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Self-Handover Optimization In LTEA Mobile System

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Abstract: **In recent era, peoples are using to share information through mobile. Wireless communication with relay nodes allows broadband internet access through radio communication. Example of such communication is vehicular communications with backhaul links. However mobility management equipment of existing system does not allow the high mobility vehicles for instant communication. We suggested a user optimized handover mechanism with dual mobile relay devises for wireless communication, to allow high speed communication environment. Proposed work combines the individual cell handover parameters with hysteresis. Performance analysis indicates that our developed mechanism is removes communications number link failure & also reduces the service interruption during handover.**

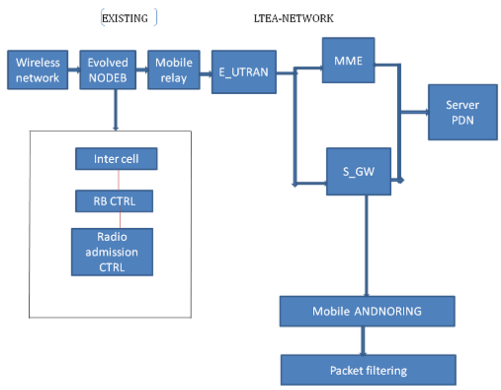
Keywords: **Handover; Hysteresis; Relay Node; Offset; Hysteresis**

I. INTRODUCTION

Current development in wireless communication allows the mobile users to communicate large amount of information through mobile devises. Moreover, online application system also allowing through the mobile devises. Thus broadband internet access through the mobile communication shoul satisfies the challenges of high mobility users. So as to overcome the problem, in this work we provide the mobile relay nodes based communication architecture. The aim is to achieve long term evaluation for high speed mobile devises to provide real time application through internet access every time everywhere. One same example network is, communication in railway system & is next generation network based on LTE mechanism [1]. LTE network consist of eNBs (evolved Node Base station), which is connected to MME (mobile management entity), S-GW (serving gateway) & P-GW (packet data network gateway) to provide different types of application [2].

Advanced LTE is a standard to satisfy the 4g mobile networks. LTE-A make use of mobile relay node for supporting high mobility rail way network communication [3]. Advanced LTE-A -12 allows the mobile relay hand over by replacing the existing UE HO [5]

Block Diagram of LTE:



In literature number of studies (LTE) proposed to minimize the capital expender in 3G network through automatic network management [6], the nodes in a network are self organized and achieve the optimization through the parameter handover. Thus different works achieve the optimization by dynamically select ho parameter to wireless communication [7,8]. But this work suffering the issue of number of RLFs & connection interrupts during handover. Thus we overcome the problem by connecting handover hysteresis to CIO (cell individual offset) depends on mobility of mobile devises & HPI (handover performance indicator) of cell.

Work [9] proposed two handover mechanisms to enhance the performance of network through handover parameters adjustment. First mechanism is based on UE velocity and second mechanism is based on optimization of TTT (time to trigger) [10]. In [11] an HO scheme, which makes use of coordinated multi-point for allowing mobility in vehicular femtocell network, is presented. In this method, different external antennas are equiped on the mobile. When the mobile appears an overlap areas, each external antennas transmit measured information for serving cell.first, an external antennas with low receiving signal strength (RSS), from the serving cell conduct the HO. Later, remaining external antennas accomplish the HO. Work [12] proposed a similar method to support bicasting in between HO procedure. Other researchers [13,14] provide the method to achieve system throughput with the help of bicasting solutions.

Primary goal of our work is HO decision triggering in high-mobility domain. If serving cell fail to brought the MRN's HO procedure at appropriate time, then there is a condition arises that MRN need to leave the serving radio communication range prior the HO procedure. Otherwise: the MRN incurs RLFs.

When an RLF happens in between the HO procedure, then the HO delay becomes longer than that of a normal HO without RLF, in addition the multiple connection interruptions increases. Therefore, we optimize the HO parameters that begin the HO procedure at the appropriate time and reduce RLFs. Further, we develop an HO mechanism with dual MRN installation with mobile. Only single MRNs amongst the two provide a measurement report, with its HO procedure triggered by the serving cell. Next MRN accomplish an HO, which emulate the prior activated HO.

II. RESULTS

2.1. Simulation Setup

We simulated & verified our developed HO mechanism & the twofol MRNs network model using LTE-sim [15]. LTE-sim is an open source framework, for simulating LTE networks. It contains several countenance of LTE network, such as multi-cell & single environment, user mobility at different speeds and existing hard HO procedures. For simulation, it has new call blocking and acceptance processes to control QoS-based call admission. A connection manager application modify & implement MRN time control RSS of the serving cell. Performance of proposed mechanism compared with existing Hand Over of LTE:sim through simulation.

We developed a simulation with topological network consist of 19 macro cells in LTE-sim, as in the Figure 1. The streaks in the figure show two fixed mobility patterns of mobiles with dual MRNs. The variation between these lines reclines in the multiple cells during which they pass. Table 1, lists the parameter used in the simulation.

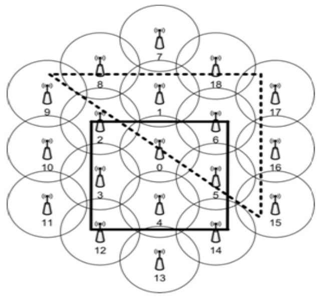


Figure 1. Simulation network architecture: 19 cells, 2 fixed mobility pattern.

Table 1. Simulation parameters.

