White Paper V4.0

A European View on 5G Architecture and Beyond

Chapter 7 - Architecture Instantiations and Validations

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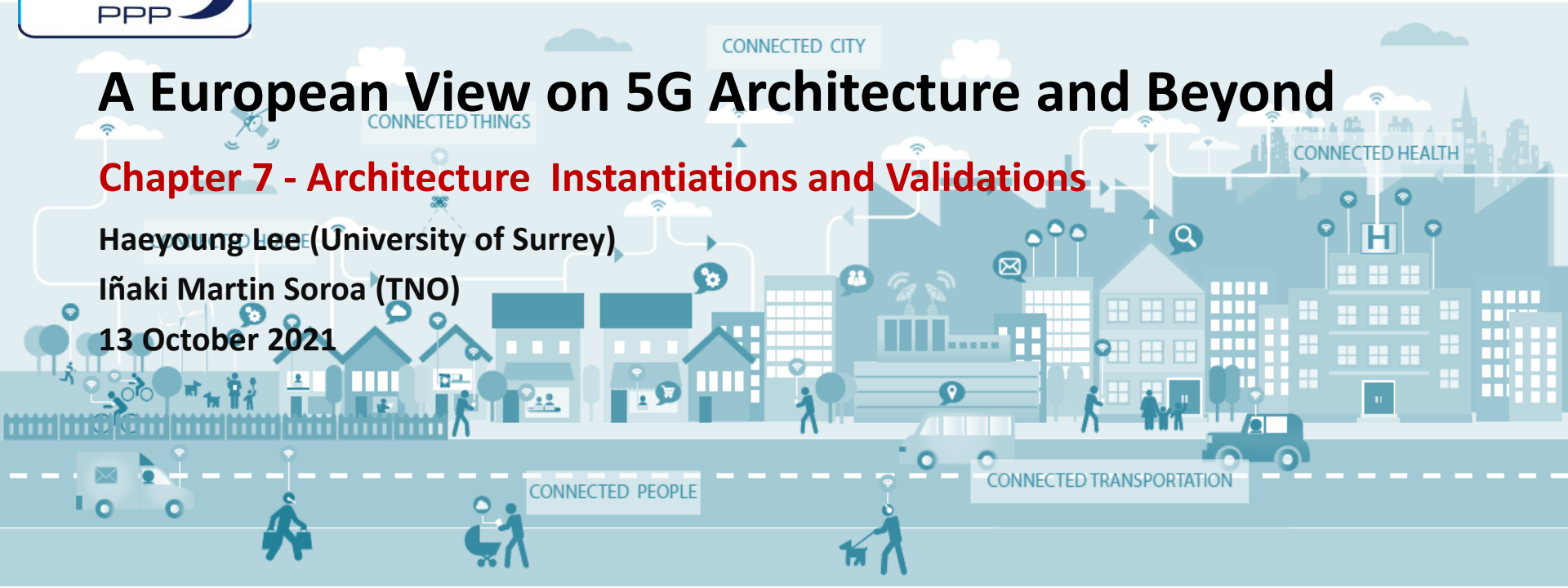
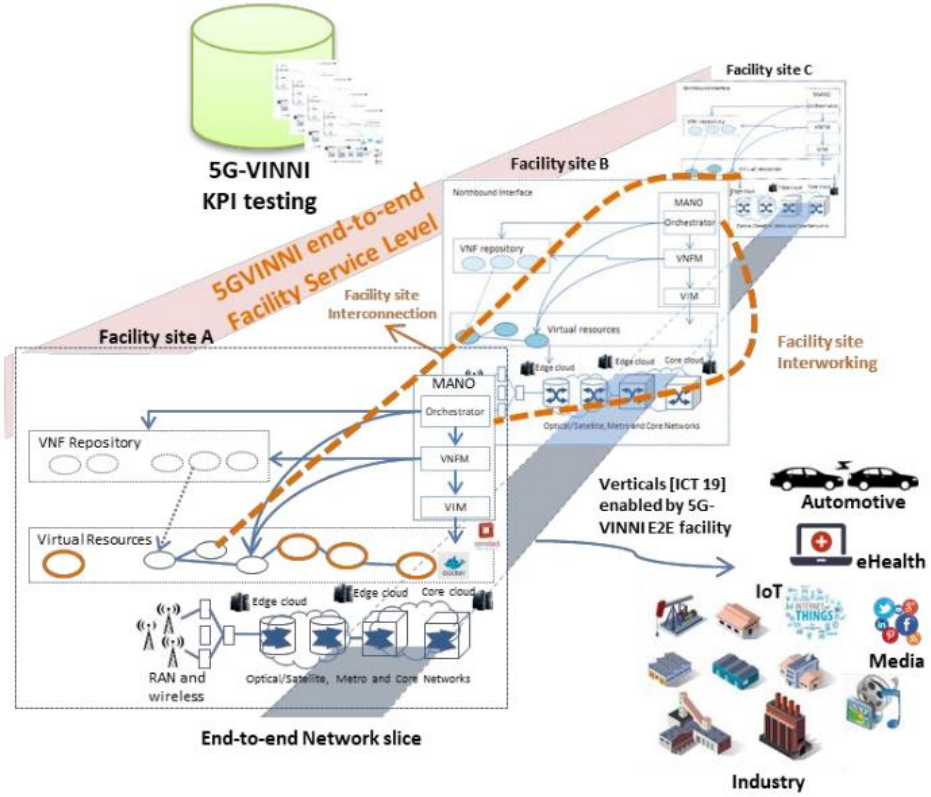


