TDD, especially in bands traditionally occupied by FDD systems. TDD was not a practical alternative to FDD for analogue systems, which is one reason why FDD is traditionally used in some bands.

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Advantages

Advantage of TDD is that the uplink and downlink radio paths are likely to be very similar. This means that techniques such as beam forming work well with TDD systems.

Advantage in the case where there is asymmetry of the uplink and downlink data rates. As the amount of uplink data increases, more communication capacity can be dynamically allocated, and as the traffic load becomes lighter, capacity can be taken away. It is possible to dynamically change the UL and Dl capacity ratio to match demand.

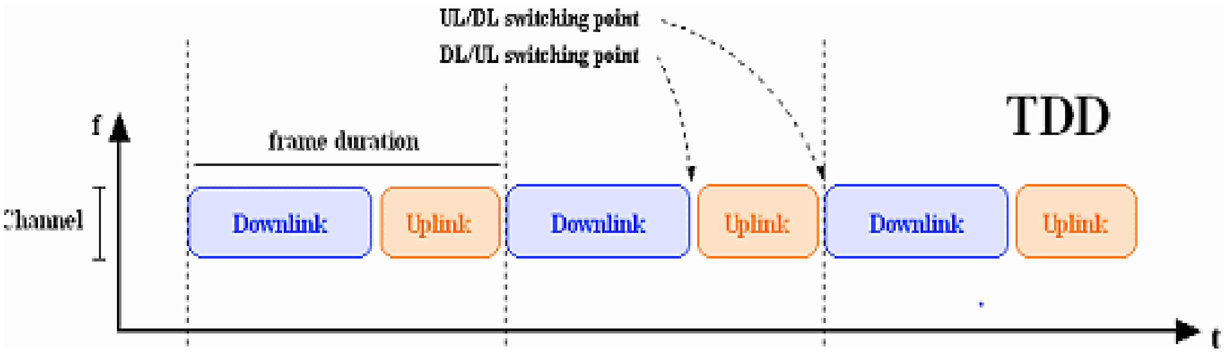

Fig 1: TDD frame

III . HANDOVER

The most basic form of handover is when a phone call in progress is redirected from its current cell (called source) to a new cell (called target). In terrestrial networks the source and the target cells may be served from two different cell sites or from one and the same cell site. Such a handover in which the source and the target are different cells (even if they are on the same cell site), is called inter-cell handover. The purpose of inter-cell handover is to maintain the call as the subscriber is moving out of the area covered by the source cell and entering the area of the target cell. The pictorial representation of handover before and after shown in below fig2

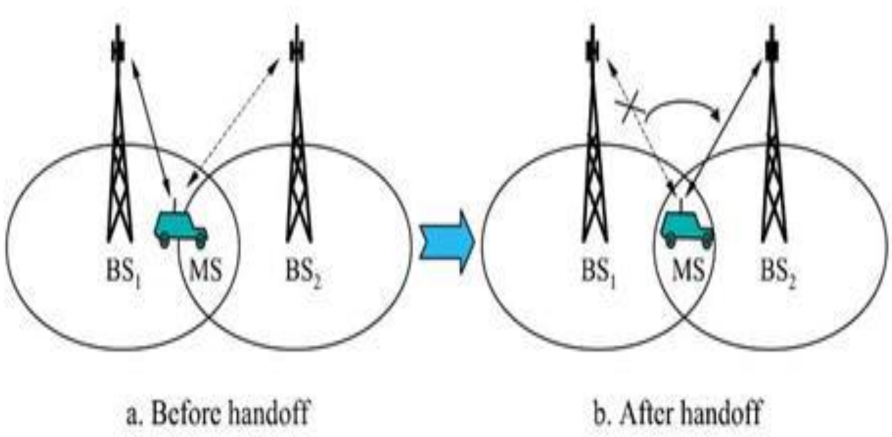

Fig 2: Handover operation

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The steps involved in the Handover Process

Compare the Target SINR-enb with the Servins SINR-enb plus HHM.

Compare UE velocity and predict user mobility.

If traffic used is voice do proactive handover else reactive handover.

