**Department of Electrical, Electronics and Communication Engineering**



**GITAM School of Technology, Bengaluru-561203**

**GITAM (Deemed to be University)**

**Capstone Project – Introduction (PROJ2999), 7th Semester**

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**Project Title: Simulation of 5G New Radio Physical Layer**

**Guide Name: Dr. T. Nagarjuna**

**Section: C**

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***Abstract:* (within 200 words)**

Advanced technologies like Low-Density Parity-Check (LDPC) coding, flexible numerologies, and beamforming present significant challenges for hardware prototyping and real-world performance validation. Physical testing of these intricate systems is often time-consuming, resource-intensive, and prohibitively expensive, creating a bottleneck for rapid development and network enhancement.

This project addresses the critical need for a robust and cost-effective platform to analyze, validate, and fine-tune the 5G NR PHY before hardware implementation. We aim to overcome the limitations of physical testing by creating a virtual environment to study the intricate interactions between different signal processing blocks. This allows for in-depth analysis of how components collectively impact Key Performance Indicators (KPIs) like throughput, latency, and Bit Error Rate (BER) across diverse and realistic channel environments.

The project's goal is to develop a comprehensive, end-to-end link-level simulator for the 5G NR physical layer using MATLAB. This simulation will accurately model the entire transmitter receiver chain, incorporating key functions such as channel coding, modulation, resource grid mapping, and OFDM waveform generation. By integrating standardized 3GPP channel models (e.g., TDL, CDL), the resulting simulator will function as a powerful and flexible testbed for algorithm validation, system-level performance evaluation, and parameter optimization for various deployment scenarios.

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