Project Proposal for Traffic Classification for 5G Networks

1. Objectives:

The primary objectives of this project are as follows:

- **Dynamic Traffic Classification:** Develop a system capable of dynamically classifying traffic based on the evolving nature of 5G networks, accommodating diverse applications and services.
- **Smart Resource Allocation:** Implement intelligent resource allocation mechanisms based on real-time traffic insights, ensuring optimal utilization of 5G network resources.
- **QoS Enhancement:** Improve Quality of Service (QoS) by prioritizing and managing different types of traffic to meet the stringent requirements of applications such as augmented reality, autonomous vehicles, and IoT devices.

2. Scope:

This project will focus on the following key areas:

- Developing an adaptive traffic classification model that can adjust to changing network conditions.
- Investigating the integration of edge computing for real-time traffic analysis and decision-making.
- Evaluating the impact of advanced traffic classification on latency, throughput, and overall network performance.

3. Methodology:

The project will employ a multi-step methodology:

- **Data Collection:** Gather network traffic data from simulated 5G environments, considering diverse applications and services.
- **Preprocessing (Feature Extraction):** Clean and preprocess the collected data to prepare it for model training.
- **Model Selection:** Evaluate and select suitable machine learning algorithms or rule-based systems for traffic classification.

- **Training and validation:** Train the selected model using the collected dataset and validate its performance against real-world scenarios.
- **Evaluation:** Assess the performance of the trained model using metrics such as accuracy, precision, recall, and F1 score.

4. Performance Evaluation

The project will measure the performance of the traffic classification system using:

- Accuracy: Overall correctness of the classification.
- Precision: Proportion of correctly identified positive instances.
- Recall: Proportion of actual positive instances correctly identified.
- F1 Score: The harmonic mean of precision and recall.
- Impact on network latency, throughput, and overall QoS.

5. Challenges and Mitigations

Potential challenges may include:

- Lack of diverse and representative data.
- Adapting to the dynamic nature of 5G networks.
- Balancing accuracy and computational complexity.

Mitigations will involve:

- Augmenting datasets to represent various network scenarios.
- Implementing adaptive algorithms capable of dynamic learning.
- Employing optimization techniques to manage computational complexity.

6. Expected Outcomes

The expected outcomes include:

- A functional traffic classification system tailored for 5G networks.
- Improved network resource utilization and QoS.
- Insights into the potential benefits of integrating edge computing for real-time traffic analysis.

7. Propose Functional Architecture

- the 5G network is clear separation in between control and Data plane , In our propose work we are try to develop packet classifier (filter) with Data plane to classified real time data traffic ,Based on classification data can be forward to local edge or cloud.

- This approach helps to QoS in the Data plane and also helps to achieve low latency.

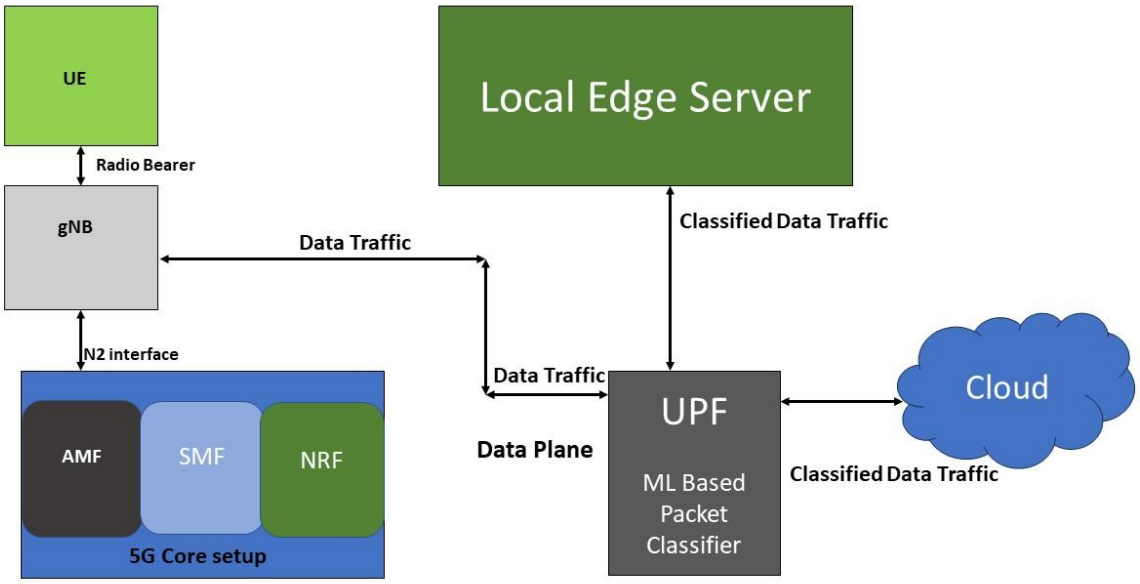

Figure:- 5G testbed architecture with traffic filter