International Journal of Engineering & Technology, 7 (1.9) (2018) 115-118

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research Paper

Performance analysis of a novel method for fast handovers in TDD and FDD for long term evolution

G. K. Venkatesh [1] *, P. V. Rao [2]

[1] *Research Scholar, Electronics Engg. Jain University Asst Prof. SJCIT, CB Pur, India*
[2] *Professor, P.G. Coordinator, Dept.of ECE Vignana Bharati Institute of Technology, Hyderabad, India*
**Corresponding author E-mail: gkvlshiv@gmail.com*

Abstract

The LTE Long Term Evolution highly developed Technology, Handover is the essential function of the mobility of user in cellular networks in Time Division Duplex as well as Frequency Division Duplex. Handover is one of the essential that can affect the [QoS] Quality of Service with Capacity of Mobile Broadband Networks. Within mobile cellular network communication systems, a (spectrum) limited shared resource needs to be shared with all the users, so full duplex communication is achieved. This paper involves studying diverse Hand over delay parameters and also focus on reducing "Hard Handover delay" by minimizing interruption time, activation time, wireless channel accesses time as well as the wireless link transmission delay. Technique is developed in order to reduce the handover delay time in Time Division Duplex network which too reduces the wireless channel access time and the wireless link transmission delay. A novel handover algorithm is developed which would decreases the handover delay time and access time inside mobile network environment. Additional work may be conceded on to obtain enhanced performance and Quality of service in Time Division Duplex mobile network.

1. Introduction

Handover or else Handoff is a procedure in telecommunication and mobile communication a connected cellular cell or else data session is transferred from one cell site (base station) to another without disconnecting the session. Handover has become a most important in cellular wireless networks since it allows User Equipment to be mobile without trailing connectivity. Though handover allows one to uphold continuous connection, it also involve a set of overhead and causes delay meant for the packets to be delivered to destination of User Equipment. Time division duplex is a method widely used in two way digital communications systems where the two directions of travel [up and down stream] of one channel are passed on the similar carrier frequency but in discrete time intervals inside a time separated way. These time intervals are frequently of fixed duration with equal time allocated for up-link and down-link information. The TDD makes use of single frequency component to regulate and transmit signals in both directions. Here fixed wireless allocation through time slots to downstream transmission intervals than upstream. TDD operates by toggling transmission direction over time signals in both the downstream and upstream, lone frequency channel is used to broadcast point-to-point systems that use TDD, between downstream transmission and the upstream transmission handled vigorously. The Transmitter and Receiver Transition Gap [TTG] is a gap among downstream transmission and the upstream transmission of the comparative band between transmit and receive streams. Capability of the downstream and upstream need a guard time (instead of a guard links can be changed in support of one direction over the other. This is accomplished by giving a greater time interval. This toggling receives large information payloads over downstream. In contrast, TDD systems obtain place exceptionally quickly and are unnoticeable to the user. Thus, TDD can support voice and for this method is Internet access in which a user enters a small message upstream and other equal communication services as well as asymmetric data services. TDD also can process uneven information flow. An apparent application asymmetry is helpful for communication. [4] Discussed that the activity related status data will be communicated consistently and shared among drivers through VANETs keeping in mind the end goal to enhance driving security and solace. Along these lines, Vehicular specially appointed systems (VANETs) require safeguarding and secure information correspondences. Without the security and protection ensures, the aggressors could track their intrigued vehicles by gathering and breaking down their movement messages. A mysterious message confirmation is a basic prerequisite of VANETs. To conquer this issue, a protection safeguarding confirmation convention with expert traceability utilizing elliptic bend based chameleon hashing is proposed. Contrasted and existing plans Privacy saving confirmation utilizing Hash Message verification code, this approach has the accompanying better elements: common and unknown validation for vehicle-to-vehicle and vehicle-to-roadside interchanges, vehicle unlinkability, specialist following capacity and high computational effectiveness

2. Time division duplex

Time Division Duplex use single frequency to regulate signals into both the upstream and downstream direction. Where as in fixed wireless point-to-point systems that use TDD, a lone channel is used to broadcast signals in both directions. TDD operates by toggling of signals over a time interval. This toggling of signals takes place very quickly and is imperceptible to the user. Hence, TDD can maintain voice and other symmetrical communication services as well as asymmetric data services. TDD also can handle a dynamic mix of both traffic types. The Capability links can be changed in favor of one direction over the supplementary. This is achieved by giving a additional time allocation to time slots of downstream transmission intervals than upstream. This asymmetry is helpful for communication processes characterize by unbalanced information flow. This contrast in the company of FDD, where each transceiver transmit and receive on two different frequencies, divided by the duplex spacing as defined in diverse CEPT recommendation. CEPT recommended channel arrangements for both point-to-point and point-to-multipoint make little explicit orientation to duplex method although those arrangements which incorporate paired frequencies clearly are able to accommodate FDD systems but do not necessarily preclude TDD systems. The regulator frequently looked the P-MP potential offered by TDD, especially in bands traditionally used by FDD systems. TDD was not a practical alternative to FDD for analogue systems, which is one reason why FDD is usually used in some bands.