Ch7 Arch Instantiations and Validations

- To present how projects implement their network to support vertical use cases & how to evaluate the service performance

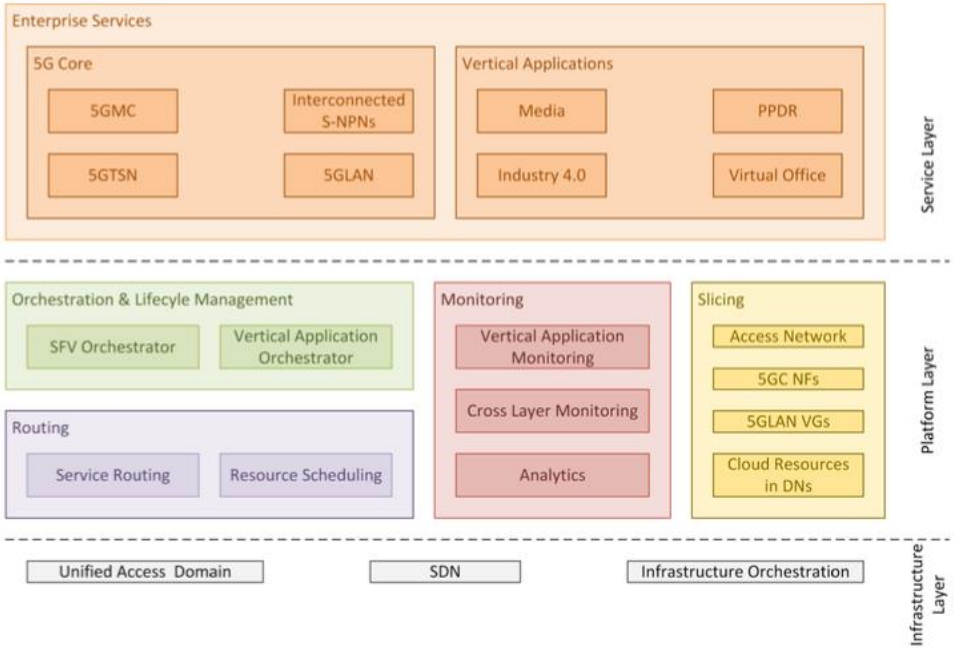
Network architecture instantiations	Service Performance evaluation
End-to-End network including multiple sites interworking	E2E Service Validation
Service-based architecture for vertical applications by SLAs	Testing-as-a-Service (TaaS)
Large scale deployment of 5G Infrastructure	A multi-slice UE in V2X networks
	Dynamic E2E slicing
	Multiple E2E network slicing for video media service

E2E network of Multiple Sites Interworking



- Facility interworking for seamless deployment of service independent of location or domain authorities
- Modular-based components
  - Freedom of facility site configurations & E2E facility interworking
- Open deployment framework
  - To support the diversity of use cases and configuration

