CS 342 – Computer Networks Lab

Assignment – 4

Group – Mahtematics M16

Airport Security Queue Optimization Report

Introduction:

Airport security screening is a critical component of ensuring passenger
safety and satisfaction. This report aims to analyze the efficiency of airport
security screening processes and explore op miza on strategies to enhance
passenger experience and overall airport efficiency.

Methodology:

A discrete-event simula on model was developed to simulate the airport
security screening process. The key parameters considered in the simula ons
include the arrival rate (λ) and service rate (μ), which represent passenger
arrivals and the rate at which passengers are processed.

Simula on Results:

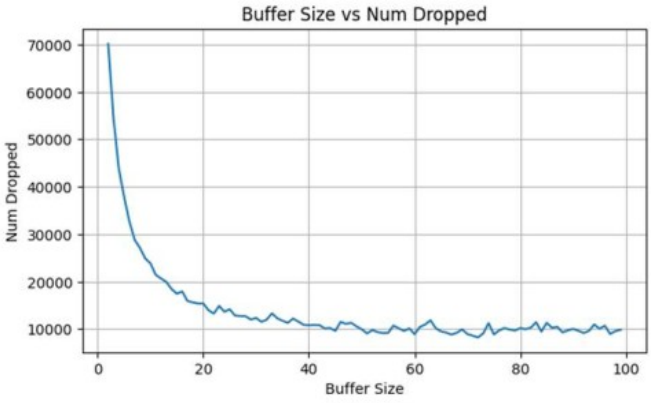
Input Parameters:

