

Windowed backoff algorithms for WiFi using NS3

Abstract

Binary exponential backoff (BEB) is a decades -old algorithm for coordinating access to a shared channel. In modern networks, BEB plays a crucial role in WiFi and other wireless communication standards. Despite this track record, well-known theoretical results indicate that under bursty traffic, BEB yields poor makespan, and superior algorithms are possible. In this project you will compare the performance of several backoff algorithms using the NS3 Network Simulator.

Project objective

1. Describe, demonstrate and compare different backoff algorithms using NS3.

Project overview

1. Review recent literature and define types of fairness.
2. Ramp-up NS3 and run the tutorial.
3. Define the tests setup.
4. Run simulations and perform analysis of fairness.
5. Write project report, final presentation and a poster for the project.

Project Milestones

1. 02.03.2023 – CDR
 - a. Theoretical Review: Types of backoff algorithms.
 - b. NS3 review (after running the tutorial)
 - i. How can NS3 help comparing performance of different backoff algorithms?
 1. What algorithms are currently available
 2. What algorithms do you plan to develop during the project?
 - c. Workplan for the rest of the semester
 - i. Goals
 - ii. Schedule
2. 03.07.2023 Final Presentation
 - a. PowerPoint Presentation (In person)
 - b. Final Report – Draft
 - c. Project Poster - Draft
3. 20.07.2023
 - a. Final Report
 - b. Project Poster

Notes

1. The above list is an estimate. Goals and tasks may be modified during the first few weeks of the semester.
2. General requirements for all LCCN Projects are specified at the lab website:
<https://lccn.cs.technion.ac.il/lab-courses/>

Prerequisites:

1. Introduction to computer networks (236334) – Mandatory.

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References

[1] Windowed backoff algorithms for WiFi: theory and performance under batched arrivals

<https://link.springer.com/article/10.1007/s00446-021-00403-9>