

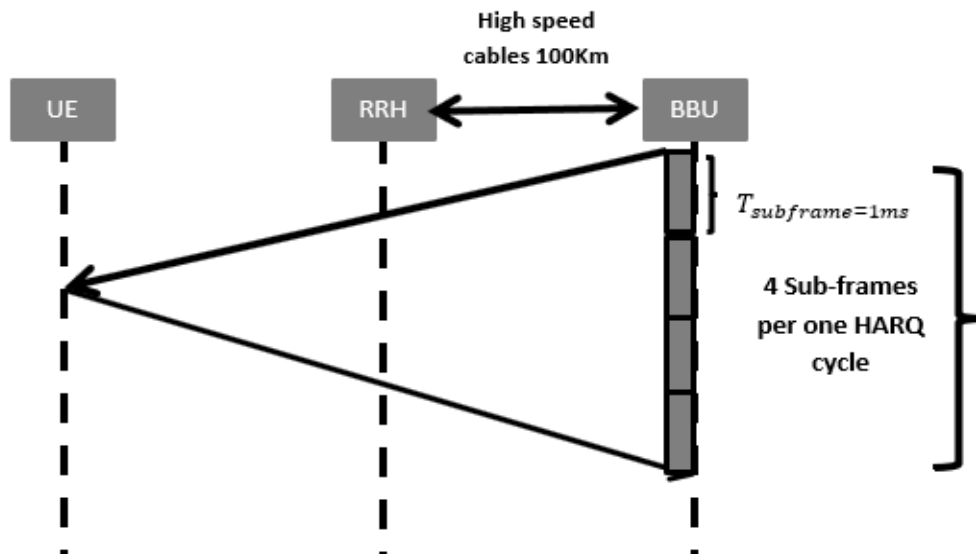
Delay Aware C-RAN Resource Allocation Model “An Optimization Problem “

Project Overview:

Think of a person with their house on fire trying to send a request to the fire station to alert them about the incident through a centralized cloud in order to activate the fire alarm system in the area? How fast should this happen?

With the evolution of 5G and the demand to provide services anywhere anytime with a required Quality of Service (QoS) quality of service, the deployment of Cloud Radio Access Networks (C-RAN) is crucial. Offloading the processing of User Requests to a cloud comes with many benefits such as Flexible/Dynamic allocation of resources, cost efficiency and resource provisioning. However the delay that comes with this type of architecture is an aspect that should be researched. It is very important with the new high and on demand technologies that the request is proceed and is delivered within a certain time threshold to ensure the QoS.

This Research problem will address how the request is migrated to a cloud in a BBU pool and how the request is translated into computational resources in the cloud all of which presents a delay. You are required to build a model of the C-RAN and analyze and test the Delay of each aspect in the network (User End, RRH , Transmission , Processing) all at the aim of minimizing the delay of the network .



Summary of Tasks

Read about C-RAN

Read about previous research that tackled the latency and processing time in C-RAN

Analytically develop an optimization problem that minimizes the Network Delay given certain constraints

Implement and test the optimization problem against varying different attributes in system

Eligible Departments:

Electronics	
Communications	
Networking	X

Software/Hardware:

Mat lab

Relevant References:

[1] Khedher, Hatem, et al. "Processing time evaluation and prediction in Cloud-RAN." ICC 2019-2019 IEEE International Conference on Communications (ICC). IEEE, 2019.

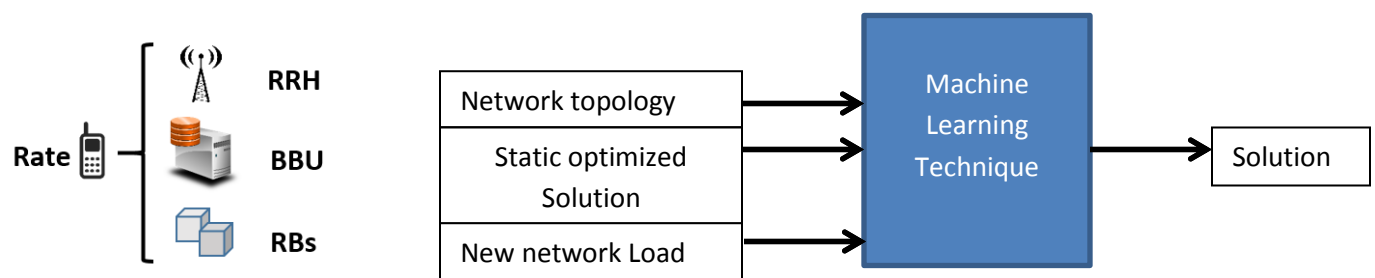
[2] Nikaein, Navid. "Processing radio access network functions in the cloud: Critical issues and modeling." Proceedings of the 6th International Workshop on Mobile Cloud Computing and Services. ACM, 2015.

Resource Prediction and Allocation in C-RAN using Artificial Intelligence

Project Overview:

The dynamic characteristic of Cloud Radio Access Networks (C-RAN) gives the service provider the ability to allocate and re allocate resources, RRH BBU RBs, to users according to their activity. The trick is how much of these resources should be allocated such that to maximize the benefit, cost, power efficiency, low latency and at the same time maintain a certain level of QoS.

This research topic aims at developing an adaptive continuous algorithm that adapts to the user behavior and predict the amount of resources that should be allocated / reallocated within the next period of time using artificial intelligence. The algorithm should take into account user activation/ deactivation and user mobility.



Summary of Tasks

- Read literature review about C-RAN and Resource allocation
- Explore previous research that implemented machine learning in C-RAN Environment
- Study different machine learning techniques and theoretically discuss how they can be used to implement resource allocation in C-RAN .
- Implement a machine learning technique using mat lab to allocate/ reallocate resources reaching a new solution according to the current network topology, the current optimized solution and the new required network load.
- Analyze the algorithm and test it against different network loads.

Eligible Departments:

Electronics	
Communications	
Networking	X

Software/Hardware:

Matlab