Compare Target SINR-Henb with the Serving

SINR-enb plus HHM.

Compare UE velocity.

Don't perform Hand-in or perform Hand-in or reactive Hand-in based on the Velocity value.

Compare Target SINR-Henb with the Serving

SINR-Henb plus HHM.

If traffic used is voice do proactive handover else reactive handover.

Compare Target SINR-enb with the Serving

SINR-Henb plus HHM.

If traffic used is voice do proactive handover else reactive handover.

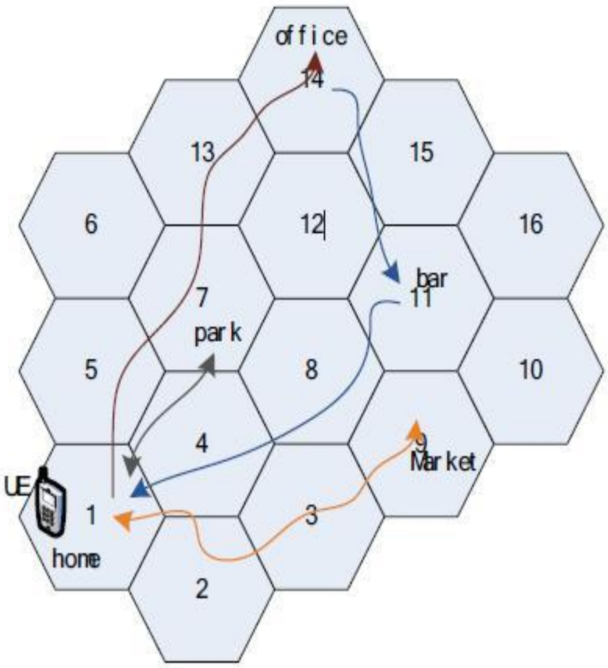

Fig3: Route Pattern of Driven User

The attributes of cell and handover parameters are updated after each handover in to the User Mobility Database. To avoid the unnecessary handovers, the records which show the short time visit of User Equipment will be removed from the User Mobility Database or not recorded into the User Mobility Database. The storage points can be User Equipment, eNodeB, MME, or other network elements which have enough storage capacity and strong computing power

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IV SIMULATION RESULTS

Table:1 Cluster selected with surrounding areas

CLUSTER:	Rajajinagar
On Air Sites	8
Off Air Sites	0
Proposed Sites	0
IBS	1
Total SQ Km	0.8

Table:2 Areas covered under cluster

AREA Covered:	
1	Dr MC Modi hospital Road
2	Chord Road
3	Basaveshwara Nagar
4	RajajiNagar

Table:3Location of the areas with Latitude and Longitude

Location	Lat	Long
KLE Law College	12.9957	77.5537
Citi hospital	12.9955	77.5508
Swati restuarant	12.9978	77.5500
Star Circle	12.9976	77.5503
Ranganath Swamy temple	12.9955	77.5503
J Spider training center	12.9949	77.5510
Nadgir institute of tech	12.9951	77.5468
UCO Bank	12.9965	77.5463
Rajajinagar RTO	12.9943	77.5536
Basaveshwar College	12.9946	77.5562
Sycone	12.9971	77.5507
KFC	12.9973	77.5464
Navya College	12.9986	77.5421
Modi Hospital	12.9975	77.5457

