

Innovation-02

1. Brief Name of the Innovation:

A method to use ISM band in 3GPP LTE downlink to improve the cell edge users' throughput

2. Contact Information:

PrafulMankar,

Project Lab, GSSST, IIT Kharagpur, WB-721302

E-mail: praful@ece.iitkgp.ernet.in.

Mobile No.: 09475523548

3. What is the technology? :

Due to increasing demand in wireless network, spectral efficiency becomes a key factor in design of next generation cellular systems. At the same time the cell edge users usually starves for the bandwidth to meet the throughput requirement due to weak signal strength which brings down the spectral efficiency. In order to satisfy these users, service provider has to increase the number of base stations or deploy relays in cell edge region so that the signal strength will be improved. Increasing number of BS is not cost effective and for deploying relays the bandwidth has to be reserved so that it won't interfere with BS which is not bandwidth effective. The proposed method maintains the satisfaction level of these users through improving the downlink signal strength at the cell edge by use of relays without compromising on cellular bandwidth efficiency.

4. What does the technology do?

This method is capable of making use of unlicensed band (ISM band) for the next generation cellular systems by coexisting with the WLAN (IEEE 802.11). The ISM band is accessed for the short range second hop (i.e. link between relays and user equipment). This means that the proposed method eliminates the reservation of network spectrum for the operation of relays which are used to improve the signal strength at the cell edge. Thus the cellular network can satisfy the cell edge users throughput requirement and maintain the fairness in network by employing cognitive relays at the cell edge which are able to receive the signal from BS in cellular band and transmit it to UE on ISM band. As shown in Fig. 1, the cell edge users are

served over two links, i.e. BS-to-relay link operating in cellular band and relay-to-UE link operating in ISM band.

5. Explain the specific problem this technology has created to address or solve:

In cellular networks, usually the cell edge users experience less signal strength compared to cell centre users. This means cell edge users are hungrier for the bandwidth which brings down the overall network spectrum efficiency. The proposed method solves this problem without compromising the network spectrum efficiency.

6. Why is it better? How much better?

Proposed method is tested in simulated sub-urban macro cell scenario for LTE network. For the coexistence with WLAN, we have dropped 10 access points per cell with a uniform distribution. Fig. 2 shows the CDF of the user throughput. The tail of the CDF is shifted to the right by the considerable amount. The average cell edge throughput for considered layout is improved by more than 60 percent. The improvement in throughput is the function of number of relays deployed at cell edge and the coverage of WLAN network.

7. Have you filed for Intellectual Property (IP)? Have Patent Cooperation Treaty (PCT) applications filed?

Not yet

8. What is the development stage of this innovation?

Under Development

9. Have any prospective users or buyers shown interest in this technology?

Not yet approached

10. Who do you consider competitors or competing technology?

11. List the milestones remaining to be accomplished to bring your technology to full development and ready for the intended end-user?

To develop the appropriate signalling and protocol for the implementation of proposed method in existing 3GPP standards.

12. Broad Technical Specifications -----

13. Diagram or Pictures if any

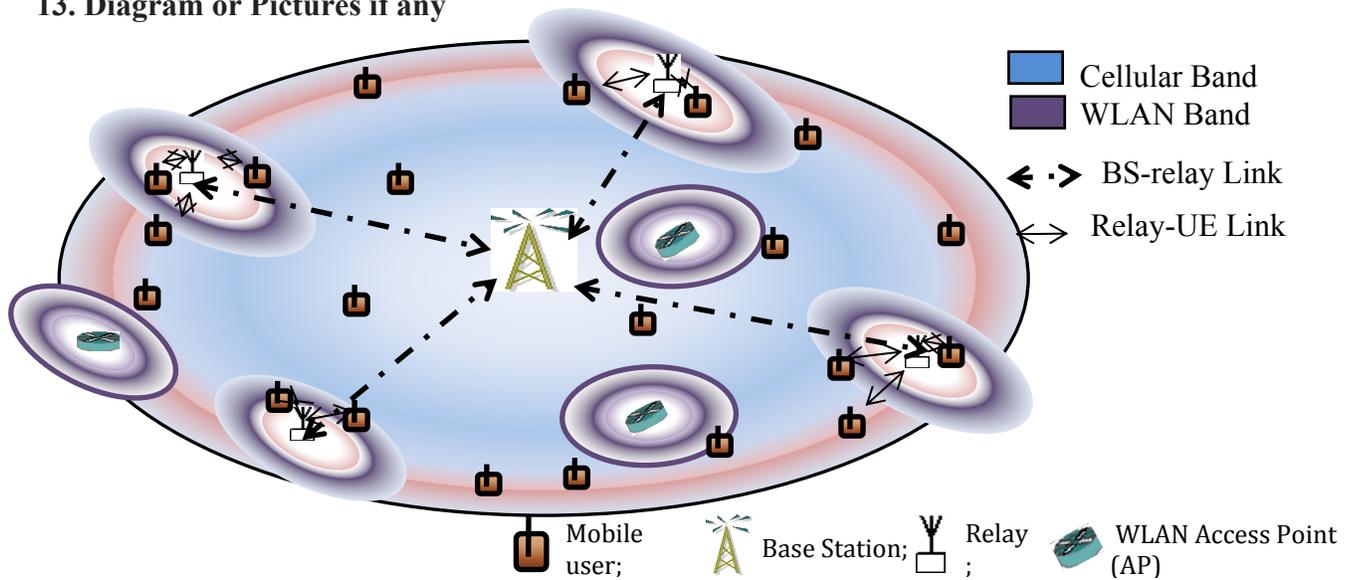


Figure 1: Typical example of the cell with proposed method

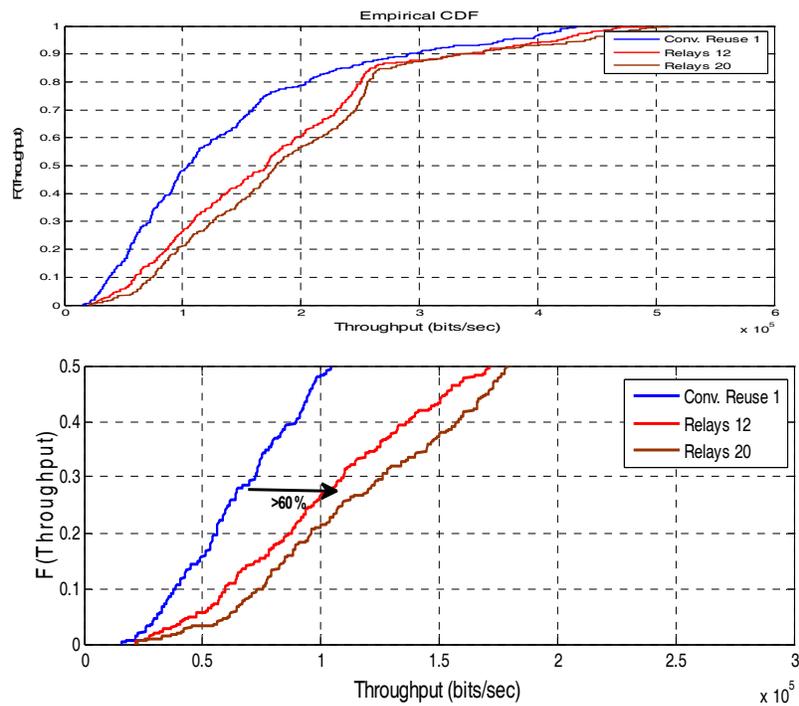


Figure 2: Cumulative distribution function (CDF) of users Throughput