

OpenAirInterface deployment at EURECOM 5G data center environment under Red Hat Openshift

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5G software alliance for democratising wireless innovation

\$ whoami

- 20+ years of experience in developing HW and SW code
- 14 years in real SW development as
 - Coder in C/C++/Java/Android/any scripting language
 - Integrator and maintainer for industrial products
 - Negotiator of features/improvements with customers
- Joined OpenAirInterface Software Alliance on April 3rd 2018
 - As “Software Manager” -> Continuous Integration and Methodology expert



Overview

KubeCon San Diego 2019 – VCO 3.0

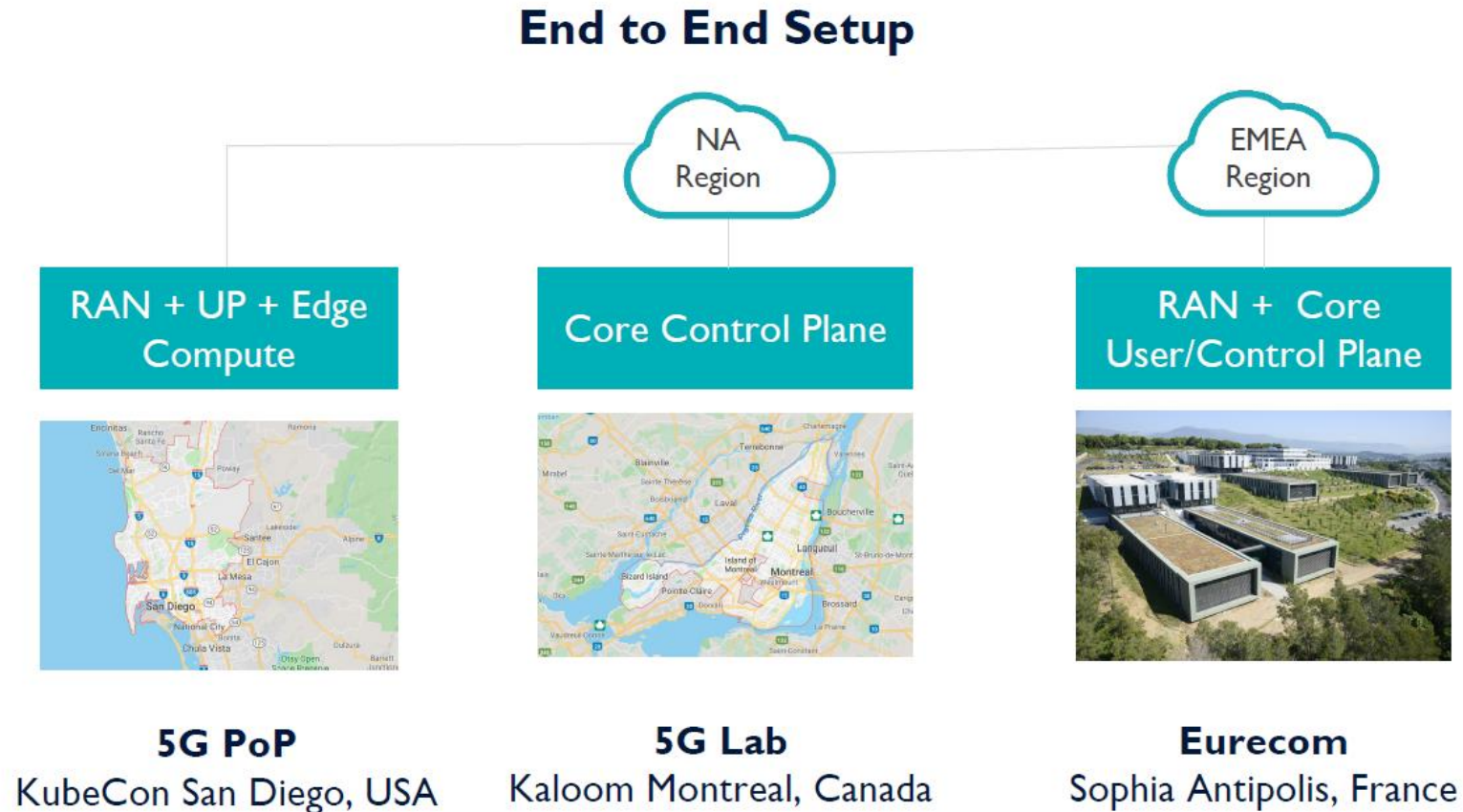
- The live deployment we made at Eurecom was geared for a live demo for KubeCon
- My presentation is based on RH Keynote and RH/Eurecom talk
 - Videos can be found on youtube
 - [E2E 5G Cloud Native Network \(Heather Kirksey, Azhar Sayeed and Fu Qiao\)](#)
 - [Build Your Own Private 5G Network on Kubernetes](#)

