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Handover Scheme for Mobile Relays in LTE-A High Speed Rail Network: A REVIEW

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ABSTRACT: Long term evaluation advanced (LTE-A) adopt the mobile relays for Increasing more coverage area in the wireless communication for high mobility environment. User equipment's (UEs) are connected to the mobile relays instead of donor evolved node base station (DeNBs). Mobile relays will form the back haul link with the serving donor eNBs. Since the mobile relays work in high mobility environment, mobile relays suffer from frequent handover between DeNBs. Due to handover, some radio resources are waste communication interrupt and also massages overhead occur. So, to overcome these challenges various handover schemes were introduced. In this paper, various handover schemes are presented together with the discussion over their advantages and disadvantages.

KEYWORDS: Handover, high-speed rail, Long term evolution advanced (LTE-A), mobile relays**,** user equipment's.

I. INTRODUCTION

Nowadays, increasing demand of wireless services especially in high speed train [8]. Many countries have built or building their high speed system to give the better service to the people while they are travelling long distance. If the people are travelling for the long distance it will attractive to giving them the better data services. While travelling for a long distance, broadband wireless communication is necessary for accessing the data like they are playing online game, video conferencing and so on. If the train is running high speed that time the UEs are suffer from handover frequently. LTE-A adopt the mobile relays for long distance communication. LTE-A is wireless technology and its demand increases day by day. The objectives of the LTE-A is to develop a frame work for the evaluation of the 3GPP radio access technology towards a high-data-rate, low-latency and packet optimized radio access technology [4].

Recently, the LTE-A standard working group has been discussing to adopt mobile relays to support data services in high-speed rail systems [7]. According to [7], some mobile relays can be deployed in a train and each mobile relay has various functionalities such as It plays roles as an eNB for, UE devices, It also redirects UE devices uplink data packets to the donor NB (DeNB) deployed along the train routes, It dispatches the downlink data packets from the network to UE devices, and It represents those UE devices (that connect to it) to perform handover procedures. So, in this paper handover scheme for mobile relay on the basis of with location information and without location information have been discussed.

Rest of the section is organized as fallows section II.Overview of the LTE-A III.Related work IV. Mobile relays handover scheme V finally conclude of this paper.

II. OVERVIEW OF LTE-A

LTE-A with propose of finding the requirements and technology component so that the evaluation of the LTE would be meet requirements of IMT-Advanced. [4] one of the most important benefit of LTE-A is the ability to take advantage of advanced topology network, optimized heterogeneous networks with a mix of microcells with low power nodes such as picocells,femtocells and new relay nodes. The next significant performance leap in wireless networks will come from making the most of topology and bring the network closer to the user by adding many of these low power nodes. LTE-A improves the capacity, coverage and ensures user fairness.

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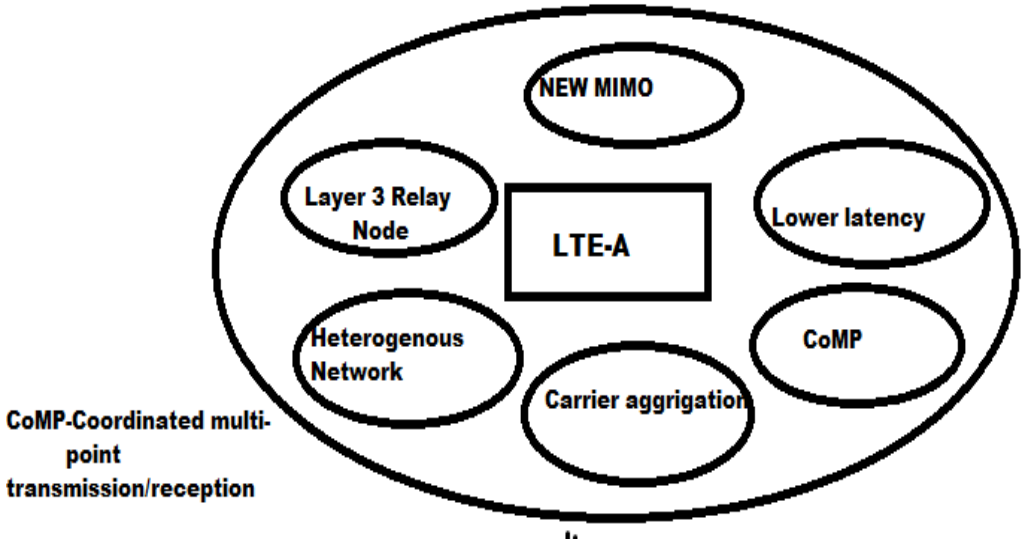

Fig.1.**New Technology Adaptation into LTE-Advanced.**

LTE-A is also introduced multicarrier to be use ultra wide bandwidth up to 100MHz of spectrum supporting vary high data rates. LTE-A support the relay node base station. LTE-A coordinated multi point transmission and reception. Its Scalable system bandwidth exceeding 20 MHz, up to 100 MHz. It also supports carrier aggregation of contagious and non-contagious spectrum allocations. [4] The peak data rates supported by LTE-A is up to 1 Gbps for downlink and 500 Mbps for uplink. Spectrum efficiency three times greater than LTE. Peak spectrum efficiency is 30 bps/Hz for downlink and 15 bps/Hz for uplink. There are many technology that will enable LTE-A to achieved the high data throughput data rates.

