

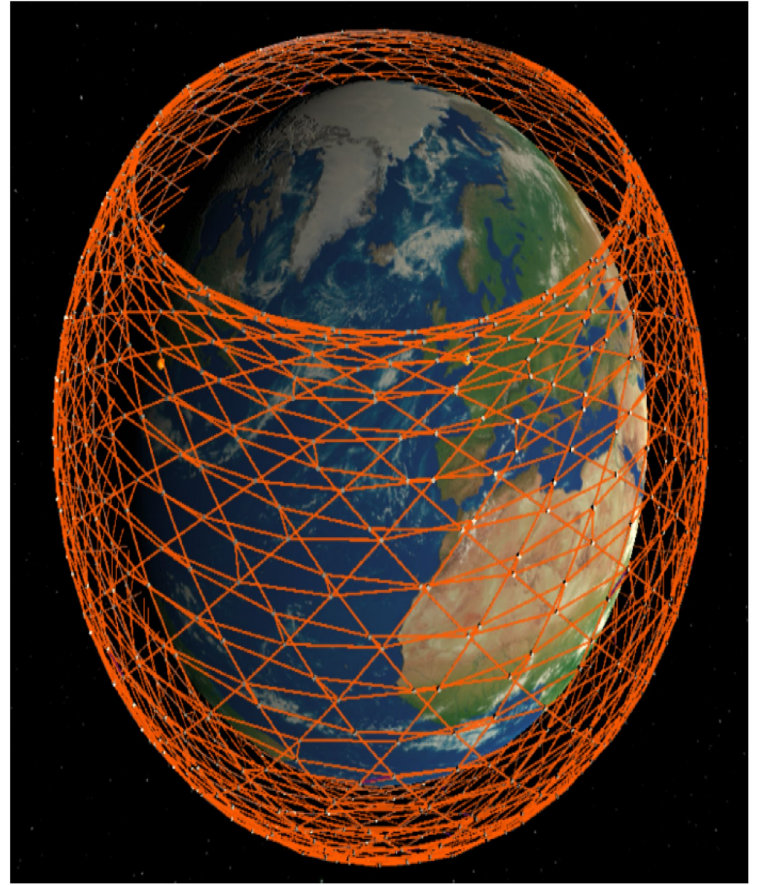
Project Report - 3

Project Report-3

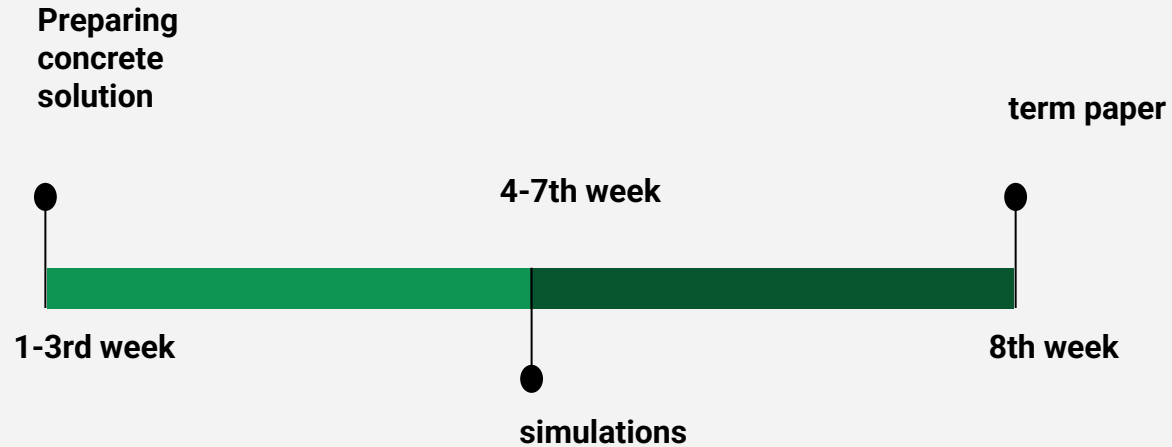
HBPR Based QoS Routing in LEO Satellites

Presented by
Sumanth Guptha M & Sasank

Mentored by Rahul Agrawal



Timeline of our project



Agenda Overview

- Clarity of the path and last solution.
- Simulation part of arima.
- Simulation part of base paper.