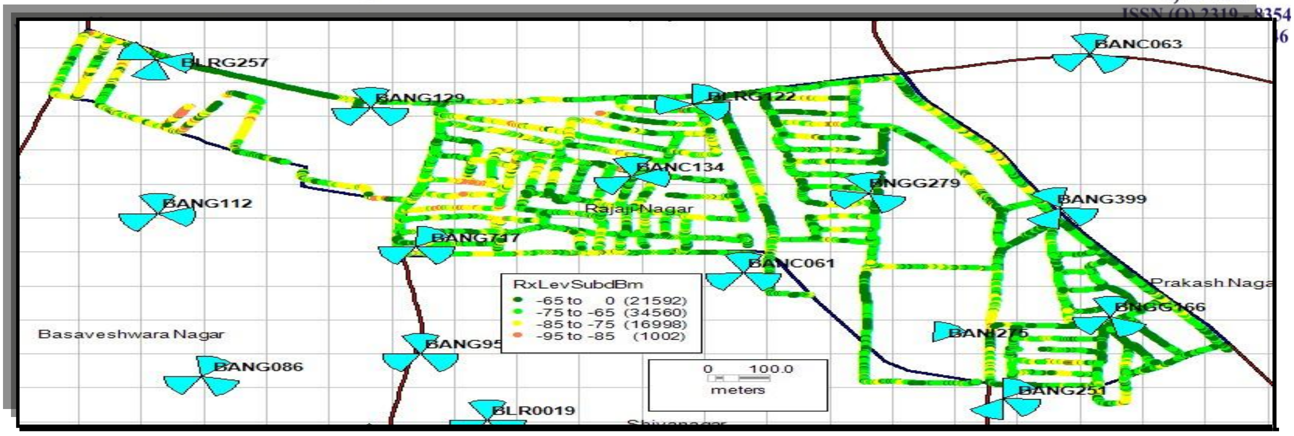

Fig 3: Rx Level Dedicated

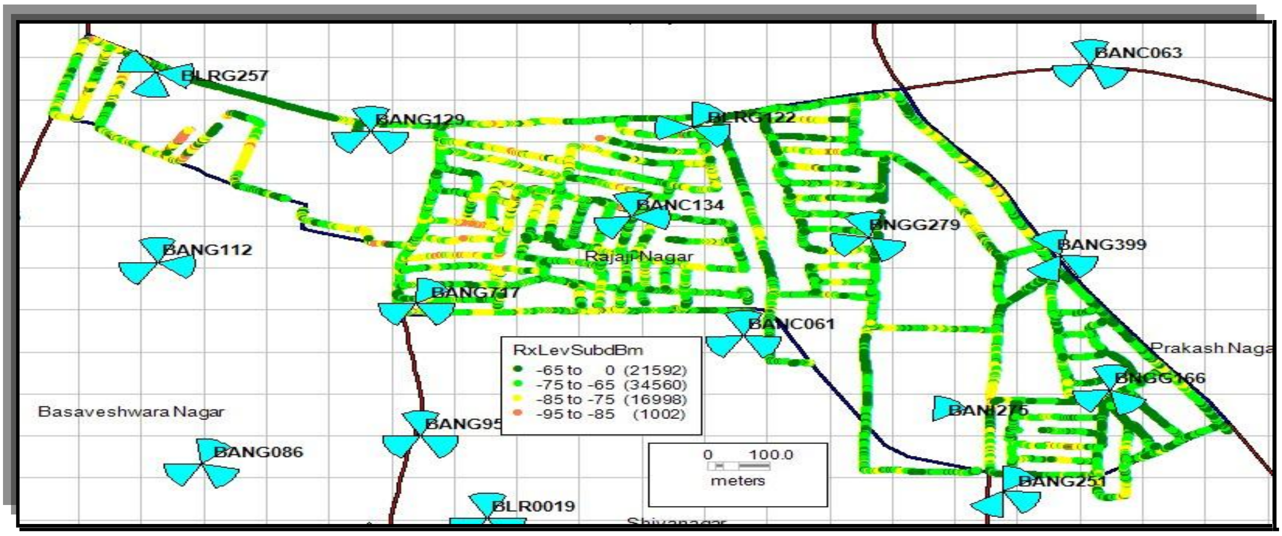

Fig 4: Rx Quality

Table:4 Receiver Quality Statistics

Rx Quality Statistics		
Rx Quality	4G	
	Samples	Percentage
0 to 5	59088	82.66
5 to 7	12387	17.33

IJARSE
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Table:5 Optimization changes proposed

SUMMARY OF OPTIMIZATION CHANGES PROPOSED	
1	BANG251A Optimization Planned Azimuth 40 10 Electrical tilt 6 4 Completed
2	BANG241C Optimization Planned Azimuth 240 210 M-Tilt 2 1 Electrical tilt 6 3 Completed
3	BANG129B Optimization Planned Mechanical Tilt 1 0 Electrical Tilt 8 5 Completed
4	BLRG257B & C Optimization planned BLRG257B M-Tilt 2 1 BLRG257C Azimuth 300 270 Electrical Tilt 7 4 Completed
5	BANG129C Optimization Planned Electrical Tilt 7 4 Completed

