

ABSTRAK

**RANCANG BANGUN ANTENA *PHASED ARRAY SECTORAL* 3,5 GHz
HIGH-GAIN UNTUK IMPLEMENTASI PROTOTIPE GNODEB 5G
DENGAN *SOFTWARE DEFINED RADIO* USRP B210
(2026: XIV+70 Halaman+20 Gambar+10 Tabel+Daftar Pustaka+Lampiran)**

M. FHADLI HARYADI

062240352311

JURUSAN TEKNIK ELEKTRO

**PROGRAM STUDI SARJANA TERAPAN TEKNIK TELEKOMUNIKASI
POLITEKNIK NEGERI SRIWIJAYA**

Jaringan 5G Sub-6 GHz pada frekuensi 3,5 GHz (band n78) menjadi fokus utama dalam pengembangan sistem komunikasi modern karena mampu memberikan keseimbangan antara kapasitas data tinggi, cakupan luas, dan latensi rendah. Namun, pada implementasi prototipe gNodeB berbasis Software Defined Radio (SDR), penggunaan antenna konvensional omni-directional masih memiliki keterbatasan dalam menghasilkan *gain* tinggi serta pola radiasi yang terarah sehingga performa sistem belum optimal. Oleh karena itu, penelitian ini bertujuan untuk merancang, memfabrikasi, dan mengimplementasikan antenna *phased array sectoral* mikrostrip patch 4×4 dengan penerapan Defected Ground Structure (DGS) dan jaringan pencatu *corporate feed* berbasis Wilkinson *power divider* untuk meningkatkan *gain*, *bandwidth*, serta kualitas pencocokan impedansi antenna pada frekuensi 3,5 GHz. Metode penelitian yang digunakan adalah Action Research yang meliputi tahapan diagnosing, planning, action, evaluation, dan learning. Proses perancangan dilakukan melalui simulasi menggunakan ADS dengan substrat FR-4 untuk memperoleh performa elektromagnetik yang optimal. Antena hasil fabrikasi kemudian diuji menggunakan Vector Network Analyzer (VNA), diintegrasikan dengan perangkat Universal Software Radio Peripheral (USRP) B210 sebagai platform SDR, serta diuji secara *Over-the-air* (OTA). Penelitian ini menghasilkan implementasi antenna *phased array* yang mampu mendukung pengujian sistem komunikasi 5G berbasis SDR serta dapat menjadi referensi pengembangan antenna *phased array* berbiaya lebih terjangkau.

Kata Kunci: 5G Sub-6 GHz, Antena Susunan Berfase, DGS, Jaringan Pencatuan Korporat, SDR, USRP, *gNodeB*.

ABSTRACT

DESIGN AND FABRICATION OF 3.5 GHZ HIGH GAIN SECTORAL PHASED ARRAY ANTENNA FOR 5G GNODEB PROTOTYPE USING USRP B210

(2026: XIV+70 Pages+28 Figures+10 Tables+bibliography+appendices)

M. FHADLI HARYADI

062240352311

DEPARTMENT OF ELECTRICAL ENGINEERING

BACHELOR OF APPLIED SCIENCE IN TELECOMMUNICATION

STATE POLYTECHNIC OF SRIWIJAYA

The 5G Sub-6 GHz network operating at 3.5 GHz (band n78) has become a major focus in modern communication system development due to its ability to provide a balance between high data capacity, wide coverage, and low latency. However, in Software Defined Radio (SDR)-based gNodeB prototype implementations, conventional omni-directional antennas still have limitations in providing high gain and directional radiation patterns, resulting in suboptimal system performance. Therefore, this study aims to design, fabricate, and implement a 4×4 microstrip patch sectoral phased array antenna by applying Defected Ground Structure (DGS) and a corporate feed network based on a Wilkinson power divider to improve gain, bandwidth, and antenna impedance matching performance at 3.5 GHz. The research method employed is Action Research consisting of diagnosing, planning, action, evaluation, and learning stages. The design process was carried out through simulation using ADS with a FR-4 substrate to obtain optimal electromagnetic performance. The fabricated antenna was then tested using a Vector Network Analyzer (VNA), integrated with the Universal Software Radio Peripheral (USRP) B210 as the SDR platform, and evaluated through Over-the-air (OTA) testing. The results of this study are expected to produce an antenna with performance that meets design specifications and support the implementation of SDR-based 5G communication systems as a reference for developing more affordable phased array antenna solutions.

Keywords: 5G Sub-6 GHz, Phased Array Antenna, DGS, Corporate feed, SDR, USRP, gNodeB.