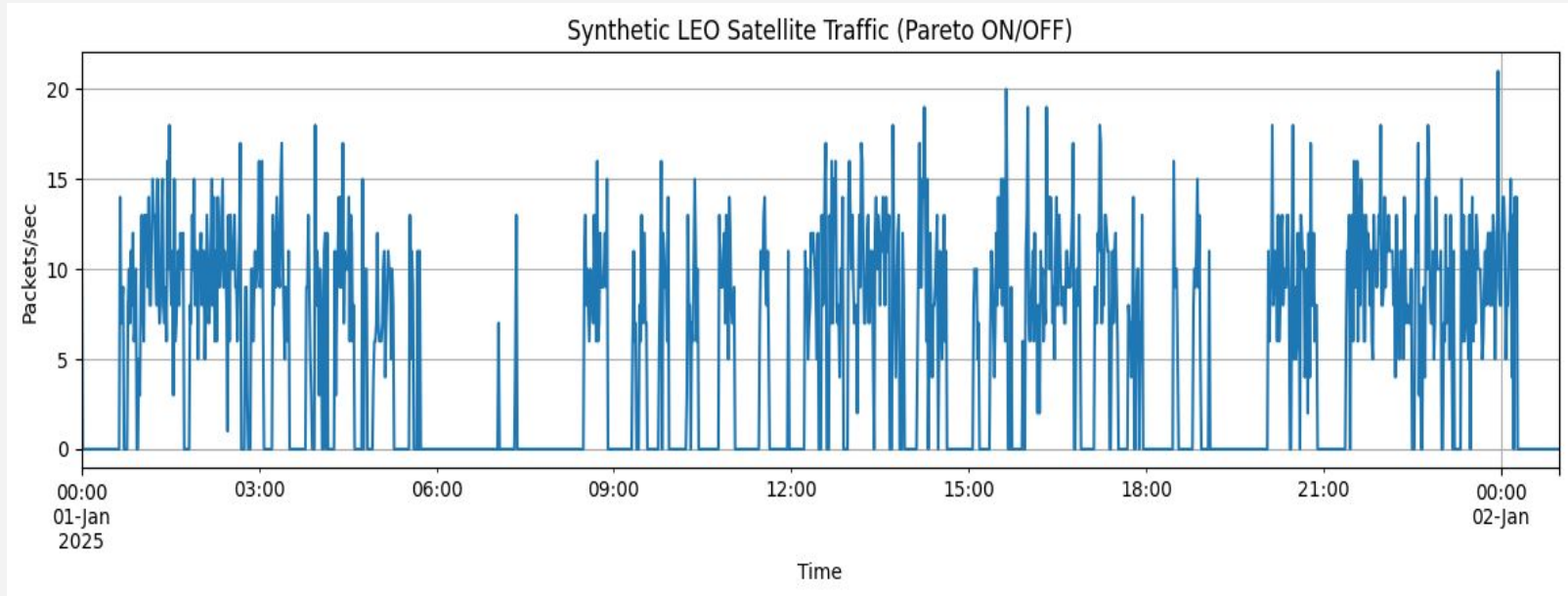
Clarity of the path and last solution

- clustering
- generating traffic
- predicting arima to get the queue length
- implementing the base paper
- trying various types to integration QoS in the existing equations