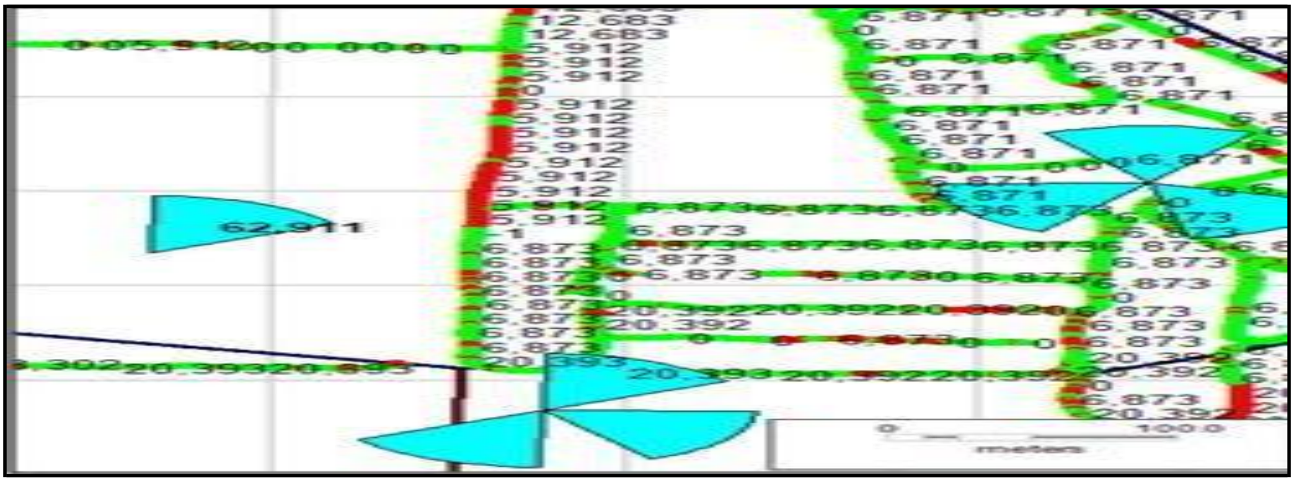

Fig 5: Poor Rx-Quality Area

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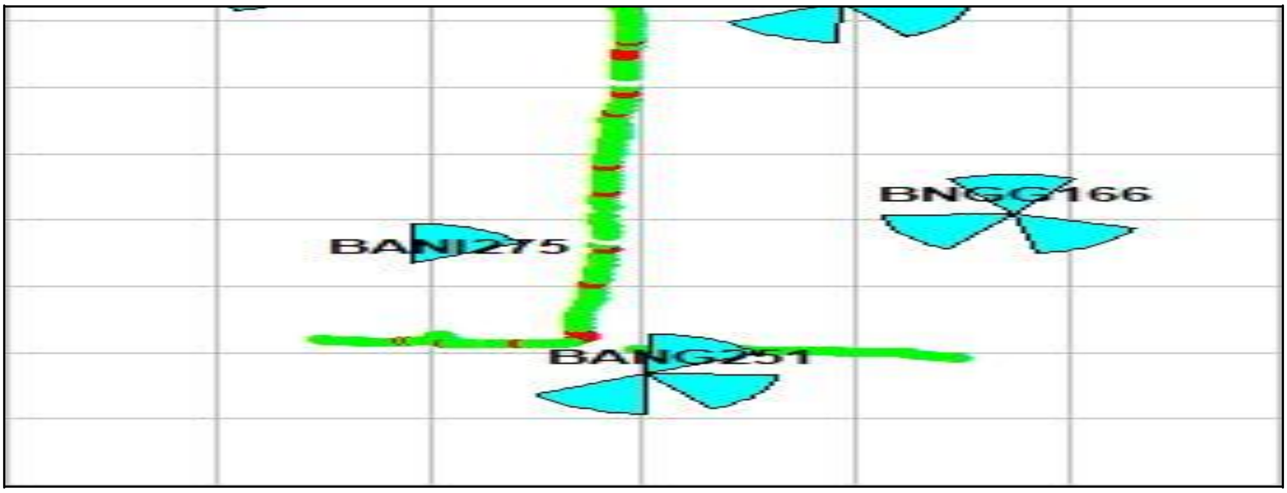

