

ABSTRAK

RANCANG BANGUN ANTENA YAGI 5,8 GHZ UNTUK OPTIMALISASI JANGKAUAN SINYAL WIFI PADA AREA BLANK SPOT

(2026 : *Pages + Picture + Tables + Attachments + List of References*)

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Kondisi *blank spot* pada jaringan Wi-Fi umumnya disebabkan oleh lemahnya kualitas sinyal akibat jarak yang jauh antara pemancar dan penerima, hambatan fisik, serta karakteristik propagasi gelombang radio, sehingga nilai *Signal Strength* (RSSI) dan *Signal-to-Noise Ratio* (SNR) menurun dan koneksi menjadi tidak stabil. Permasalahan yang dibahas adalah bagaimana merancang antenna Yagi 5,8 GHz yang mampu mengoptimalkan jangkauan sinyal Wi-Fi pada area *blank spot*, serta bagaimana kinerjanya berdasarkan hasil simulasi dan pengukuran lapangan. Penelitian ini bertujuan merancang, membangun, dan mengimplementasikan antenna Yagi 5,8 GHz yang bersifat *directional* dan bergain tinggi pada perangkat MikroTik, kemudian menganalisis peningkatan RSSI dan SNR dibandingkan antenna bawaan. Metode penelitian diawali dengan perhitungan dimensi elemen *reflector*, *driven*, dan *director*, dilanjutkan simulasi menggunakan CST Studio Suite, fabrikasi fisik, pengukuran karakteristik antenna dengan LiteVNA, serta pengujian lapangan pada empat arah mata angin. Hasil simulasi menunjukkan VSWR 1,142, *return loss* -23,568 dB, impedansi 50 Ω , dan *gain* 6 dB, sedangkan hasil pengukuran LiteVNA menunjukkan VSWR $\leq 1,1$ dan impedansi 49,25 Ω dengan *gain* yang sama. Pengujian lapangan mengonfirmasi peningkatan RSSI dan SNR yang konsisten pada seluruh titik uji dibandingkan antenna bawaan. Dengan demikian, antenna Yagi 5,8 GHz yang dirancang terbukti memenuhi spesifikasi teknis dan efektif memperluas jangkauan sinyal Wi-Fi pada area *blank spot* secara hemat biaya.

Kata Kunci : Antena Yagi, 5,8 GHz, WiFi, *Blank Spot*, Jangkauan Sinyal

ABSTRACT

DESIGN AND CONSTRUCTION OF A 5.8 GHZ YAGI ANTENNA FOR OPTIMIZING WIFI SIGNAL COVERAGE IN BLANK SPOT AREAS

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The blank spot condition in Wi-Fi networks is generally caused by weak signal quality resulting from long distances between transmitter and receiver, physical obstacles, and radio wave propagation characteristics, which lower the values of *Signal Strength* (RSSI) and *Signal-to-Noise Ratio* (SNR) and make the connection unstable. The problem addressed in this study is how to design a 5.8 GHz Yagi antenna capable of optimizing Wi-Fi signal coverage in *blank spot* areas, and how its performance is reflected in simulation and field measurement results. This research aims to design, build, and implement a directional, high-gain 5.8 GHz Yagi antenna on a MikroTik device, and to analyze the improvement in RSSI and SNR compared to the default antenna. The research method began with calculating the dimensions of the *reflector*, *driven*, and *director* elements, followed by simulation using CST Studio Suite, physical fabrication, characterization measurement with LiteVNA, and field testing in four cardinal directions. The simulation results showed a VSWR of 1.142, *return loss* of -23.568 dB, impedance of 50 Ω , and gain of 6 dB, while the LiteVNA measurement results showed a VSWR ≤ 1.1 and impedance of 49.25 Ω with the same gain. Field testing confirmed a consistent improvement in RSSI and SNR across all test points compared to the default antenna. Thus, the designed 5.8 GHz Yagi antenna is proven to meet technical specifications and effectively extend Wi-Fi signal coverage in *blank spot* areas as a cost-effective solution.

Keywords: Yagi Antenna, 5.8 GHz, Wi-Fi, *Blank Spot*, Signal Coverage