Service-based Architecture



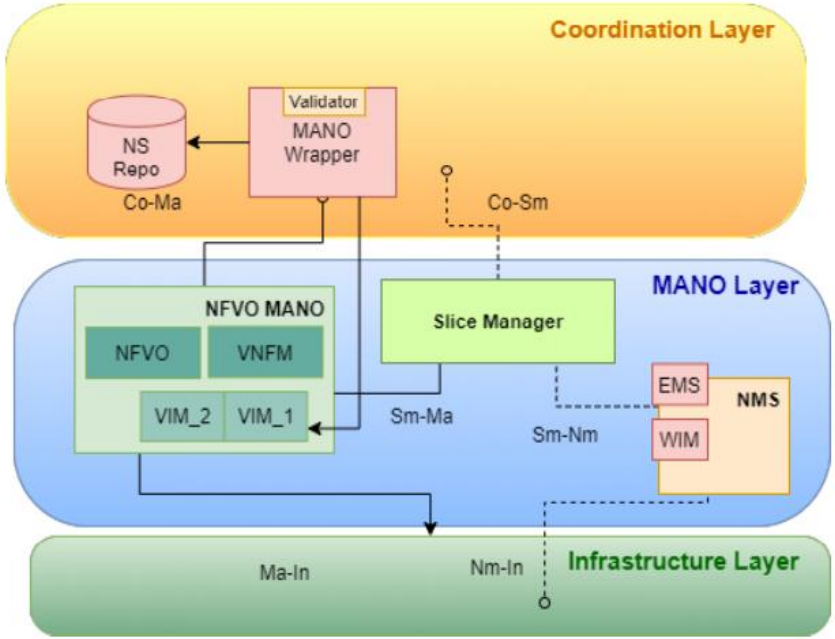
- Holistic approach for approach for Service-based Architecture in an NFV-enabled infrastructure

5G Infrastructure PPP
The European path towards global next generation communication networks

Large Scale Deployment of 5G Infrastructure

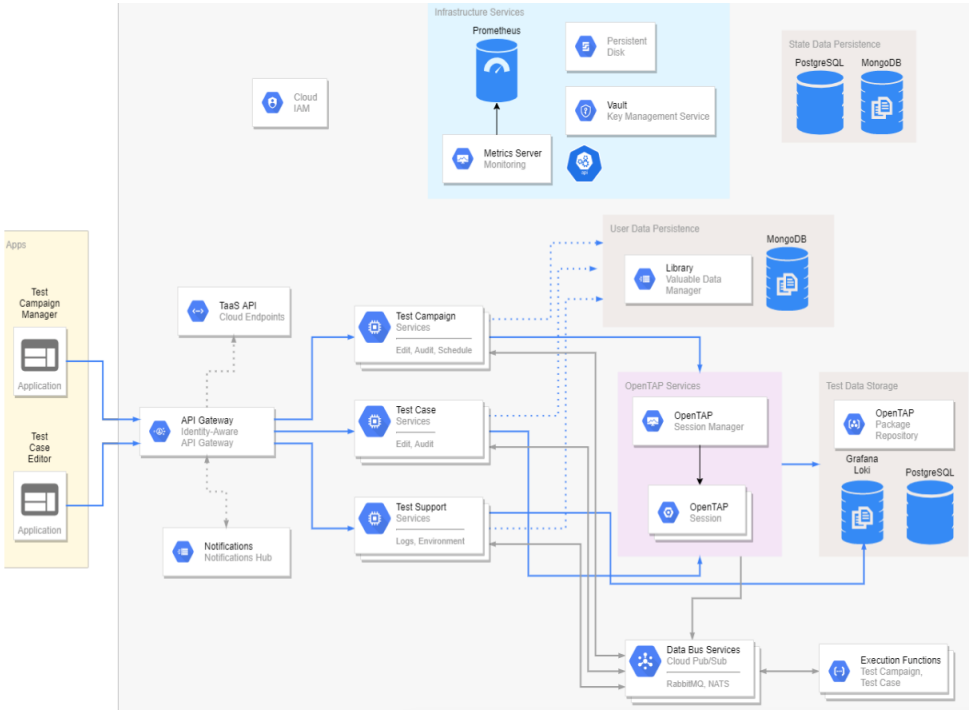
- Network deployment in historic places to cover a large number of tourists

E2E Service Validation



- To provide a toolset to experimenters for
  - 5G network KPIs validation
  - Service performance assessment
- The experimentation process
  - The Experiment Lifecycle Manager
  - Portal
  - The Dispatcher module
  - The analytics module

