

ABSTRACT

Nowadays, users of a mobile network increase rapidly, proven by internet services that are accessed mostly through mobile broadband usage. Wireless mobile broadband technology uses limited resources, namely, the frequency spectrum whose allocation is restricted. Thus, the licensed frequency for mobile broadband is facing a problem, i.e., spectrum scarcity. 3GPP sees this opportunity by launching LTE-Advanced Pro (4.9 G) technology through 3GPP Release-13, namely Licensed Assisted Access (LAA). LAA uses carrier aggregation technology between the licensed band and an unlicensed band of 5 GHz. It aims to increase network capacity and increase downlink speed. Indonesia represents one of the largest countries in the world, and the number of mobile broadband users is one of the largest. Especially in some big cities with the urban area and high-density mobile user, it is difficult to deploy more LAA sites in MNO point of view, due to its difficult site acquisition. Thus LAA deployment in Indonesia is required, especially in the urban area.

Therefore, we do study comprehensive about technical, economic, and regulatory analysis of LAA deployment in the urban area, in this case, MNO in Bandung, where has a high density of mobile user. There are capacity and coverage analysis in the technical aspect. The capacity analysis aims to compare existing required traffic capacity and capacity allowed by the existing LTE site so that we can determine how much the additional capacity and how many LAA site must be deployed. While coverage analysis aims to calculate and predict the coverage, both indoor and outdoor LAA site. Economic analysis has a goal to do a business feasibility test of LAA deployment from the MNO point of view. Afterward, the regulation analysis contains explaining existing regulation about LAA in Indonesia, listing some benchmarks of 5 GHz usage over the world, and determining the recommendation related to the LAA regulation.

The results of the analysis will be explained as follows. Based on technical analysis, LAA can increase the capacity of LTE, especially in urban areas, by utilizing unlicensed 5 GHz frequency. The additional capacity by LAA is as much as the capacity that LTE BTS is unable to serve anymore. In business analysis, LAA deployment in urban areas is feasible. The value of the feasibility test indicators is as follows: IDR 4,799,111,344 of NPV; 16.96% of IRR; 7 years three months of PP; and 1.024 of PI. Based on sensitivity analysis, the most impactful parameters of the business are the number of LAA penetration and the growth of the LAA-enabled device. Then, in resource regulation perspective, outdoor LAA operating license needs to be added to the frequency range of 5.2 and 5.3 GHz as well as the USA and Canada, not just in 5.8 GHz.

Keywords: *Enhancing capacity, Licensed Assisted Access (LAA), Techno-Economic Analysis, Urban area*