Fig 6: POST OPTIMIZATION

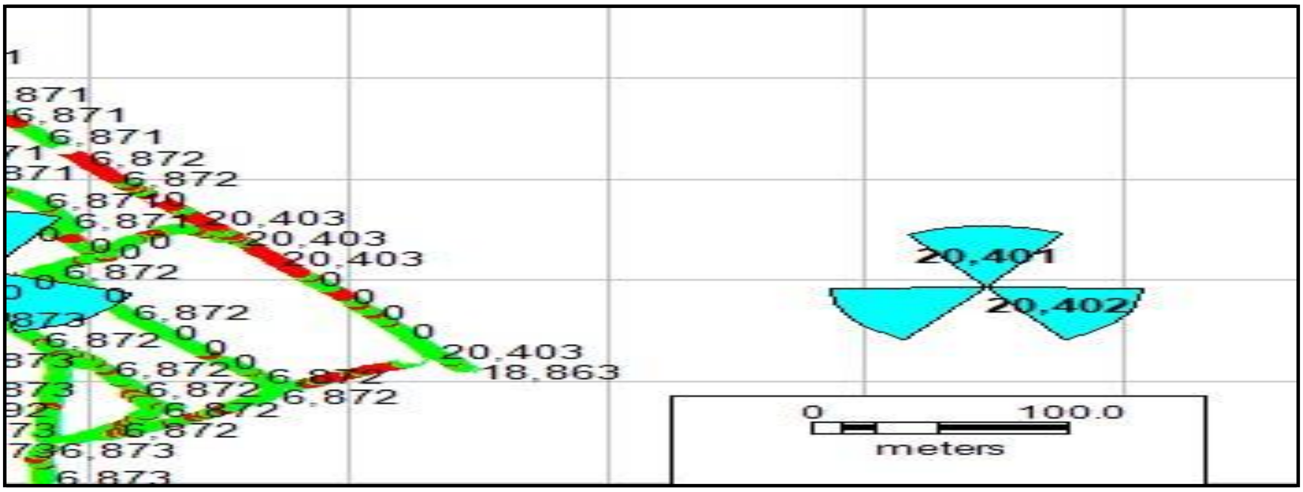

Fig 7: Poor Rx-Quality Area

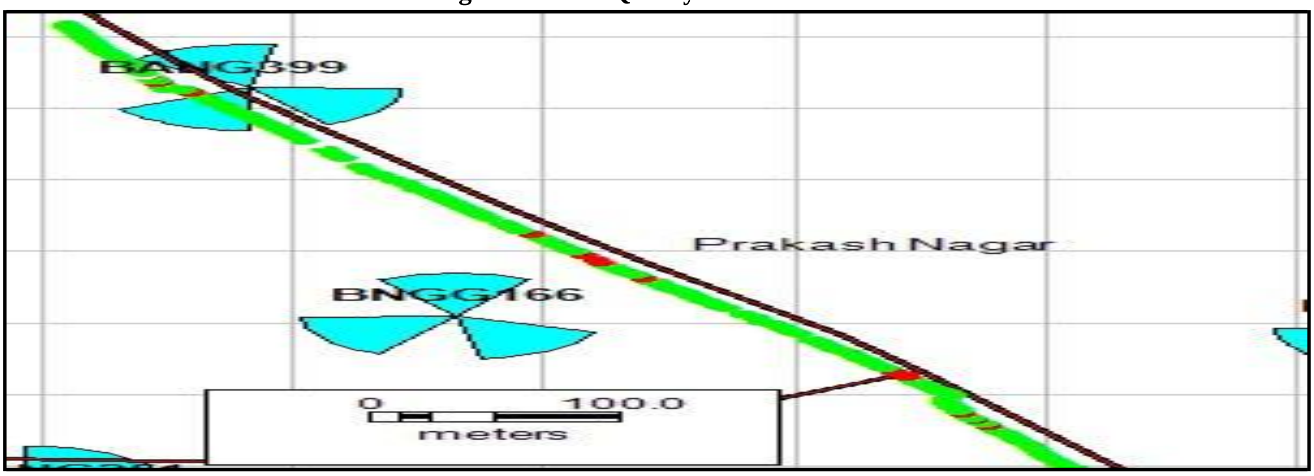

Fig 8: Post Optimization

IJARSE
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AREA Covered:	
1	Dr MC Modi hospital Road
2	Chord Road
3	Basaveshwara Nagar
4	Rajaji Nagar

Table:7 Location with Latitude and Longitude

Location	Lat	Long
KLE Law College	12.9957	77.5537
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J Spider training center	12.9949	77.5510
