# Test Report

**Default Parameters:**

- Number of Users: 20, 40, 60, 80, 100
- Number of Servers: 4
- Number of UAVs: 0, 5, 10, 15, 20
- UAV Waiting Policy: 100
- User Mobility Policy: Mobile
- Edge Server Radius: Default setting
- UAV Radius: 100
- Number of Episodes: 500

**Modified Parameters for the First Test Run:**

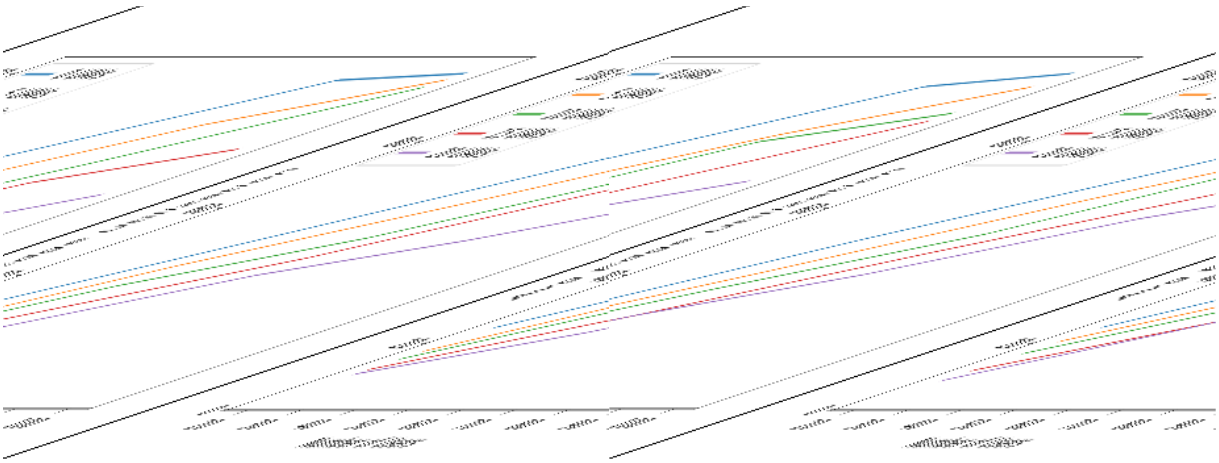
- Number of Users: 80, 100, 250
- Number of Servers: 2, 4, 6, 8
- Number of UAVs: 20, 50
- UAV Waiting Policy: 100
- User Mobility Policy: Mobile, Nomadic
- Edge Server Radius: 50, 100, 150, 200
- UAV Radius: 10, 15, 20, 25, 30, 100
- Number of Episodes: 500

**Results & Comparison**

Edge Utilization

Default Run: Edge servers handled the majority of tasks, and utilization increased as the number of users grew. However, the edge servers were never fully saturated due to limited UAV offloading.

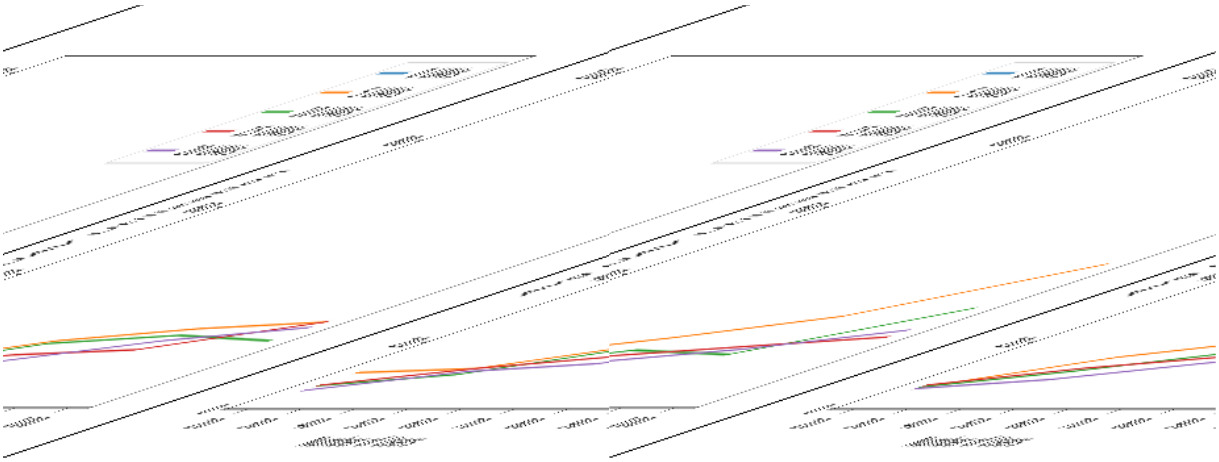
Test Run: Edge utilization showed dramatic variations, especially when only 2 or 4 servers were available, causing congestion. When 6 or more servers were deployed, edge servers maintained a steady balance of task handling.