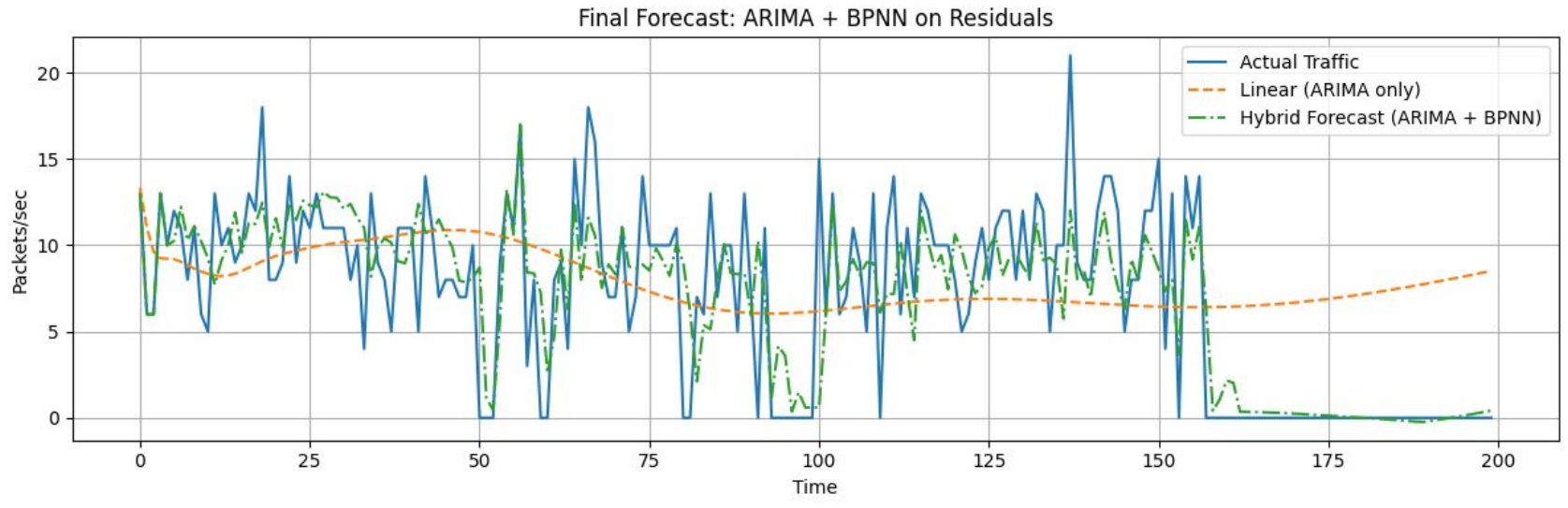
Simulation part of arima

- Imagine you are analyzing network traffic data from a Low Earth Orbit (LEO) satellite. The traffic is bursty, meaning it has periods of high activity (ON) followed by periods of low activity (OFF).
- **How the code works**
 - Traffic Generation
 - Signal Decomposition
 - Linear Forecasting
 - Residual Analysis
 - Non-linear Forecasting
 - Hybrid Forecasting
 - Evaluation

Simulation part of arima



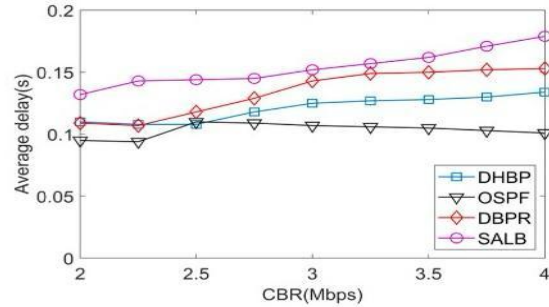
Simulation part of arima



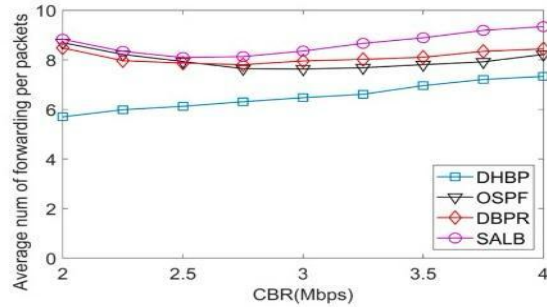
Sarima and Pmdarima

- SARIMA(seasonal autoregressive integrated moving average) is an extension of arima model that incorporates seasonality in addition to the non-seasonal components.
- It has parameters p, d, q, s .
 - P - seasonal autoregressive order
 - D - seasonal differencing
 - Q - seasonal moving average order
 - S - length of seasonal cycle
- Pmdarima is a python library that provides statistical time series analysis tool, with a particular focus on automating the process of building arima models. It's often used for forecasting and model selection in time series data.
- Pmdarima has a feature named `auto_arima` which automatically selects the best ARIMA/SARIMA model parameters based on criteria like AIC/BIC.