Nadgir institute of tech	12.9951	77.5468
UCO Bank	12.9965	77.5463
Rajajinagar RTO	12.9943	77.5536
Basaveshwar College	12.9946	77.5562
Sycone	12.9971	77.5507
KFC	12.9973	77.5464
Navya College	12.9986	77.5421
Modi Hospital	12.9975	77.5457

Table:6 Cluster with 7 on Air sites

CLUSTER:	Rajajinagar
On Air Sites	7
Off Air Sites	0
Proposed Sites	0
IBS	0
Total SQ Km	0.8

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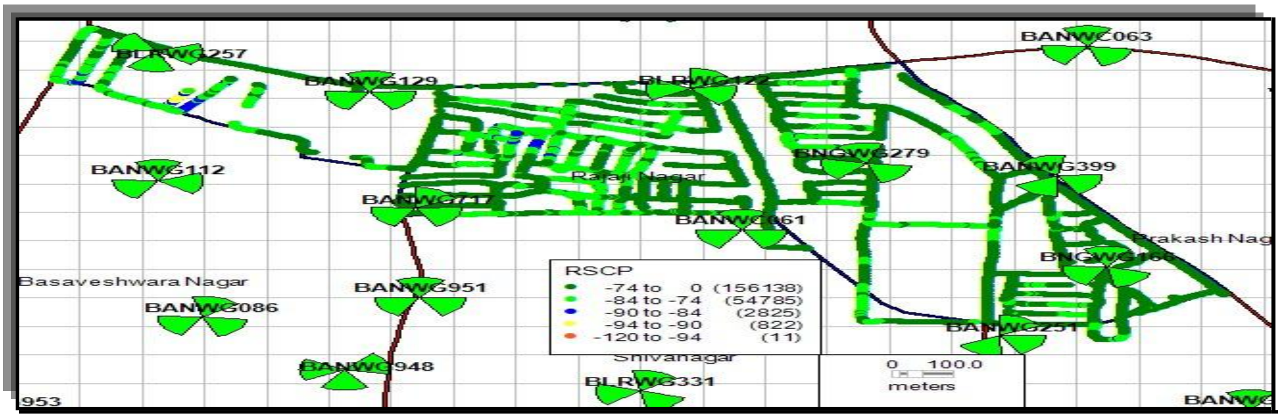