UAV Utilization

Default Run: UAV utilization remained relatively low, with UAVs acting as secondary computational units.

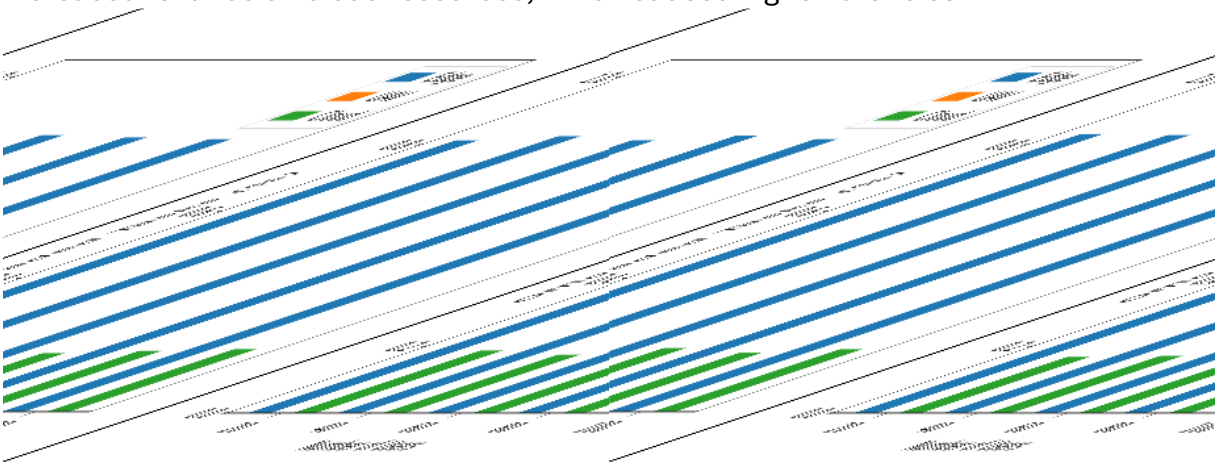
Test Run: The introduction of 50 UAVs resulted in high UAV utilization, indicating that UAVs were actively participating in task offloading. However, at 250 users, UAVs reached maximum capacity, leading to performance degradation due to resource overload.