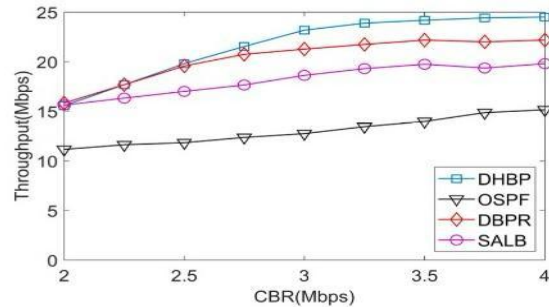
Simulation part of base paper



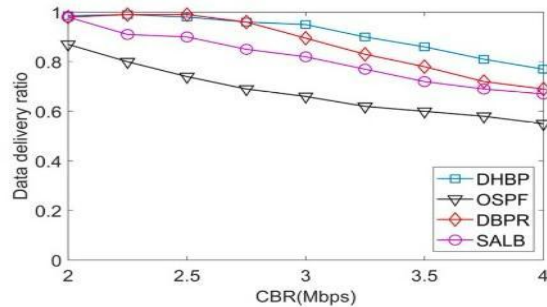
(a) Average delay.



(b) Average number of forwarding per packets.

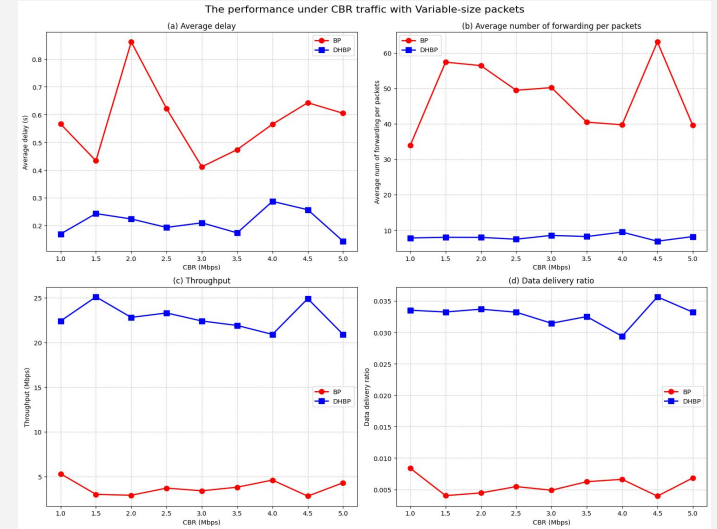
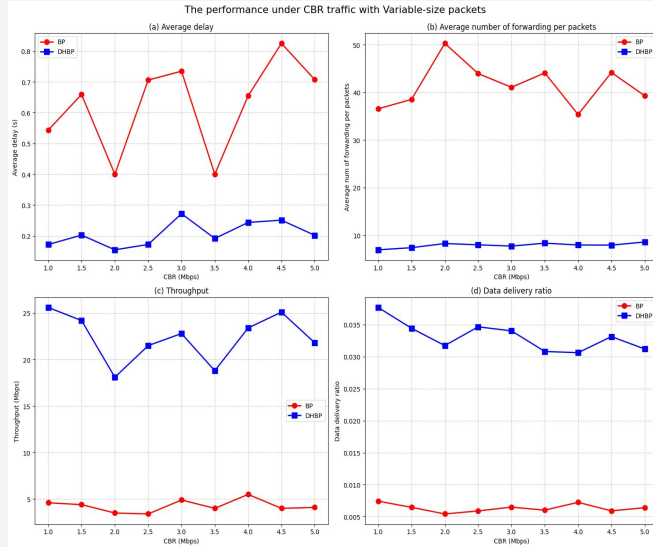


(c) Throughput.