Fig 9: RSCP

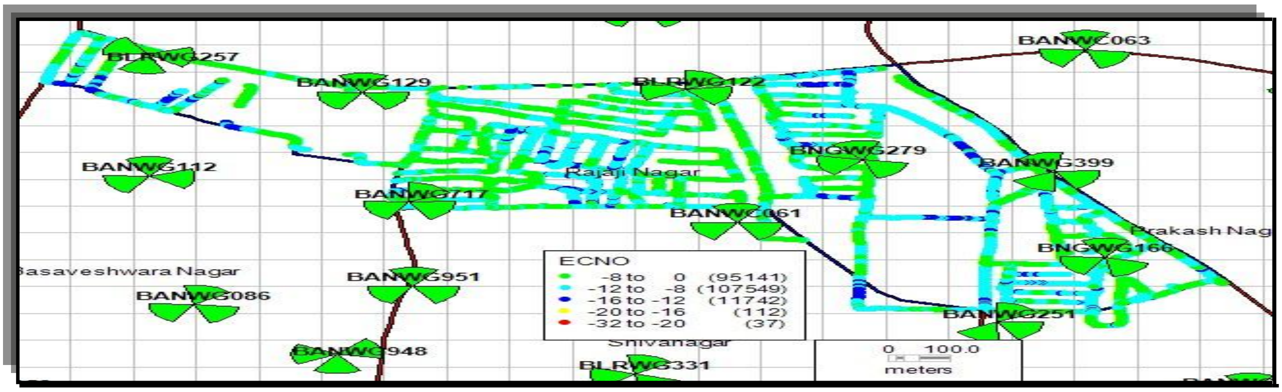

Fig 10: Ec/No

Table:8 3G BIN COUNT with RSCP

RSCP		
Range	**Count**	**Percentage (%)**
0 to -74	**156138**	**72.76**
(-74 to -84)	**54785**	**25.53**
(-84 to -90)	**2825**	**1.31**
(-90 to -94	**822**	**0.38**
(-94 to -102)	**11**	**0.005**

Table:9 3G BIN COUNT Ec/No

Ec/No		
Range	**Count**	**Percentage (%)**
0 to -8	**95141**	**44.33**
(-8 to -12)	**107549**	**50.12**
(-12 to -16)	**11742**	**5.47**
(-16 to -20)	**112**	**0.05**
(-20 to -32)	**37**	**0.01**

VIII CONCULSION

The paper provides an efficient method of Handover by optimizing the handover parameters like number of air sites selected, cluster area, Signal strength in order to improve the quality of Service in mobile communication for driven wards. Simulation results shows that the handover percentage is improved and the access and delay time are reduced.

REFERENCES

[1] Mugen Peng Wenbo Wang "A framework for investigating radio resource management algorithms in TD-SCDMA systems", ,Communications Magazine, IEEE Volume:43 , Issue: 6 , 2014

[2] Azita Laily Yusof, Norsuzila Ya'acob, and Mohd Tarmizi Ali, "Handover Adaptations for Load Balancing Scheme in Macrocell/Femtocell LTE Network", Journal of Advances in Computer Networks, Vol. 1, No. 4, December 2013

[3] Nagy Faroug Merghani, Rashid A. Saeed, Rania A. Mokhtar, "Hard Handover Optimization for Co-Channel WCDMAHeterogeneous Networks", Proceedings of 2014 International Conference on Sustainable Research and Innovation, Volume 5, 7th- 9th May 2014

Hamed Fehri, Jalil Chitizadeh, Mohammad H. Yaghmaee, "A Novel Downlink Handover Priority Scheduling Algorithm for Providing Seamless Mobility and QoS in IEEE802.16e BWA System", 978-0-7695-3501-2/09 $25.00 © 2009 IEEE

[5] Thanachai Thumthawatworn, Anjum Pervez, "Multi-level Threshold Handover for Hmogeneous Wireless Mobile Networks", PGNet ISBN: 978-1- 902560-22-9 © 2009

[6] Harri Holma, Sanna Heikkinen, Otto-Aleksanteri Lehtinen, and Antti Toskala, "Interference Considerations for the Time Division Duplex Mode of the UMTS Terrestrial Radio Access", IEEE Journal on Selected areas in Communications, vol. 18, no. 8, August 2000

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346
[7] Ravichandra M, Kiran Gowda H N, Udaya Kumar C A**, "**A Survey on Handovers Literature for Next Generation Wireless Networks", International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 12, December 2013

[8] Singhal, D. Kunapareddy, M. Chetlapalli, V. James, V.B. Akhtar, N. "LTE-Advanced:Handover interruption time analysis for IMT-A Evaluation" 2014, Computing and Networking Technologies (ICSCCN)

[9] Awada, A. , Wegmann, B. , Viering, I. , Klein, A. "A location-based self- optimizing algorithm for the inter-RAT handover parameters" Communications (ICC), 2013 IEEE International Conference on June 2013