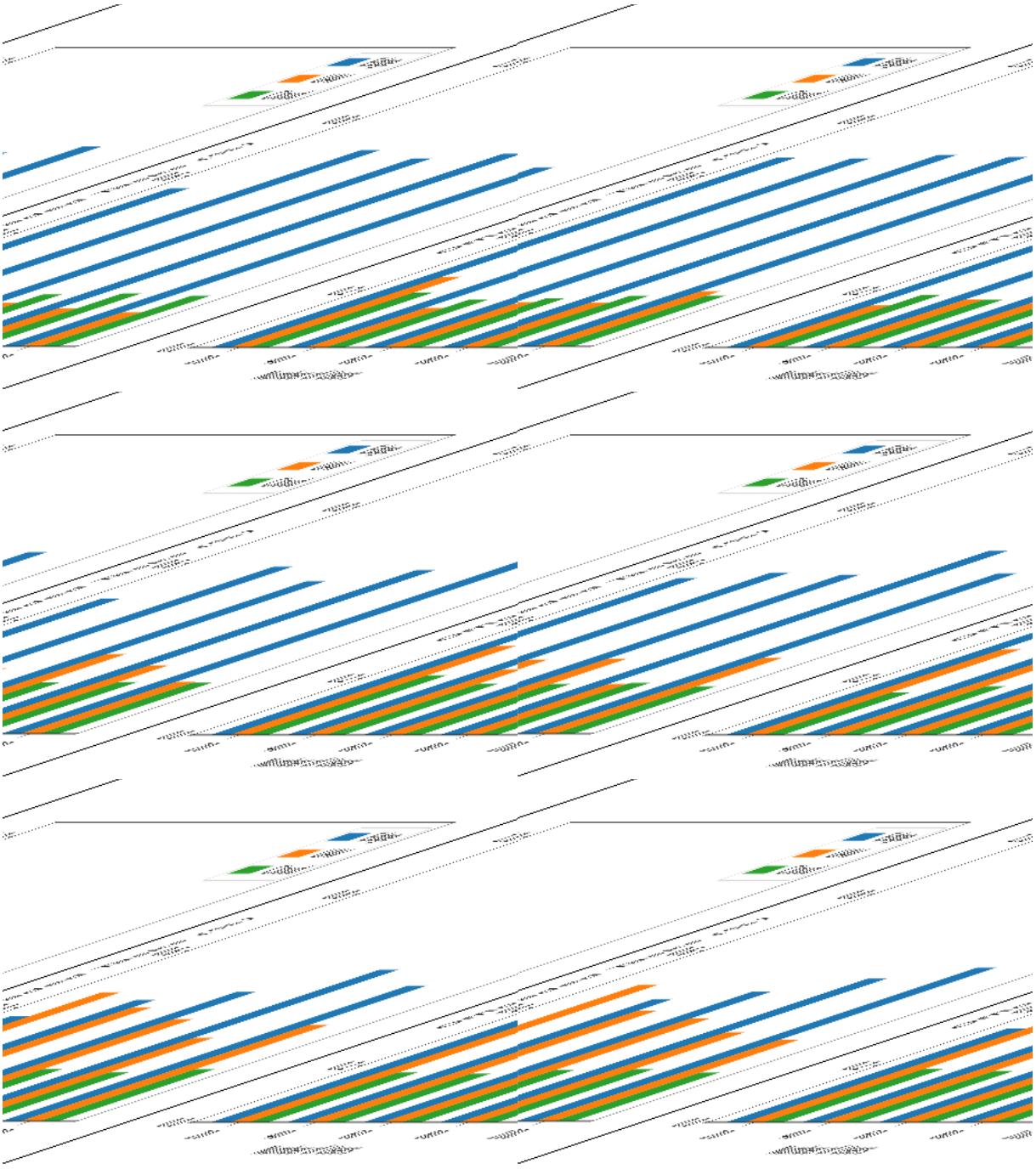


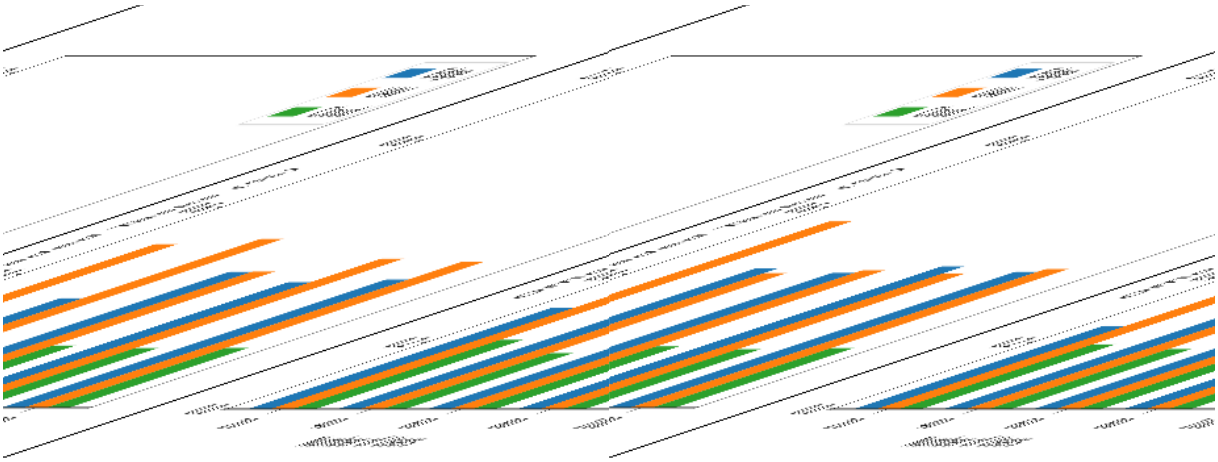
Offloaded Task Distribution (Edge, UAV, Cloud)