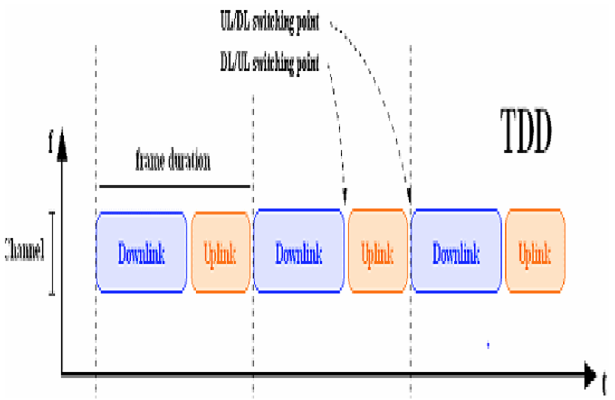

Fig. 1: TDD Frame.

Advantages

- The TDD with the uplink along with downlink radio path are fairly very similar. The techniques such as beam forming give good response with TDD systems.
- In case wherever asymmetry of the uplink as well as downlink data rates. The amount of uplink data increases, towering communication capacity can be dynamically allocated, and as the traffic load reduce, the capacity.
- It provides flexibility to change dynamically the UL as well as Dl capability ratio to equal the demand.

3. Handover

The measurable handover while a phone call is in progress and is redirected from its current cell (called source) to a new cell (called target). Inside mobile networks the source and the target cells might be served from two dissimilar cell sites otherwise from one and the same cell site. Handover having the source and the target are of dissimilar cells (belonging to same cell site), is known as inter-cell handover. The purpose of inter-cell handover is to uphold the call as the subscriber is moving out of the area enclosed by the source cell and entering the area of the target cell. The pictorial illustration of handover before as well as after shown in the below fig2.

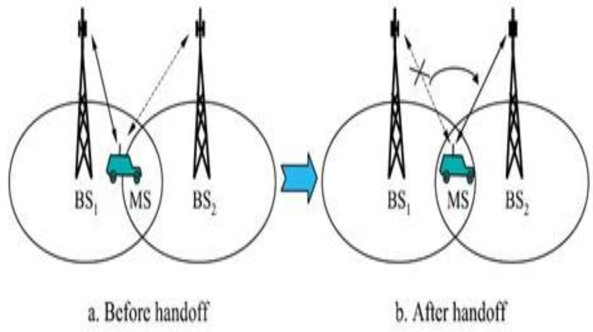

Fig. 2: Handover Operation.

4. Algorithm

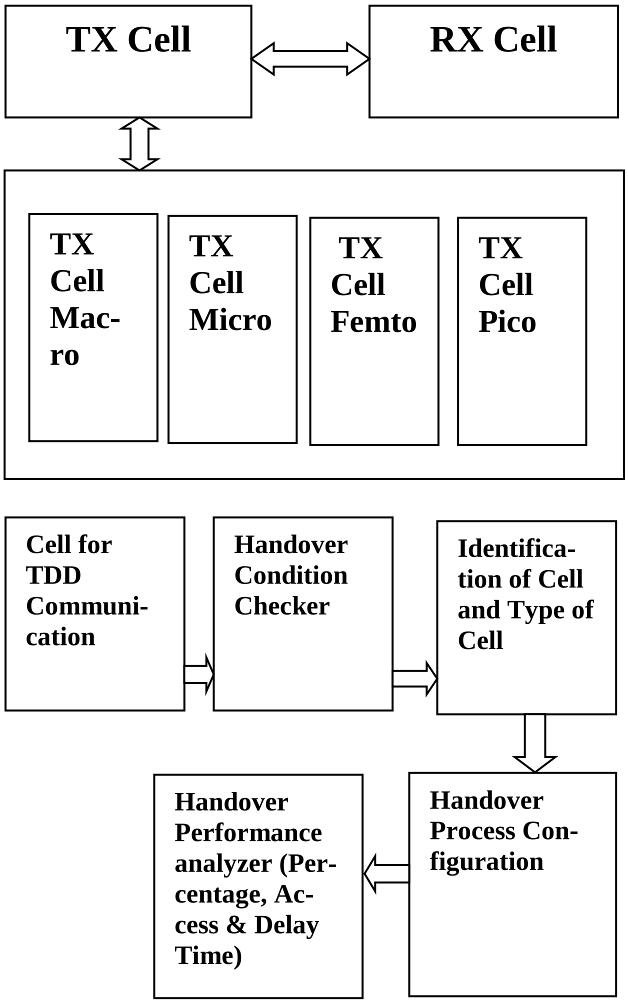

Fig. 3: Algorithm for Handover.

