

ABSTRACT

Kereta Cepat Indonesia-China (KCIC), known as Whoosh, is the first high-speed rail project in Indonesia and Southeast Asia. The line connects Jakarta and Bandung with a length of about 142.3 kilometers using high-speed rail technology from China based on the CRH (China Railway High-speed) standard. The train is capable of traveling up to a maximum speed of 350 km/h. Shortening the travel time between the two cities to only about 36-45 minutes compared to the previous one which could take more than 3 hours. In addition to improving connectivity and transportation efficiency between cities, the high-speed train is also expected to encourage economic growth in the area around the Jakarta-Bandung corridor as well as technology transfer from China to Indonesia. However, the line from Padalarang Station to Halim Station passes through 13 tunnels, resulting in wireless communication interference. This condition reduces passenger comfort, especially in accessing internet services during the trip.

This research makes a wireless communication design solution that refers to the 3GPP TS 36.101 User Equipment (UE) radio transmission and reception, 3GPP TS 36.104 Base Station (eNodeB) Radio Transmission and Reception, 3GPP TS 36.133 Requirements for Support of Radio Resource Management, and Regulation of the Minister of Communication and Information Technology Number 7 of 2021 concerning the Use of Radio Frequency Spectrum. In this research, three wireless communication solutions were studied, namely Distributed Antenna System (DAS), Leaky Feeder, and Repeater. This design simulated the selected solution, namely leaky feeder system using Atoll software at 1800 MHz frequency with RSRP, RSSI, SINR, RSRQ, and Throughput parameters. In addition, the cost aspect of implementation is taken into consideration, which includes CAPEX, OPEX, Revenue, Profitability Index, and Payback Period.

Analysis results showed that LTE services in whoosh tunnel using leaky feeder technology obtained RSRP value of -66.82 dBm, RSSI value of -37.25 dBm, throughput value of 54,987.82 Kbps, SINR value of 24.68 dB, and RSRQ value of -12.58 dB. In terms of financial feasibility, it shows an NPV value of Rp 2,832,577,026.58 and revenue per year. Thus, the design of wireless communication in whoosh tunnel for padalarang - halim station.

Keywords: Atoll, KCIC, Leaky Feeder, Passenger Internet, tunnel, wireless communication.