5GC Performance Testing Report

Atif Khan

Test Without Loxilb – Direct gNB to AMF Connection

1 Introduction

This report presents the results of a performance test on a 5GC system, deployed in **Kubernetes** with **30 gNBs** directly connected to a single **AMF**, without using a **load balancer (Loxilb)**. The goal was to evaluate the system's ability to handle increasing loads, especially when subjected to **concurrent UE requests**, and to observe how the AMF performs when it is not load-balanced.

2 Test Methodology

For this test, the **5GC cluster** was set up in **Kubernetes**, with **30 gNBs** running on ports 1200 to 1230, all connected to the same **AMF** instance. The absence of a load balancer meant that all requests were routed to this single AMF.

We conducted the test by gradually increasing the load:

- Initially, no concurrent sessions were tested (gNB 1200).
- We then introduced **3 concurrent UE sessions** with each session sending up to **50 requests**, totaling **125 reqests**.

The test aimed to measure **failure rates**, **RAM usage**, **CPU performance**, and overall **system stability** as the load increased.

3 Test Results

Here's a summary of the **UE requests**, **failures**, and **success rates** for each gNB port tested:

gNB Port	UE Req.	Reg. Fail	PDU Fail	Dereg. Fail	Total Fail	Fail %	Success %	Remarks
1200	25	1	1	1	3	12	88	No concurrent sessions. Stable performance.
1210	50	1	3	1	5	10	90	3 concurrent sessions. AMF handled initial load.
1220	50	28	28	28	84	168	32	AMF overwhelmed by 125 requests.
1225	25	20	20	20	60	240	20	Severe performance degradation.

4 Observations

- **RAM Usage**: Increased from 7.2 GB to 8.96 GB under load
- **CPU Load**: Significant increase during high traffic
- **Failure Trends**:
  - 12% failure at gNB 1200 (no concurrency)
  - 240% failure at gNB 1225 (3 concurrent sessions)

5 Conclusion and Recommendations

Key Findings

- Single AMF becomes bottleneck without load balancing
- Failure rates increase exponentially with concurrent sessions

Recommendations

- Implement Loxilb load balancer
- Scale AMF horizontally (amf-1, amf-2)
- Optimize resource allocation

End of Report