5. Flow chart

Handover in Macro, Micro, Pico, Femto cells.

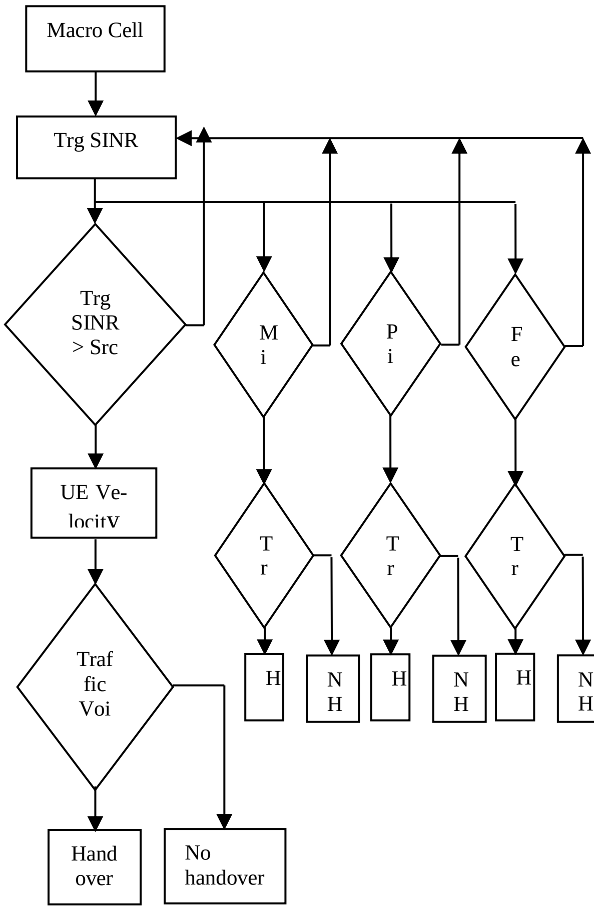

Fig. 4: Selecting A Particular Cell and Performing Handover.

The steps implicated in the Handover Process

- Measure the Target SINR-enb with the Serving SINR-enb plus HHM.
- Compare UE velocity as well as predict user mobility.
- If traffic used is voice do practical handover else reactive handover.
- Measure Target SINR-Henb along with the Serving SINR-enb plus HHM.
- Compare UE velocity.
- Do not perform Hand-in or perform Hand-in or reactive Hand-in based on the Velocity value.
- MeaureTarget 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.

6. Experimental result

Uplink Budget

a) Transmitting End:

$$EIRP = P_{Tx} + L_{AF} + GME \quad (1)$$

Transmitter(Mobile equipment (ME) or MS)	Parameter Value
1. Transmitter power of ME (P_{Tx})	33dbm
2. MS or ME antenna gain (isotropic antenna) (G_{ME})	0
3. Connector loss or Antenna feeder loss (L_{AF})	3
4. Effective isotropic radiated power (EIRP)	33dbm
5. Mobile station antenna height (h_m)	1.5m

b) Receiving End:

Receiver (BTS)	Parameter value
1. Receiver sensitivity (R_S)	- 114dBm
2. Body loss (B_L)	3db
3. BTS receiving antenna gain (G_{BTS})	14db
4. Interference margin (I_M)	2
5. Fast fade margin (F_M)	5db
6. Connector loss (L_C)	3db
7. Base station antenna height (h_b)	30m or 35m

$$R_s = EIRP - L_p - I_M - F_M - L_C + G_{BT} \quad (2)$$

Using equation (1)

EIRP=33-0-0=33dB

Using equation (2) below:

$$R_s = EIRP - L_p - I_M - F_M - L_C + G_{BTS}$$

-114 =33-Lp-2-5-3+14

Therefore LP= 151dB

Down Link Budget

c) Transmitting End:

$$EIRP = P_{TXB} - L_{cableB} - L_c + G_{TXB} \quad (3)$$

Transmitter(BTS)	Parameter Value
1. Output power of BTS (P_{TxB})	44.5dbm
2. Transmitter antenna gain (G_{TXB})	18db
3. Cable loss (L_{CableB})	2db
4. EIRP	
5. Combiner loss (Lc)	2db

d) Receiver End:

$$R_s = EIRP – L_p – B_{LM} – I_D – L_s – L_{CC} - G_{MS} \quad (4)$$

Receiver (MS or ME)	Parameter value
1. Mobile station Sensitivity (R_{SM})	-104dbm
2. Body loss (B_{LM})	3db
3. MS receiving antenna gain (G_{BTS})	18db
4. Interference margin (I_M)	3db
5. Fast fade margin (F_M)	5db
6. Connector loss (L_C)	2db