Default Run: The majority of tasks were processed by edge servers, with UAVs offloading only a small percentage. Cloud computing played a minimal role.

Test Run: With 20+ UAVs, task offloading shifted significantly towards UAVs. However, when user loads reached 250, both UAVs and edge servers became overloaded, leading to increased reliance on cloud resources, which caused higher latencies.



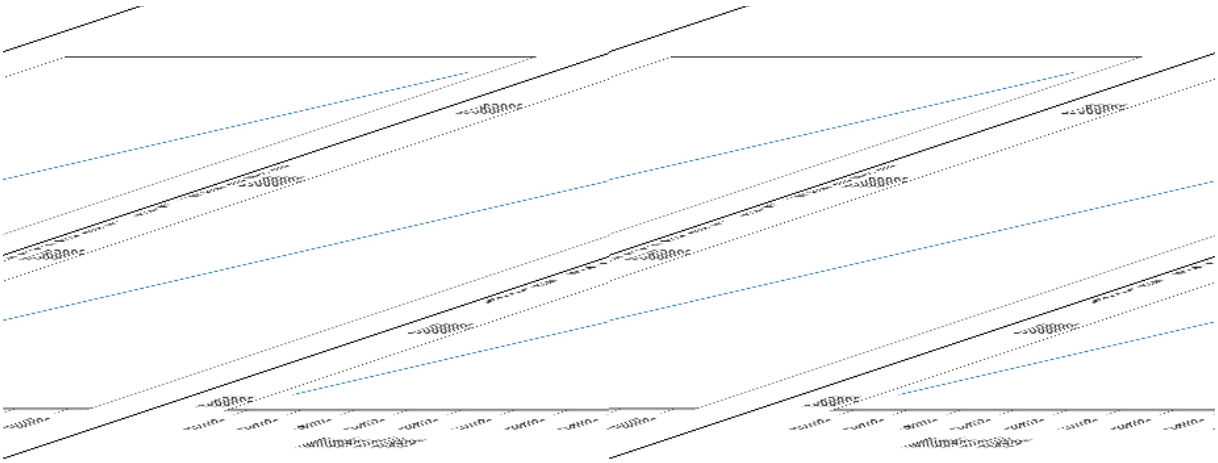




Total Task Completion Rate

Default Run: A steady success rate was observed, but as the number of users increased, some delays were noticed.

Test Run: Task completion rates suffered when fewer edge servers were available. However, when more UAVs were introduced, task success rates improved. At 250 users, a bottleneck occurred, leading to some unprocessed tasks.