support from

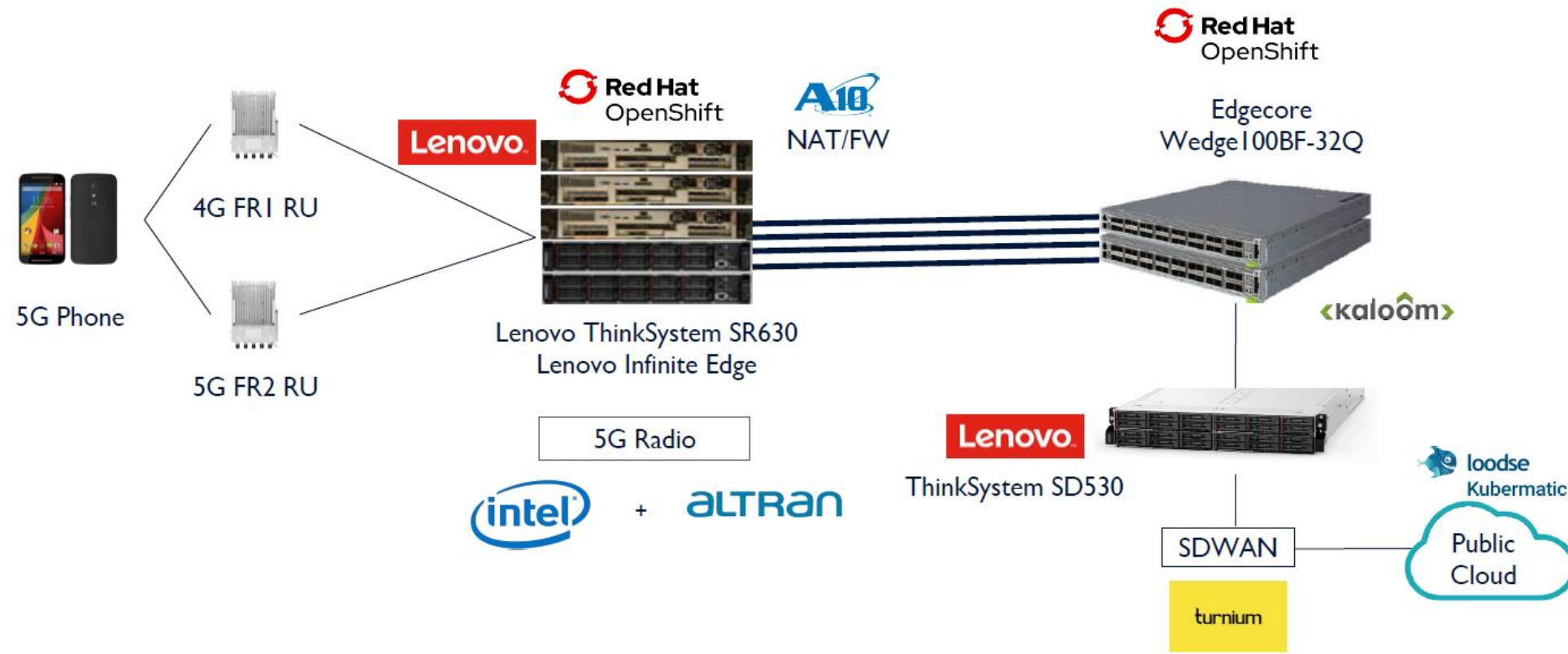


**PARTNER
CONNECT**

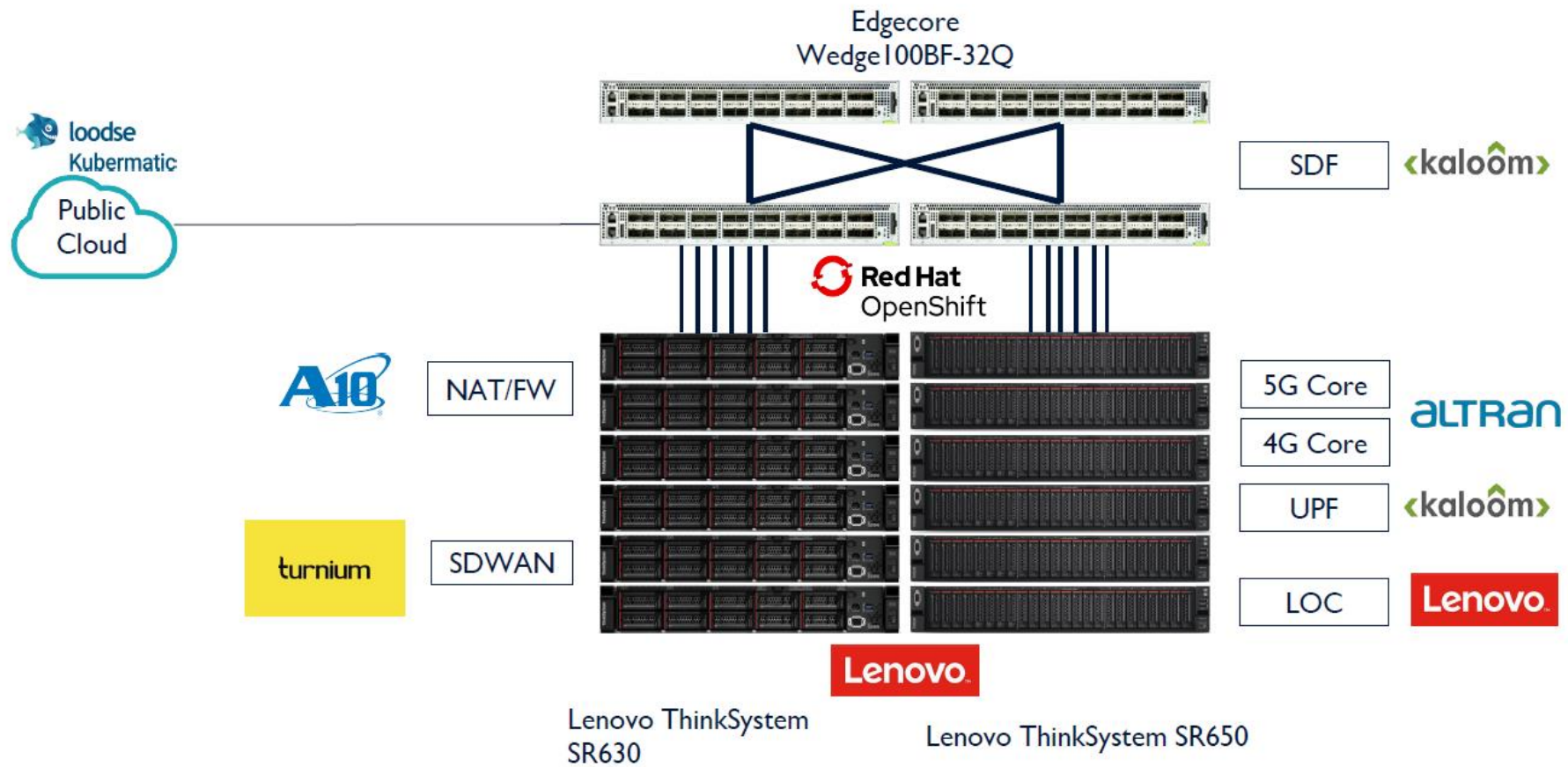
High Level POC Network



