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The Impact of Macro Base Station Densification and High Order Sectorisation on the Energy Consumption of 4G LTE Access Networks

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ABSTRACT

A detailed analysis of the impact of 3-sector macro base station densification versus deploying higher order sectorised base stations on the energy efficiency of LTE macro radio access networks is presented in this paper. Our objective is to find the most energy efficient deployment path for network operators to improve the capacity of their macro RANs. The energy consumption gain (ECG) is used as a metric for evaluating the energy consumption of the network in this paper. The radio base station power consumption is estimated by using a realistic power consumption model developed by the authors in a previous publication. The results have shown that 3-sector macro base station densification is more energy efficient than deploying 6-sector base stations for the same area capacity density target. However, when a progressive adaptive sectorisation technique is implemented in sectorised macro sites by switching off the base station sectors progressively as the traffic decreases, the option of the deployment of 6-sector macro base stations becomes more energy efficient than the deployment of more 3-sector base stations. The results of this paper are applicable on LTE mobile networks which consist mainly of macro only RAN and small cells are not deployed yet.

Keywords: RAN, Energy Efficiency, Sectorised networks, Energy Consumption Gain, Power consumption model, LTE.