

ABSTRAK

RANCANG BANGUN ANTENA YAGI *DUAL BAND* 900 MHZ -1.8 GHZ UNTUK KEBUTUHAN AKSES KOMUNIKASI SELULER PADA DAERAH LEMAH SINYAL

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Antena merupakan komponen penting dalam sistem komunikasi nirkabel yang berfungsi untuk memancarkan dan menerima gelombang elektromagnetik. Pada daerah dengan kondisi lemah sinyal, kualitas komunikasi seluler sering mengalami penurunan akibat jarak dari *Base Transceiver Station* (BTS) maupun hambatan lingkungan. Penelitian ini bertujuan merancang dan membangun antena Yagi *dual band* yang bekerja pada frekuensi 900 MHz dan 1,8 GHz untuk mendukung penerimaan sinyal seluler. Metode penelitian meliputi perancangan antena, proses fabrikasi, pengukuran menggunakan NanoVNA dan *Spectrum Analyzer*, pengujian pola radiasi horizontal dan vertikal, serta pengujian lapangan dengan antena referensi sebagai pembanding. Hasil pengukuran menunjukkan nilai VSWR < 2, dengan *Return Loss* < -10 dB, impedansi 50 Ω , Selain itu diperoleh gain antena > 3 dBi. Berdasarkan hasil pengujian, antena mampu bekerja pada kedua frekuensi yang dirancang dan antena telah memenuhi standar performa antena sehingga bisa digunakan untuk meningkatkan penerimaan sinyal seluler pada daerah dengan kondisi lemah sinyal.

Kata Kunci: Antena Yagi, *Dual Band*, 900 MHz, 1,8 GHz, NanoVNA, *Spectrum Analyzer*.

ABSTRACT

DESIGN OF A 900 MHZ -1.8 GHZ DUAL BAND YAGI ANTENNA FOR MOBILE COMMUNICATION ACCESS NEEDS IN WEAK SIGNAL AREAS

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An antenna is an important component in wireless communication systems that functions to transmit and receive electromagnetic waves. In areas with weak signal conditions, the quality of cellular communication often decreases due to the distance from the Base Transceiver Station (BTS) as well as environmental obstacles. This study aimed to design and construct a dual-band Yagi antenna operating at frequencies of 900 MHz and 1800 MHz to support cellular signal reception. The research method consisted of antenna design, fabrication, measurements using NanoVNA and a Spectrum Analyzer, horizontal and vertical radiation pattern measurements, and field testing using a reference antenna for comparison. The measurement results showed a VSWR of less than 2, a return loss below -10 dB, an impedance close to $50\ \Omega$, and an antenna gain greater than 3 dBi. Based on the test results, the proposed antenna successfully operated at both target frequencies and satisfied the required antenna performance parameters. Therefore, the proposed antenna can be used as an alternative solution to improve cellular signal reception in areas with weak signal conditions.

Keywords: *Yagi Antenna, Dual-Band, 900 MHz, 1.8 GHz, NanoVNA, Spectrum Analyzer.*