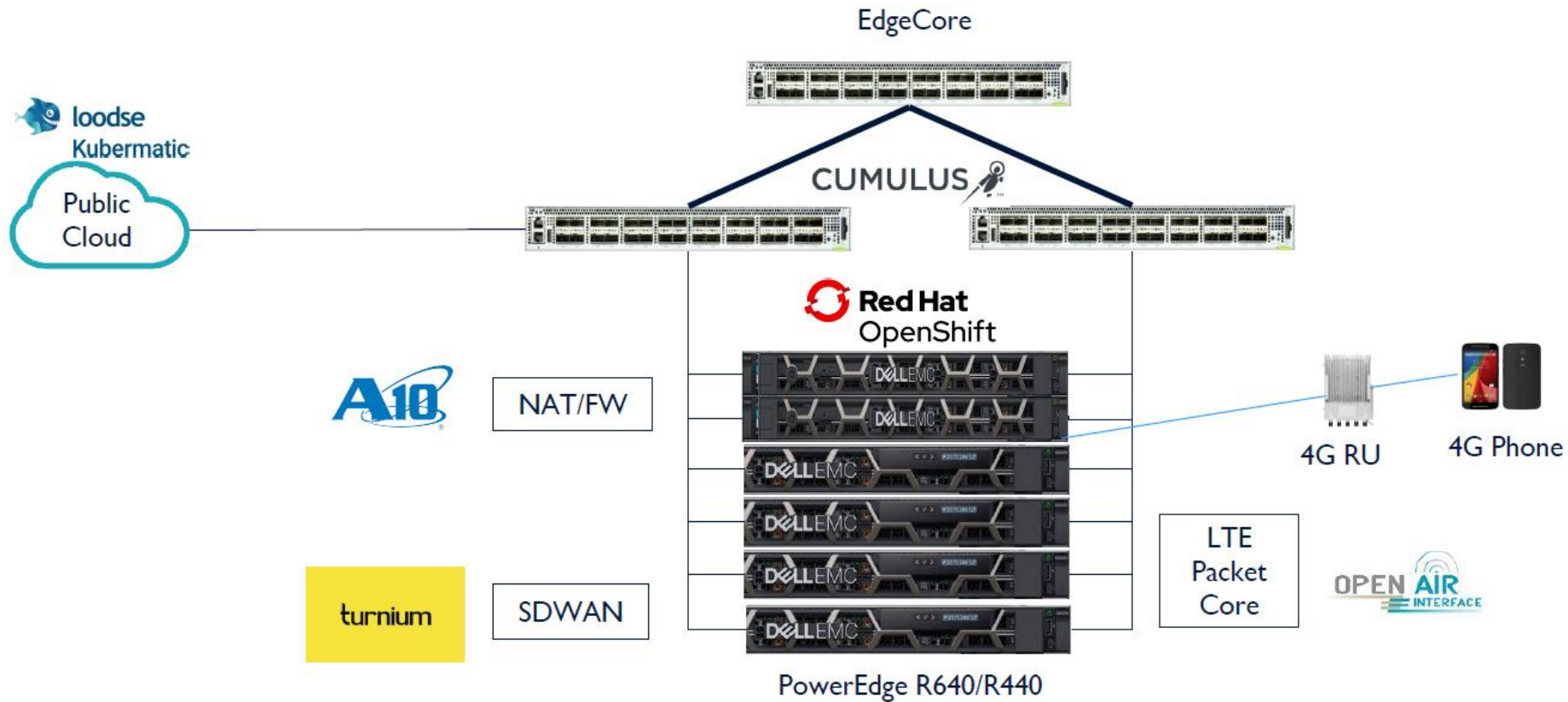
5G RAN + Edge Compute – San Diego



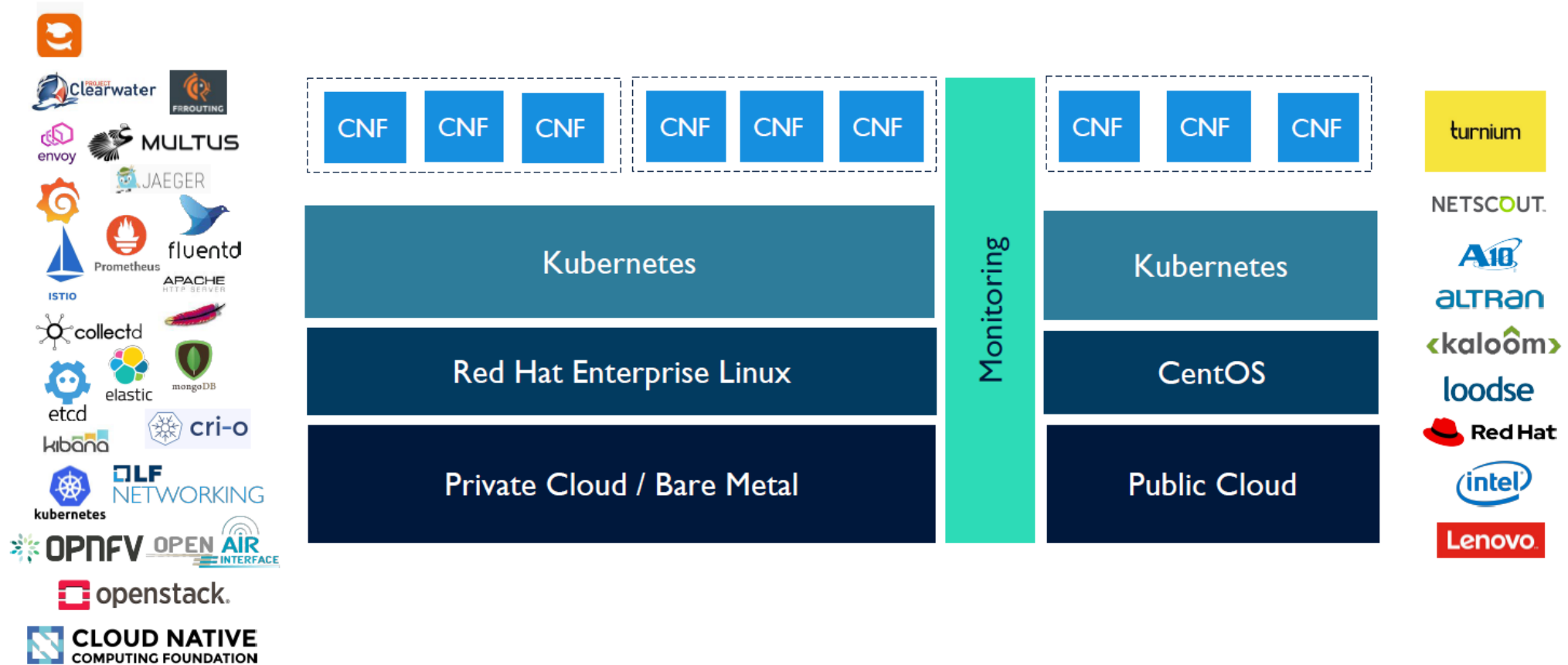