MIMO and OFDM are two basic technologies. Form the basis of the radio bearer along with the OFDMA (orthogonal frequency division multiple access) is use to achieved the high data rate while downlink and SC-FDMA (single channel orthogonal frequency division multiple access) is use to achieved the high data throughput rate while uplink. MIMO (multiple input multiple output) enables data rate achieved to be increase beyond what the basic radio bearer would normally allow [4].

III. RELATED WORK

Every UEs support the wireless services. If the user travelling from high speed train that time all the UEs are suffer from frequent handover. If the handover occur that time the data services are stop for short time of periods. At that time the radio resources are waste. To make the handover time short, there has been lots of research done on handover every researcher try to minimize the handover interrupt time. Mobile relays is use to increase the coverage area so mobile relays are distributed in the train it also act as a base station. While train is moving that time mobile relays also suffer from handover. For example, given a cell size of 2 km which is typical in GSM-R (GSM for Railways) networks[1], a high-speed train of 350km/h experiences one handover every 10-20s.handover scheme are used to solve this problems. Handover schemes on the basis of with location information and without location information. Aiming of both the schemes is reducing handover interrupt time, massages overhead. But without location information carrying scheme is more preferable than with carrying location information because in with location information carrying scheme every time need to carry GPS information that is not possible for some situation. But both the handover schemes are trying to reduce the handover interrupt time, increasing the throughput of the system and also trying to reduce the latency.

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IV. MOBILE RELAYS HANDOVER SCHEMES

LTE-A introduced mobile relay for increasing the coverage area. Mobile relay are connected to the DeNBs and form the backhaul link with the serving donor eNBs as shown in figure 2.When the mobile relays is in the train it suffer from frequent handover due to this some radio resources are waste.

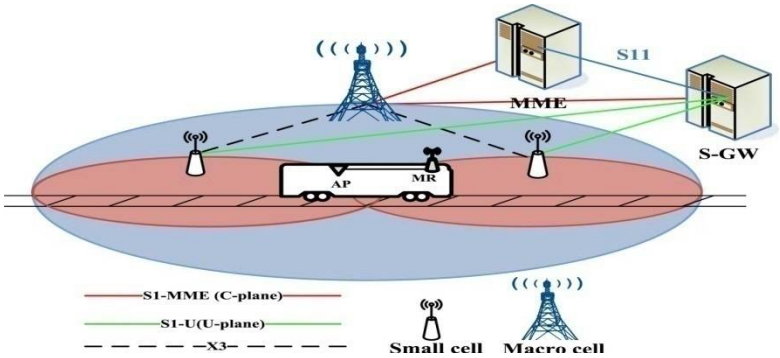

Fig.2. C/U-Plane decoupled architecture in high speed railway.

Introduced some mobile relays handover scheme, which can be divided into two categories.

A. With the help of location information:

In this type of scheme use the direction, on the basis of direction perform the handover. With the help of location information scheme, every time need to carry the location information. This type of handover scheme use the direction and velocity information provided by the GPS to facilitate the selection on candidate eNBs and to adoptively shorten time to trigger (TTT).But the mobile relays and DeNBs need to exchange the location information. Hence, the network need to configure additional data bearer for each mobile relays and also mobile relays need to carry GPS information in its measurement report Moreover, we observe that the location-based schemes may not be robust in case of poor GPS signal reception or when GPS service is intermittent. For example, when the train leaves a long tunnel or mountain area, the GPS device on a mobile relay may need a long time to search satellites. During the searching time, the given location-based schemes cannot work well, and thus, mobile relays may not able to handover in time.

B. Without the help of location information:

In this type of handover scheme the handover perform without the help of location information. This type scheme the handover decisions are made on the basis of velocities of the train, coverage area of cells of mobile relays and DeNBs. The coverage area of each cell varies according to implementation environment for example if the train is travelling at a speed of 300 km/h and the train is going to pass through a DeNBs. Mobile relays are form the back haul link with DeNBs .the coverage area is 1 km after crossing this 1 km of coverage area, the mobile relay perform the handover. So in this we need not to be configure additional bearer and also DeNBs need not to carry any GPS information.

Schemes	Advantages	Disadvantages
A. With the help of location information	• Minimized handover latency.	• Hanover not performs on time. • Network need to configure additional data bearer for each mobile relays. • Mobile relays need to carries GPS information

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		in measurement report. • Signaling overhead.
B. Without the help of location information	• Handover perform on time. • Network need not to configure any extra data bearer for each mobile relay.	• Sensitive to link transfer-time may result in dropped call.

Table 1. Summary of advantages and disadvantages of mobile relays handover schemes.

V. CONCLUSION

In this paper LTE-A was discussed. Handover which is an issue in every telecommunication network was explored two scheme were both the scheme was good. Both the scheme was perform handover as early as possible but without the help of location information scheme is more preferable than with the help of location information scheme because in without the help of location information scheme need not to be configuring extra data bearer while handover and need not to install the GPS system. also advantages/disadvantages of each techniques are discussed. On that basis, we preferred handover scheme without location information.

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BIOGRAPHY

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