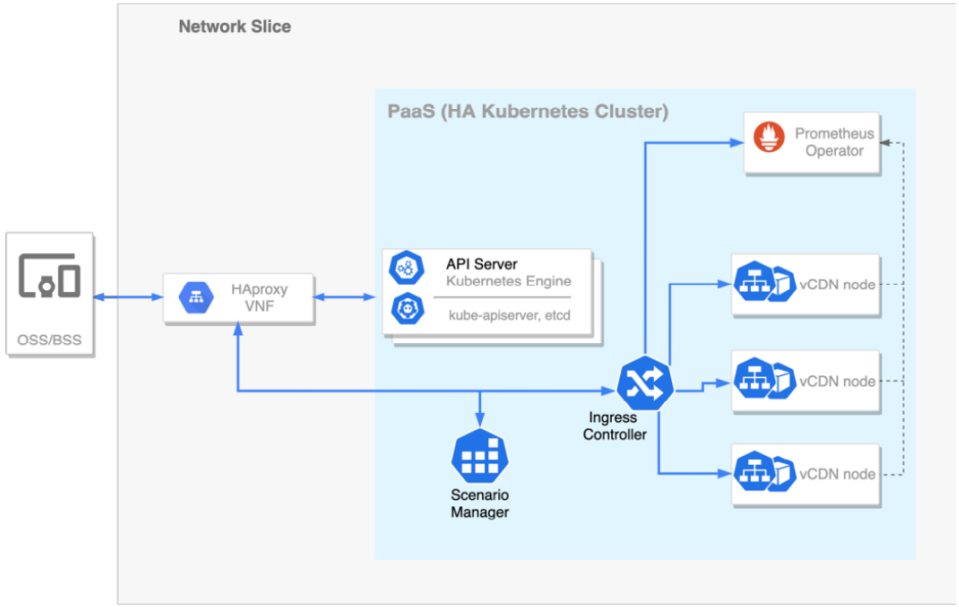
Adoption of Testing-as-a-Service (Taas)



- A testing platform using TaaS
  - KPI validation of test facility
  - Test by vertical industry experiments

(Ultra High-Fidelity Media)

UHFM Video broadcasting and on demand delivery service

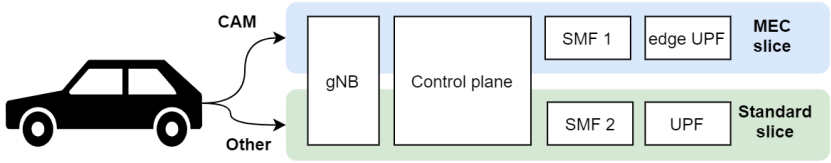


- To measure latency in experiments using caching services running as a shared network services
- How to emulate a virtual CDN with a limited set of nodes and clients
- How to content should be distributed among vCDN

A multi-slice UE in V2X networks

- Concept - A vehicle on the road using 2 slices:
  - Slice #1: for V2X communication requiring low latency
  - Slice #2: for general purpose

- Setup – To connect a real UE using 2 slices in 5G SA
  - 1 slice with MEC
  - 1 slice without MEC



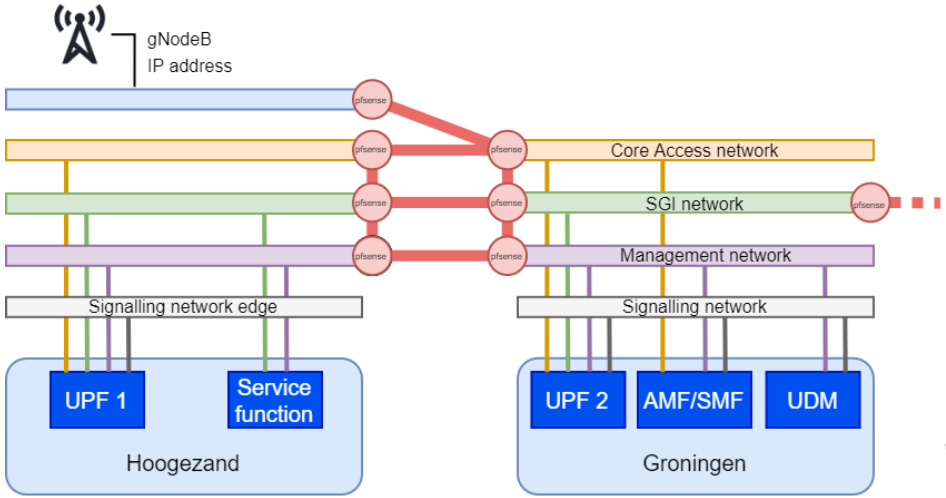
- Aim – To analyse the **latency** performance in both slides