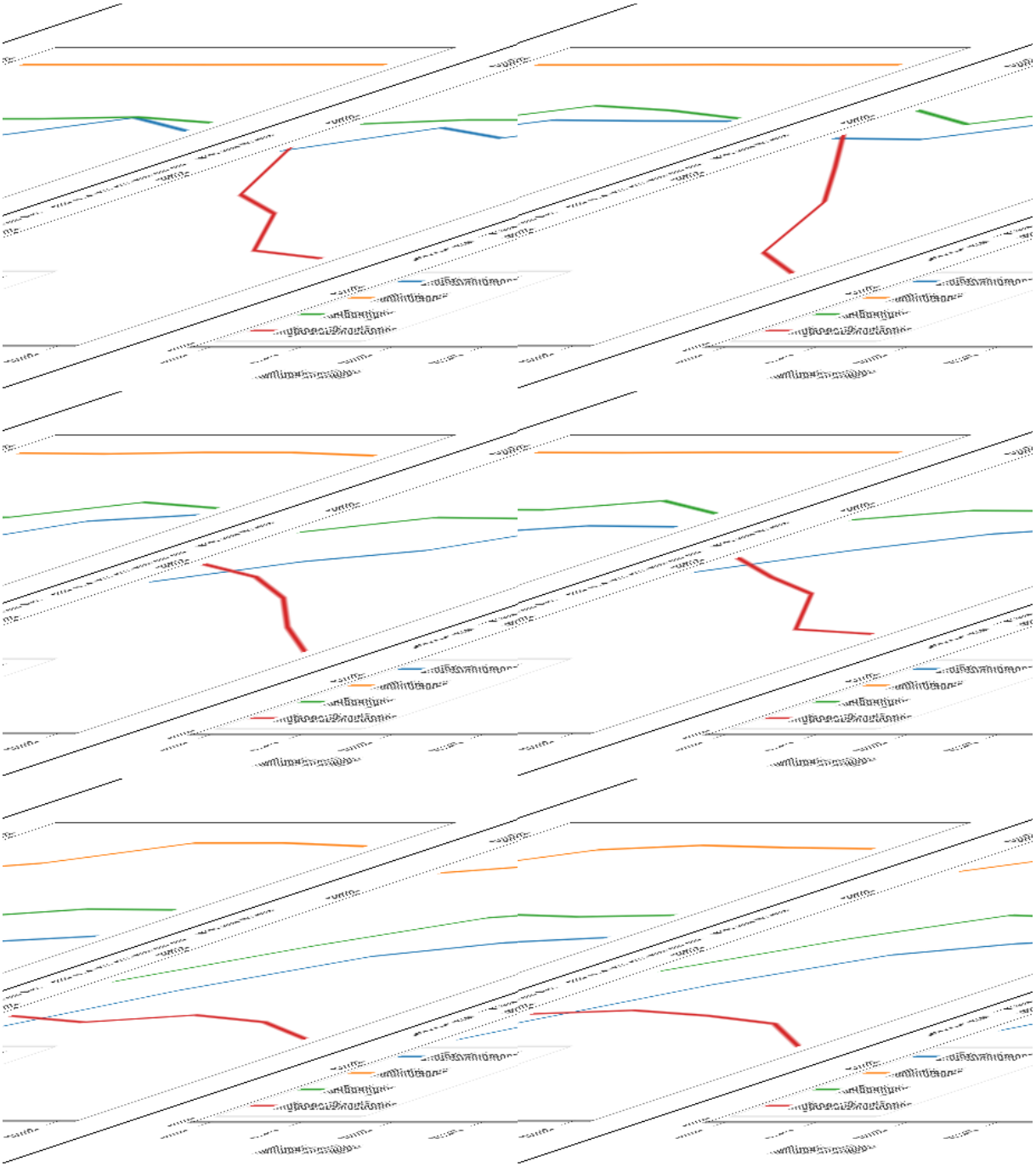


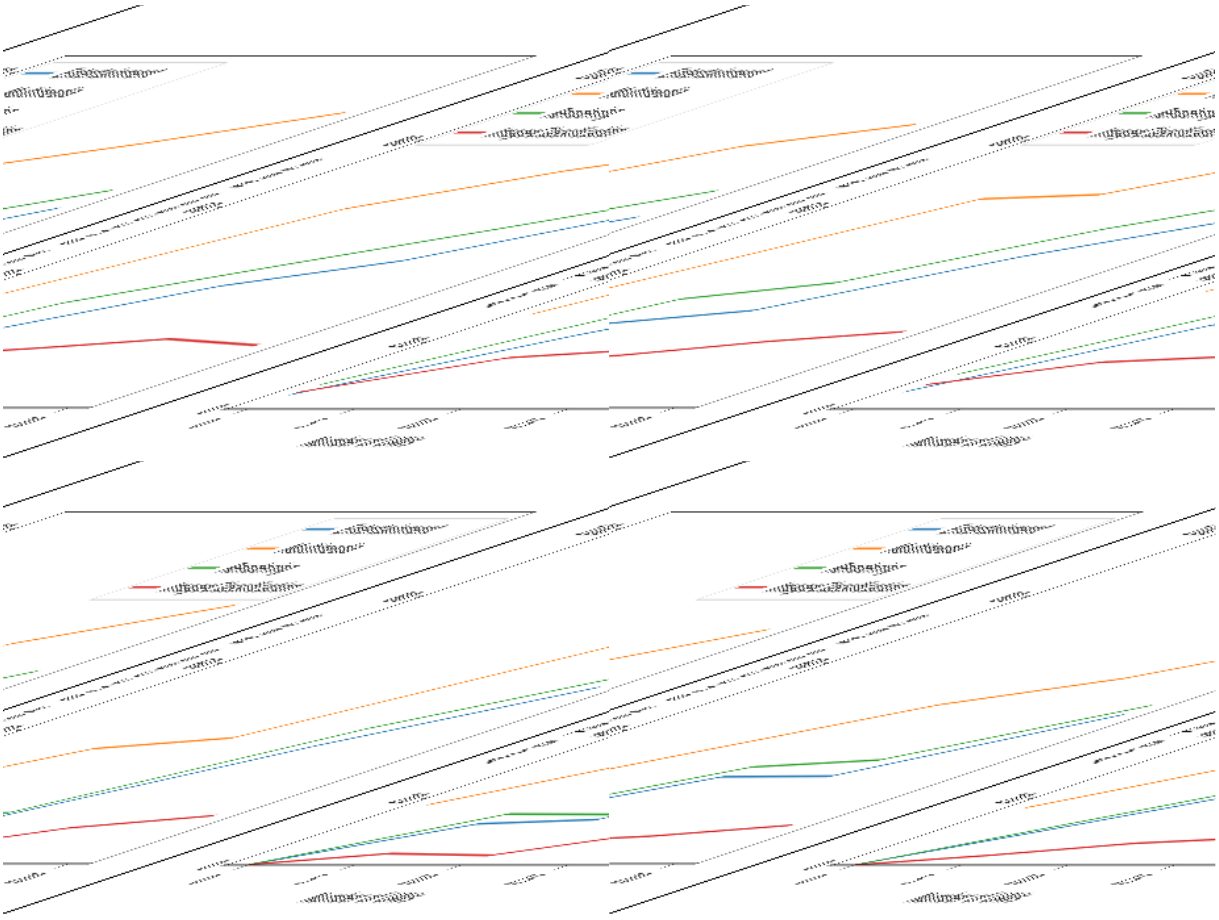
Impact of Different User Counts & UAV Policies

Test Run observations suggest that reducing edge servers while increasing UAVs does not guarantee better performance. A more balanced approach is needed to ensure both UAV and edge resource availability.

At 250 users, UAV overload became a major challenge, proving that UAVs alone cannot compensate for reduced edge server capacity.

The introduction of a Nomadic mobility policy introduced slight inefficiencies, as users frequently moved out of UAV range, requiring task reallocation.





**Key Observations**

1- Higher UAV Count Reduces Edge Load: UAVs significantly contributed to handling tasks, preventing excessive load on edge servers.

2- Edge Server Reduction Causes System Delays: With only 2 servers, queueing delays increased dramatically, leading to decreased task success rates.

3- Cloud Dependence Increases Under High Loads: When both UAVs and edge servers became overwhelmed, cloud resources had to handle offloading, increasing overall service time.

4- User Mobility Patterns Affect Stability: The Nomadic mobility policy led to task migration inefficiencies, making UAV-based computing less predictable.