5G Core – NSA - Montreal



4G / 5G RAN & EPC – NSA - Eurecom



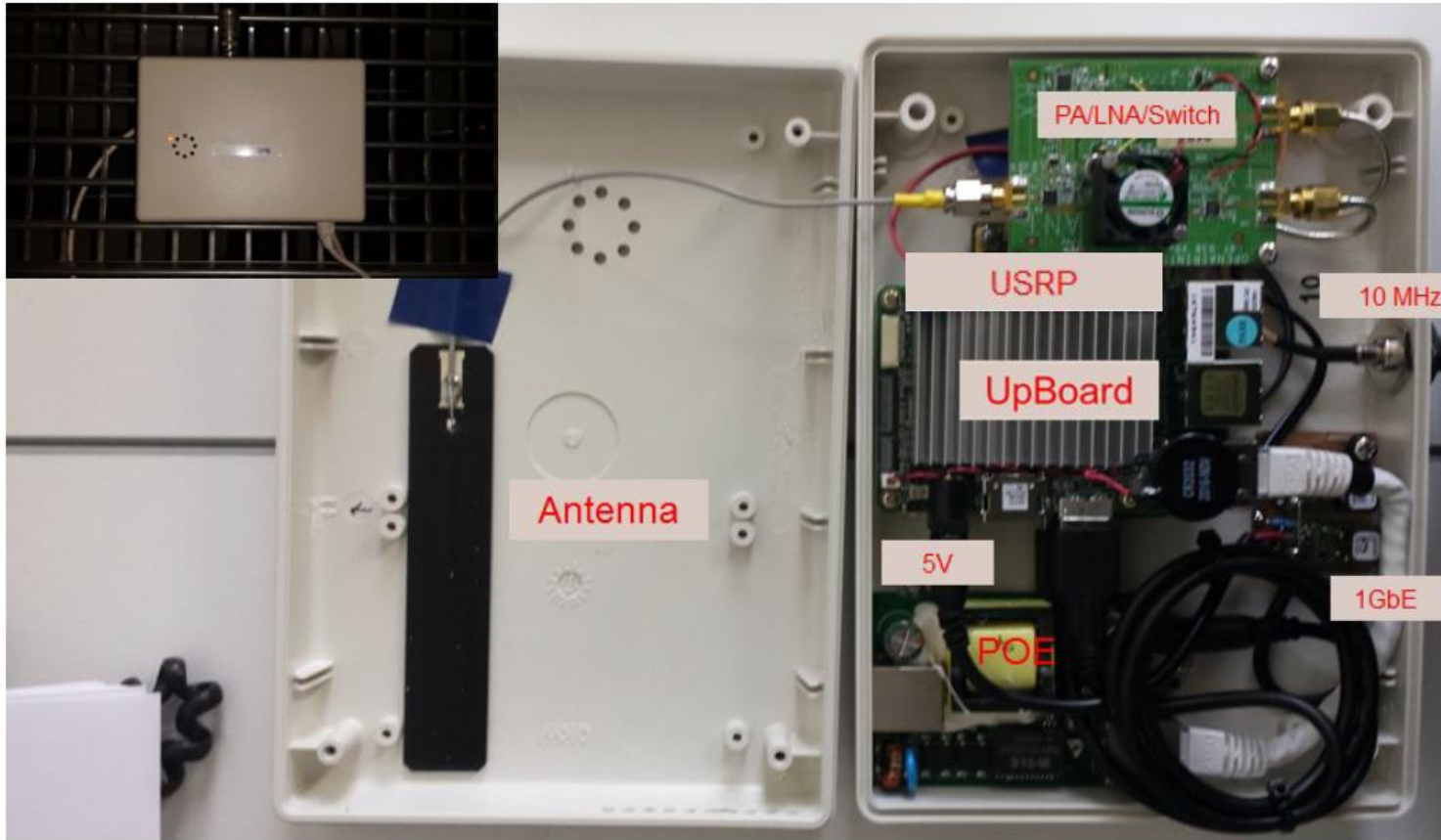
Software Stack



Focus on Eurecom / OAI Setup

First on the Radio Hardware

Low-End Prototyping Hardware



Shopping List:

- USRP B200-mini (\$500)
 - Up to 50 MHz BW
- Custom 20 dBm PA/LNA/Switch (\$300)
 - Band 38, 42/43, n38/n77-78
- Upboard/Upboard2
 - (low-end \$90 PC)
- GbE frontHaul POE+
- Antenna