A multi-slice UE in V2X networks

- 5Groningen testbed has been used (for 5G-HEART)
  - Distributed testbed
  - 4 locations, in the Netherlands
    - 2 pairs of locations, common database
  - Created by TNO, non-profit Dutch research institute
  - 4G, 5G NSA and 5G SA capabilities

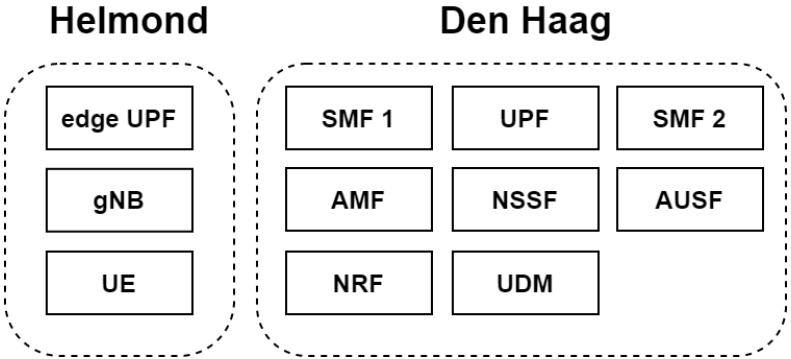
A multi-slice UE in V2X networks

- The setup in Hoogezand-Groningen



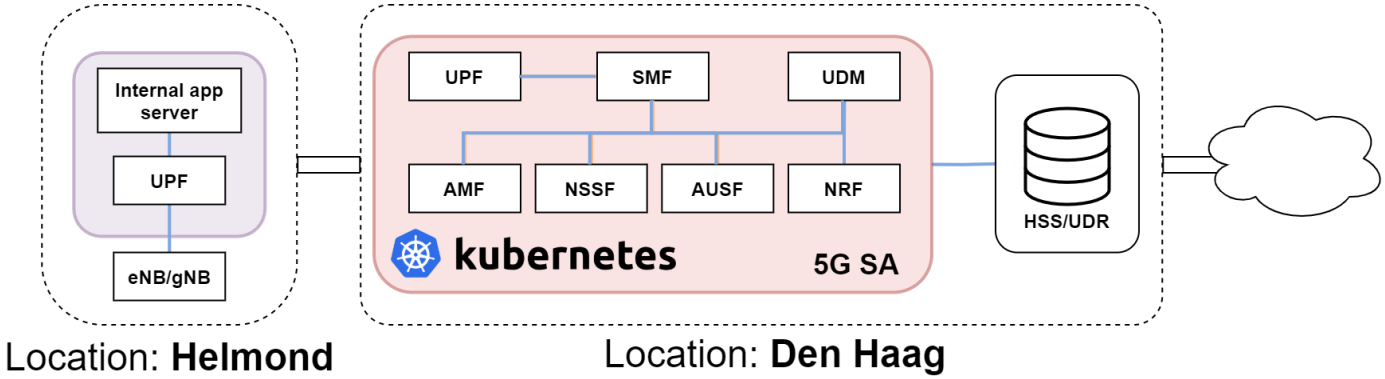
A multi-slice UE in V2X networks

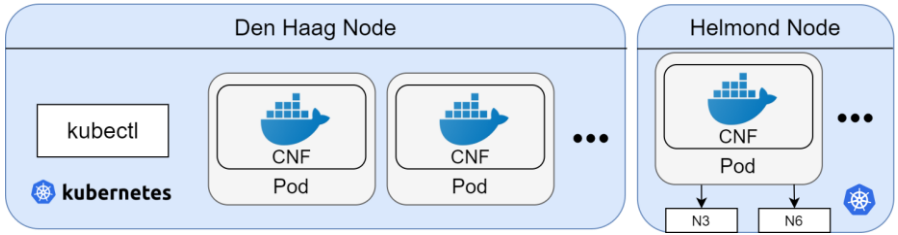
- The setup in Helmond-Den Haag



A multi-slice UE in V2X networks

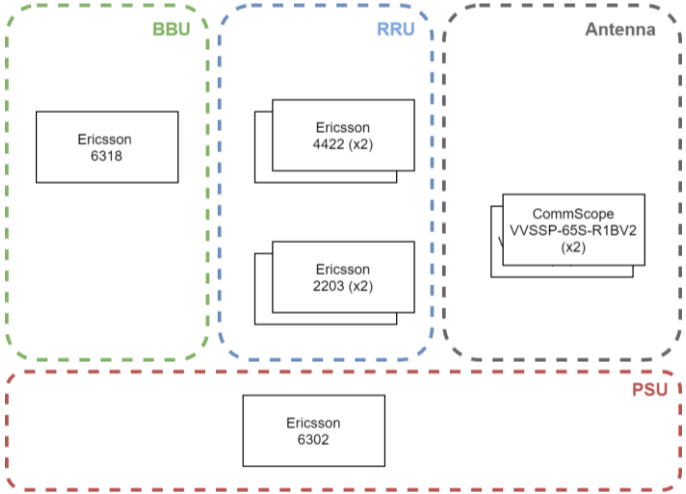
- The setup in Helmond-Den Haag





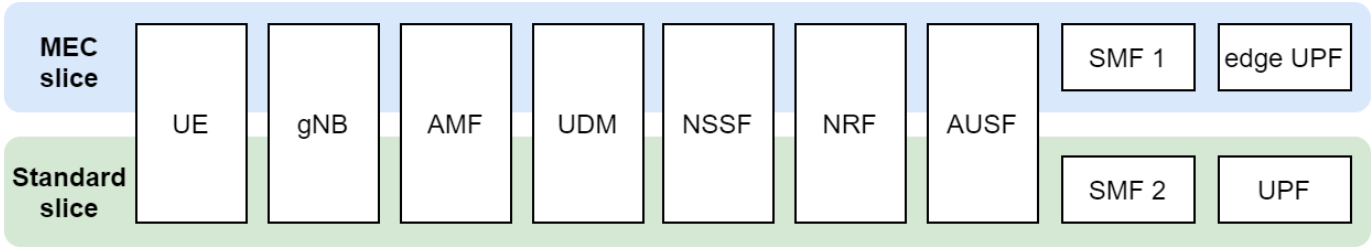
A multi-slice UE in V2X networks

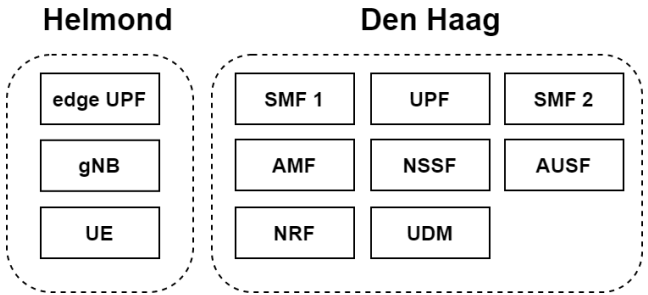
- Radio
  - Using Ericsson equipment with NSA and SA compatibility
  - Using 3.5GHz frequency
- UE
  - We used a Fibocom 5G SA UE
  - Slice selection using different APN names



A multi-slice UE in V2X networks

- Slicing approach





A multi-slice UE in V2X networks

- Methodology
  - Using ping to a server located in the edge
  - Using 3.5GHz frequency

- Results
  - The overall latency is greatly reduced, improving the reliability of V2X on the MEC slice

Conclusion and Outlook

- **Versatile** network platform
  - to support various vertical use cases
    - Including tourism, vehicular, media
    - Adopting Service-based architecture, Dynamic E2E slicing
  - To be complicated and growing up
    - by interworking multiple network facility sites
    - to cover large area and more users
  - Requiring the less complicated performance assessment
    - providing a toolset for E2E service validation
    - adopting Testing-as-a-Service
  - Promising to add automation (configuration/testing) by AI/ML

The 5G Infrastructure Public-Private Partnership

https://5g-ppp.eu/white-papers/
https://5g-ppp.eu/wp-content/uploads/2021/11/Architecture-WP-V4.0-final.pdf