Parameters	Value
Mobile speed	up to 355 km/h
Carrier frequency	2.6 GHz
Transmission power of DeNBs:	Up to25 dBm
Threshold of HPI	4%
Hysteresis of Event A3	72 dB
Time-to-trigger (TTT)	300 ms
Path loss model	128.1 + 37.6log10d,
	d is range between mMRN and DeNB
Cell radius	1 km
HO overlap area	300 m
mMRN measurement interva	50 ms
Adjustment amount of CIO ( )	1 dB

2.2. Simulation Results

The mathematical outcome of the fixed MRN mobility pattern framework, in the five hour duration of simulation given below. Results are considered those averages of 5 simulations. Comparison of multiple RLFs happen in the suggested mechanism with existing approach with multiple occurred previous mechanisms with using of A3 condition. Previous mechanism manage HO depends on Event A3 uses relay nodes. RLF is a key indicator of the HO procedure. The X-axis appears the simulation run time, while the Y -axis is an average number of RLFs, Proposed mechanism much useful in comparison with existing work, when HO & MRNs happen simultaneously.

The average number of RLFs, for the existing HO scheme ranged between 8 and 13 throughout the entire simulation, whereas in the proposed scheme, the number of RLFs minimized to four after 100 min, which demonstrates a better wireless communication quality and improvement for high-speed mobiles with dual MRNs. In summary, the number of RLFs decreased, and slight changes occurred during the HO procedure of the suggested scheme.

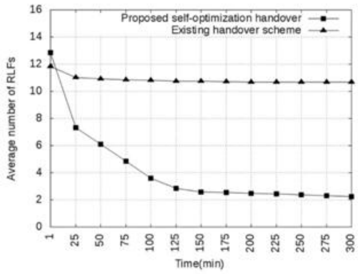


Figure 2. Performance comparison with high speed (300 km/h).

Figure 3 gives the main number of RLFs that happend late & soon in the suggested HO mechanism. sundry HOs that has been too early has been slightly modified because the HOs that are too early are regulated by the HPI threshold.

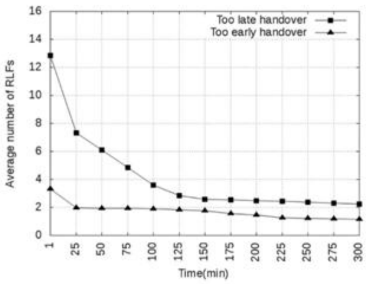


Figure 3. Performance of the developed method for late and early HOs.

Consider the evaluation of developed HO method with respect to delay, communication interruption time & HO triggering probability. We describe the HO delay time as the time interval, from the MRN receiving the last packet from the serving donor NB (DeNB) to its receipt of the first packet from the S-GW during the aim DeNB. In [16], the time consumption of all messages is defined.

Only NCHH is supported in the LTE system. Thus, interruption of communication is denoted by path switching phase of HO & time duration with no survival of MRNs. Figure 4 demonstrate the average Hand Over delay time with different MRN speeds up to 355 km/h. Velocity is more than 125 km/hr, HO delay duration vary between 103 ms & 109 ms

The speed of the chariot was higher than 125 km/h: accordingly the delay times HO varied between 103 ms and 109 ms in the developed HO procedure. Conversely, the current method of HO delay duration grow up to a greater of 235 ms. Thus, the developed method conclude that it can allow communication with respect to low average delay in between the HO procedure.

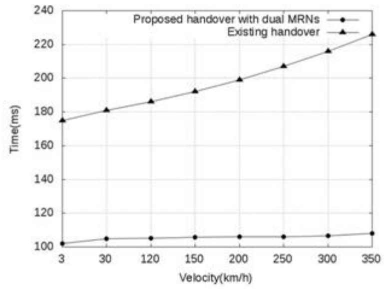


Figure 4. Average HO delay.

We also contrasted the existing and proposed HO schemes in terms of communication interruption time. The results in the Figure 5. The suggested scheme reduced the communications interruption time by approximately 9.8 ms at 200 km/h, which is sufficient for the provision of good quality of service to users. Further, the communications interruption time of the suggested HO scheme with dual MRNs was less than that for the existing scheme in a higher velocity environment.

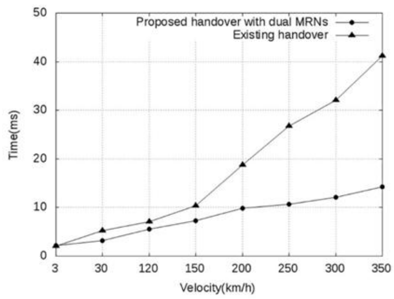


Figure 5. Communication interruption time during HO procedures.

III. CONCLUSIONS

Self-optimizing, Hand Over parameters could decrease the wireless backhaul link (between the MRN & DeNB) failures in between the HO steps in high-speed environments. In this research, we developed a self-optimizing HH and CIO scheme with dual MRNs for LTE systems. The suggested HO self-optimization scheme comprises two main features: (i) HH optimization based on the speed of the vehicle; and (ii) a CIO optimization scheme for RLFs. We discussed the HO steps of the dual MRN-based network model in terms of data communication quality for mobile users. The results of the simulations conducted, in which we compare the existing NCHH and the proposed self-optimization HO schemes, showed that the developed mechanism reduces the multiple of RLFs & service interruptions in between the HO procedures. Our future scope is to investigate real time traffic transmission through the backhaul link of MRNs in future work.

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