High-End Prototyping Hardware

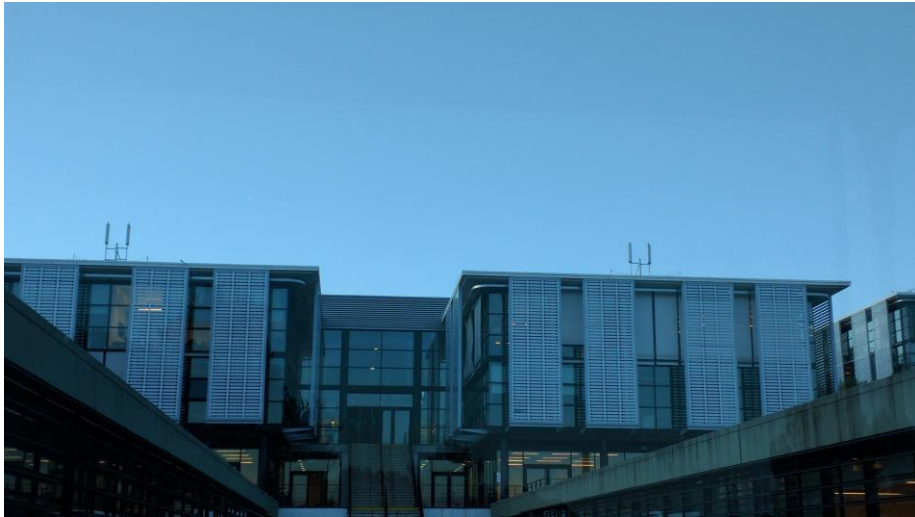
8 antenna, 100 MHz (FR1)



Shopping List:

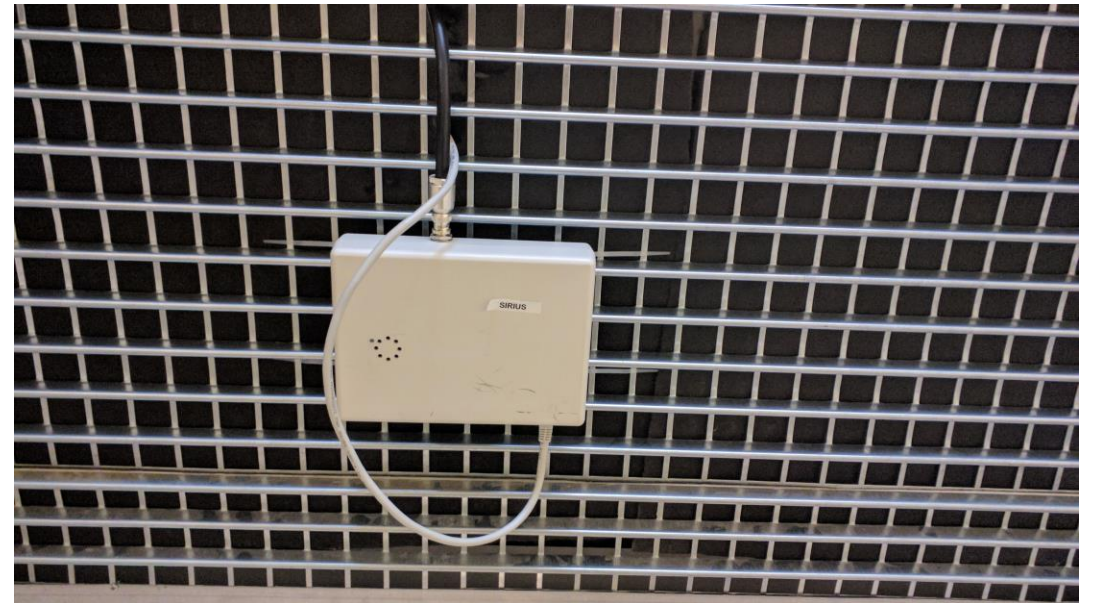
- two USRP N310 (~\$20000)
 - up to 100 MHz BW, 8 antennas in total
- eight 2W PA/LNA/Switch (~\$2500) - 2.6 or 3.5 GHz bands, e.g. www.zhixun-wireless.top
- 10 GbE optical fronthaul
- two 4-port Kathrein Antennas
- GPS antenna for N310s