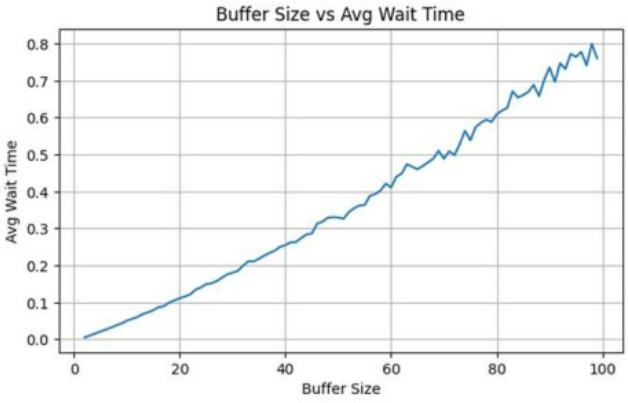
Number of passengers (n) = 100000

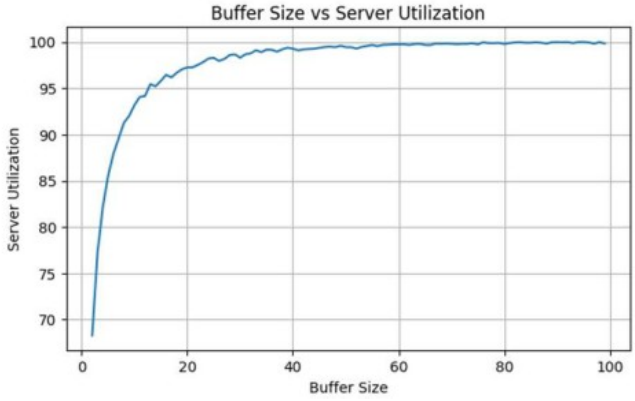
Arrival rate (λ) = 100

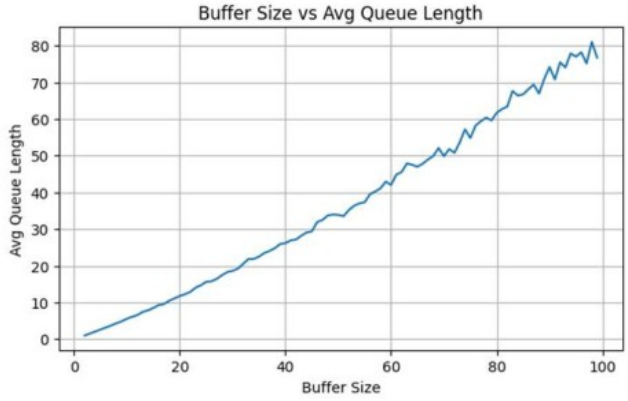
Service rate (μ) = 105

Single Server Model

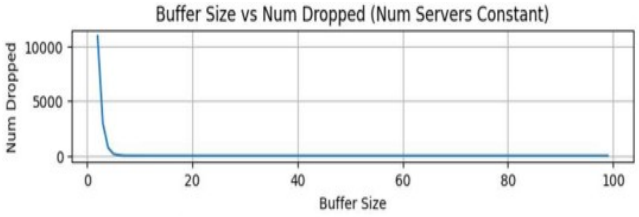


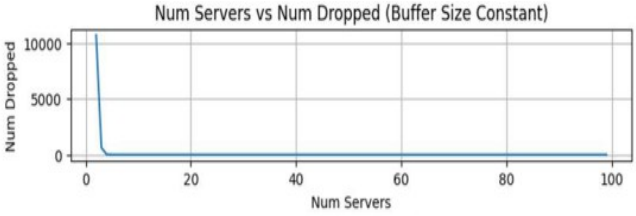


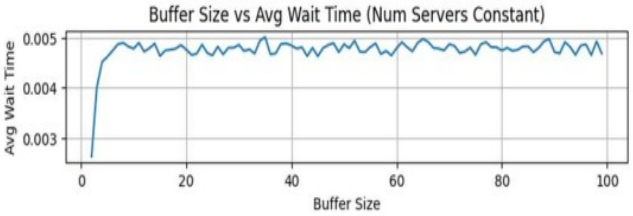


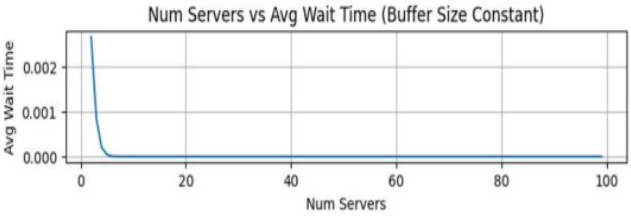


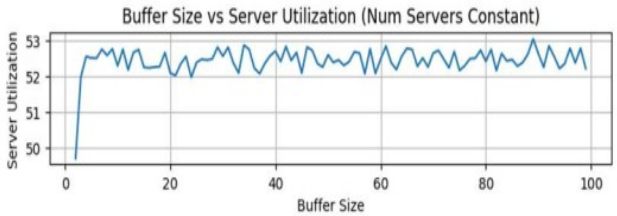
Multi Server Model

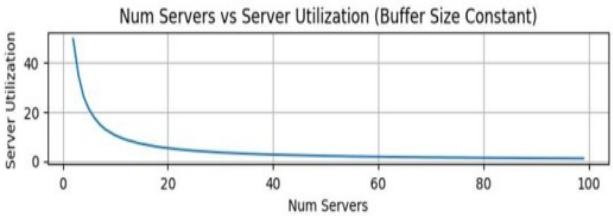


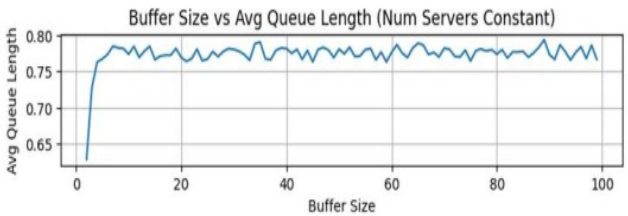


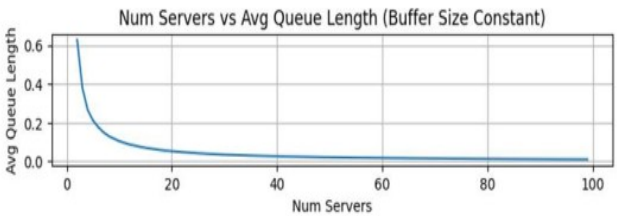












Optimization Strategies:

1. Buffer Size Optimization:

Increasing the buffer size (K) significantly reduces the number of dropped
packets, and increases the server utilization. But it also increases the average
wai ng me and average queue length. In our single server model, we can
take buffer size close to 50, which ensures us close to 100% server u liza on,
with an average packet drop rate 10%. We can increase the buffer size further
if we want to prioritize fewer dropped packets over shorter average wai ng
me and queue size.

2. Mul -Server Configuration:

Introducing mul ple security scanners improves overall system efficiency,
reducing packet drop rate, average waiting me and average queue length.
But it comes at the cost of a very low server u liza on, leading to huge
wastage of resources. 5-8 servers seem to be op mal for our case.

Conclusion:

The results of our simula on indicate that optimizing the airport security
screening process can significantly airport efficiency. By adjusting parameters such as buffer size, the number of

security scanners, and the presence of buffers in mul - server scenarios,
airports can tailor their security screening processes to accommodate varying
passenger flows and minimize wai ng mes. These op mizations are
essential for ensuring a smoother and more efficient passenger experience.