$$R_s = EIRP - L_p - B_{LM} - I_M - F_M - L_C + G_{MS} \quad (5)$$

RS= -104= EIRP-151-3-3-5-2+18 therefore EIRP=52

52=P_{TxB}-2-2+18 therefore P_{TxB}=38 dBm

Calculating SINR

$$SINR = \rho w \log\left(1 + \frac{1}{fp}\right) \quad (6)$$

Where

- ρ is reuse ratio(factor).
- fp is amount of total out-of-cell interference at base station as a fraction of the receiver signal power of a user at the edge of the cell. It depends on the reuse factor and the topology of the cellular system. For 2-D hexagonal array of base station reuse ratio corresponds to nearest reusing base station as ρ α/2.
- α is decay factor.
- w is bandwidth

Determination of reuse factor

$$N = i^2 + j^2 + ij$$

Where i and j are positive integers and measures the number of nearest neighbours between co-channel cell.

N = ρ

7. Simulation results

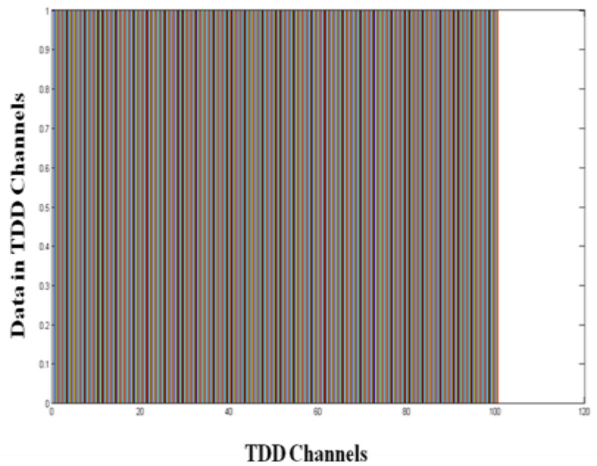

Fig. 5: TDD Communication in One Cell.

The Fig5 indicates the data transmitted over the predefined channels for a reference of hundred channels in TDD. Each channel is carrying a fixed amount of predefined data.

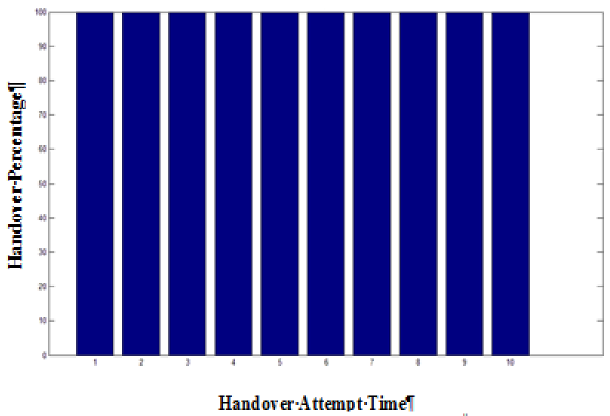

Fig. 6: Hand over Percentage in TDD Handover.

The Fig 6 indicates that number of attempt for the Handover is made and percentage of successful handover.

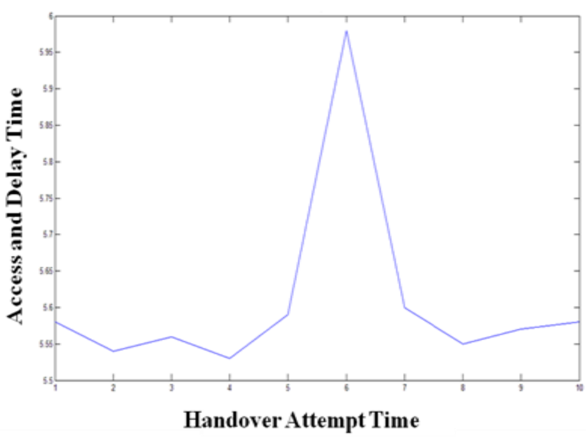

Fig. 7: Handover Access and Delay Time in Time Division Duplex.

The Fig7 shows that number of attempts made handover and at the sixth successive time an Handover is performed and also it gives the amount of delay introduced in performing a successive handover.

8. Conclusion

The paper provide an capable technique of Handover by optimizing the handover parameter in order to get better quality of Service inside mobile communication. Simulation results show that handover percentage is enhanced as well as access and delay time are reduced. Future the methods can be implemented using frequency division duplexing for improvement in quality of service.

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.

[4] Christo Ananth, Dr.S. Selvakani, K. Vasumathi, “An Efficient Privacy Preservation in Vehicular Communications Using EC-Based Chameleon Hashing”, Journal of Advanced Research in Dynamical and Control Systems, 15-Special Issue, December 2017,pp: 787-792.

[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. https://doi.org/10.1109/49.864004.

[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 Page(s):6168.