ABSTRACT

The need for internet access in Indonesia is increasing rapidly. However, the geographical conditions in Indonesia have hampered the development of communication infrastructure, especially terrestrial communications using both wired and wireless. The satellite communication system which has been launched as a solution to overcome the problem of terrestrial communication systems is still constrained in terms of high operating costs. Even though it has a wide coverage, the satellite communication system has a large delay and is not suitable for application in rural areas that have low traffic density. In overcoming the weaknesses of the terrestrial and satellite communication systems, High Altitude Platform Systems (HAPS) were developed. HAPS enable the expansion of broadband wireless telecommunications services in densely populated urban areas as well as underserved urban areas. The cities of Balikpapan, Bontang, and Samarinda are three urban areas in East Kalimantan. All of the activities in East Kalimantan Province are centered in these cities. To support each activity, it is necessary to design a Long Terms Evolution (LTE) network that can cover all areas with adequate capacity.

In this study, there are two aspects that will be discussed in technical and economic aspects. In the technical aspect, using a quantitative study of the feasibility of HAPS with capacity planning and coverage planning methods in the urban area of East Kalimantan. This is to determine the needs of telecommunication infrastructure. The HAPS scenario model in this study used an airship scenario at 17 - 24 km altitude which applies an integrated HAPS topology with terrestrial. In the economic aspect, the techno-economic using cost and benefit analysis method based on the CAPEX, OPEX, and revenue are applied and the output from this model are NPV, IRR and payback period. This is to determine the feasibility of HAPS implementation related to costs incurred by operators for construction and services provided.

Based on this research, the capacity planning approach in Kalimantan Timur required one HAPS to cover the area in each of urban area in Kalimantan Timur with cell radius up to 15.12 km^2. While in coverage planning, the number of HAPS needed

to cover urban area in East Kalimantan is two platform of HAPS in Bontang city, five in Samarinda city and seven in Balikpapan city. The E_b/N_o of 15,25 dB and the C/N_o of 95,26 dB are obtained. Meanwhile, the investment feasibility analysis about HAPS business in East Kalimantan considered feasible.

Keywords: *HAPS, Coverage and Capacity Planning, Investment Feasibility Analysis*