

# 5G Core Deployment on AWS EKS

## Customer Overview

The customer is a Connectivity-as-a-Service (CaaS) cloud provider for public and private device connectivity. Their rapidly expanding services accelerate innovation and growth in the Internet of Things (IoT) by providing seamless, cost-effective device connectivity in a simplified and easily accessible way.

## The Context

The customer wanted to create a ready-to-use, cloud-based 5G core network for enterprises. They currently had a 4G core network and wanted to replicate the same in 5G. The solution had to be flexible enough for enterprises to either use their small cells to integrate with the secure 5G core in the cloud - offered as a service or leverage the complete solution. Separation of data and control planes across cloud and on-prem deployments was also to be accommodated.

The solution would enable rapid provision of a cloud-based private 5G solution to enterprises to create their own cellular network. It would provide flexible deployment options for choice of data path either via the cloud or by deploying UPF on edge to improve network performance.

## Type of Service Provided

Deployment, Integration Testing, End to End Functional Testing

## Technologies Used

Aether 5G Core, Telecommunications, 5G, Docker, Kubernetes, AWS, EKS, NGAP, GTP

## Solution Summary

With expertise in 4G/5G core, multiple open source and cloud technologies, extensive deployment experience and opensource contributions, the GS Lab | GAVS team successfully deployed Aether 5G core on AWS EKS and integrated it with the customer's gNodeB. This enabled the customer to quickly provide high quality cloud-based, secure 5G-as-a-Service for their enterprise customers.

## Challenges

- Required expertise in a wide range of technologies
- Required understanding of configuration, troubleshooting of disparate gNodeBs
- Device compatibility issues consumed a lot of time for RAN setup
- RAN devices had to be configured - which was not in scope of work
- Many grey areas due to evolving nature of 5G technology
- Issues with Aether 5G core had to be fixed
- 5G core had not been tested earlier on EKS
- Very specific customer requirements to deploy 5G core on EKS cluster
- Several issues in UEs, CPEs, UDM, PCF/SMF processes etc. that had to be fixed

## Solution Highlights

- Deployment of OpenSource Aether 5G Core on EKS
- Control and data planes deployed in AWS in phase 1
- Separation of the control plane (in AWS) and data plane (on edge) in phase 2
- Configuration of RAN devices
- Integration with 3rd party gNodeBs and CPEs
- End-to-end testing of the 5G setup and with different CPEs and phones
- Discovery and fixing of several issues relating to the 5G core, commercial gNB and CPE integrations, network and throughput

## Solution Impact

- Enabled the customer to provide a cloud-based 5G-as-a-service solution for enterprises
- Comprehensive end-to-end testing of 5G setup
- Helped discover many bugs in CPEs and gNBs and got them fixed by the vendors through upgrades

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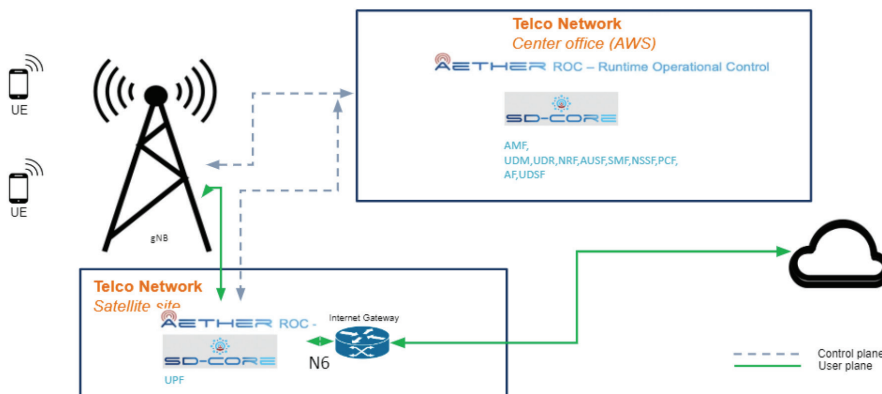
## Solution Details

Having extensive expertise and experience with relevant technologies - 4G/5G core, open source and cloud technologies, deployment experience, and open source contributions, the GS Lab | GAVS team successfully deployed Aether 5G core on AWS EKS, integrated it with the customer's gNodeB, and tested it end-to-end. This enabled the customer to quickly provide high quality cloud-based, secure 5G-as-a-Service for their enterprise customers. The solution was tested with various CPEs and phones.

- In phase 1 all Aether 5G core components were deployed on AWS using EKS, with the control plane and the data plane together inside the AWS; whereas in phase 2 the control and user plane were separated, with the control plane deployed in AWS and the data plane on edge.
- Integrations with third-party gNodeBs were tested. Configuration and troubleshooting aspects of disparate gNodeBs had to be understood in depth – which was a challenge.
- Integrations with third-party CPEs were tested and log analyses, troubleshooting, band selection, DNN configuration, etc. were done by the team.
- Multiple underlying issues in gNodeBs and CPEs was discovered and fixed by vendor upgrades.
- There were issues with getting 5G network on UEs, CPEs that had to be fixed initially without help from the gNB vendor – by debugging and configuring the gNB.

- Issue with UDM fixed during CPE registration; issue with signalling for data path establishment encountered during data validation fixed in the SMF process; bug in PCF process due to which default MBR could not be changed to higher values handled.

### Aether Deployment (CP on AWS and DP on Edge)



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