ABSTRACT

High-speed data services are required due to the rapid spread of ICT into high-tech fields during the Industry 4.0 era. Indonesia, an archipelagic country with large expanses devoid of land-based network infrastructure, has difficulties connecting remote places to the Internet. While submarine cables have reached major islands, satellite systems are crucial for extending broadband access to underserved regions. The Indonesian government has embraced high-throughput satellite (HTS) technology, as exemplified by the Indonesian HTS-A satellite, to enhance internet connectivity nationwide.

The benefits of HTS include frequency reuse and multi-beam technology, which conserve bandwidth, a costly and limited resource. However, the need for many spot beams to use the same frequency might result in Co-channel Interference (CCI), a side effect on multi-beam antennas. CCI can lower the quality of the communication link, which can impact both link capabilities and link capacity, as well as the user terminal's ability to receive the intended signal.

This study discusses co-channel interference in the four reuse color schemes on 8 beams of multibeam HTS with Ku-band frequency in Indonesia. The analysis is carried out by analyzing the link budget and capacity before and after interference on the user communication side, such as forward downlink and return uplink. The result of the link budget before CCI, the average *C/N* on Beam 1 to 8 was 23.34 dB to 23.50 dB. And the average return uplink *C/N* was 18.74 dB to 19.07 dB. When the communication link is added with interference, the forward downlink produces an average *C/(N+I)* of 11.96 dB to 12.15 dB, and the return uplink produces an average *C/(N+I)* of 13.96 to 14.05 dB on beam 1 to beam 8. The decrease in signal quality decreases the capacity for the entire beam. The forward downlink capacity before interference was 8.99 Gbps and decreased to 4.74 Gbps, while the return uplink capacity before interference was 7.09 Gbps and decreased to 5.27 Gbps. The decrease in capacity impacts the loss of satellite operator revenue of $137,235,254.49, equivalent to 37.71% of the total revenue of $363,285,974,743.95.

Keywords: High Throughput Satellite, Co-channel Interference, Frequency Reuse, Multibeam Antenna, Ku-band Frequency, Link Budget, Capacity, Revenue.