Classification of 5G base stations

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# 1. Introduction

This project addresses the classification of such base stations using machine learning techniques applied to channel frequency response (CFR) data.

The objective is to build a classifier capable of identifying three classes:

* Class 0: Legitimate gNodeB (5G base station)
* Class 1: Attacker at location 1
* Class 2: Attacker at location 2

Using CFR samples and supervised learning, we aim to distinguish between legitimate and rogue signals reliably.

# 2. Problem Description

Each CFR sample is a 2D matrix with dimensions 72 (subcarriers) by 48 (repetitions). The training dataset contains labeled examples, while the test set is used for final evaluation through Kaggle. The core challenge is correctly classifying new, unseen data into one of the three predefined classes.

The dataset is moderately imbalanced, with the legitimate base station (class 0) overrepresented compared to the attackers.