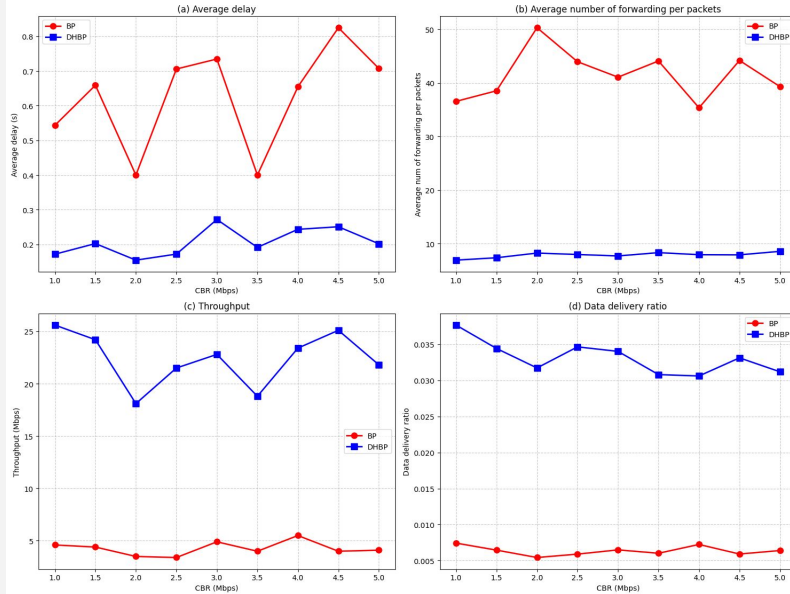
(d) Data delivery ratio.

Simulation part of base paper

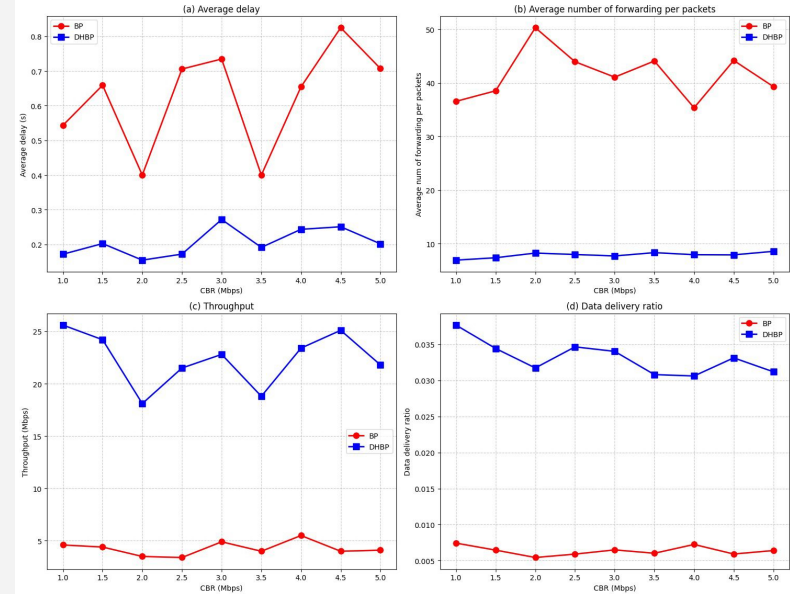


Simulation part of base paper

The performance under CBR traffic with Variable-size packets



The performance under CBR traffic with Variable-size packets



All Codes Are Available Here

- **Base paper code:**
https://drive.google.com/drive/folders/1r3pt-ZZCYv5Uleg6Q3ojO_KlGk9_-8Ww?usp=sharing
- **Prediction of queue length using arima model code:**
https://colab.research.google.com/drive/1NGrE9uP5ZZlvdSkLnU5KOai8YDw1d_r8?usp=sharing
- **Base paper code results:**
https://colab.research.google.com/drive/19Y_wcpfJug-v9V2B25qdMC3HSotxLbQz?usp=sharing

What's Next?

- trying various types to integration QoS in the existing equations.
- to see the good results than the base paper.
- writing the term paper.