In the Field



2 sets of 5G Antennas on rooftop

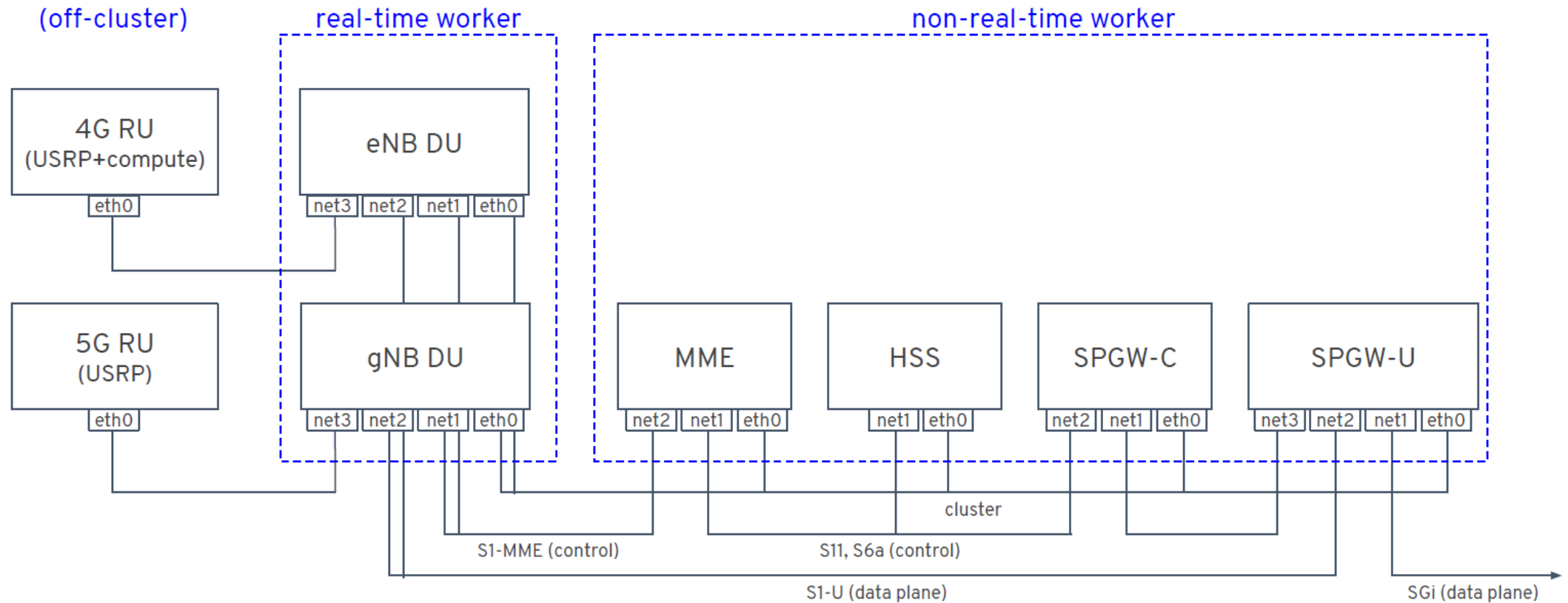
16 RRU in 2 hallways



Focus on Eurecom / OAI Setup

Now on the Software Side

Deployment Architecture – Non-Standalone



Deploying OAI on the OpenShift Cluster

- Deploy vRAN-ready:
 - Using the Akraino KNI for vRAN blueprint [0]
- Clone openair-k8s GitHub repo [1] with all manifests and scripts
- On a RHEL host, build OAI images and push to local cluster registry
 - `hack/build_images`
 - `hack/push_images $your_cluster_registry`
- Adapt the configuration files to your deployment
- Deploy
 - `kustomize build manifests/$component | kubectl apply -f -`

Let Demo It

- 2 Videos
- [4G smartphone attachement and browsing on OC](#)
- [OAI 5G experiment on OpenShift Cluster](#)

What We Did Achieve

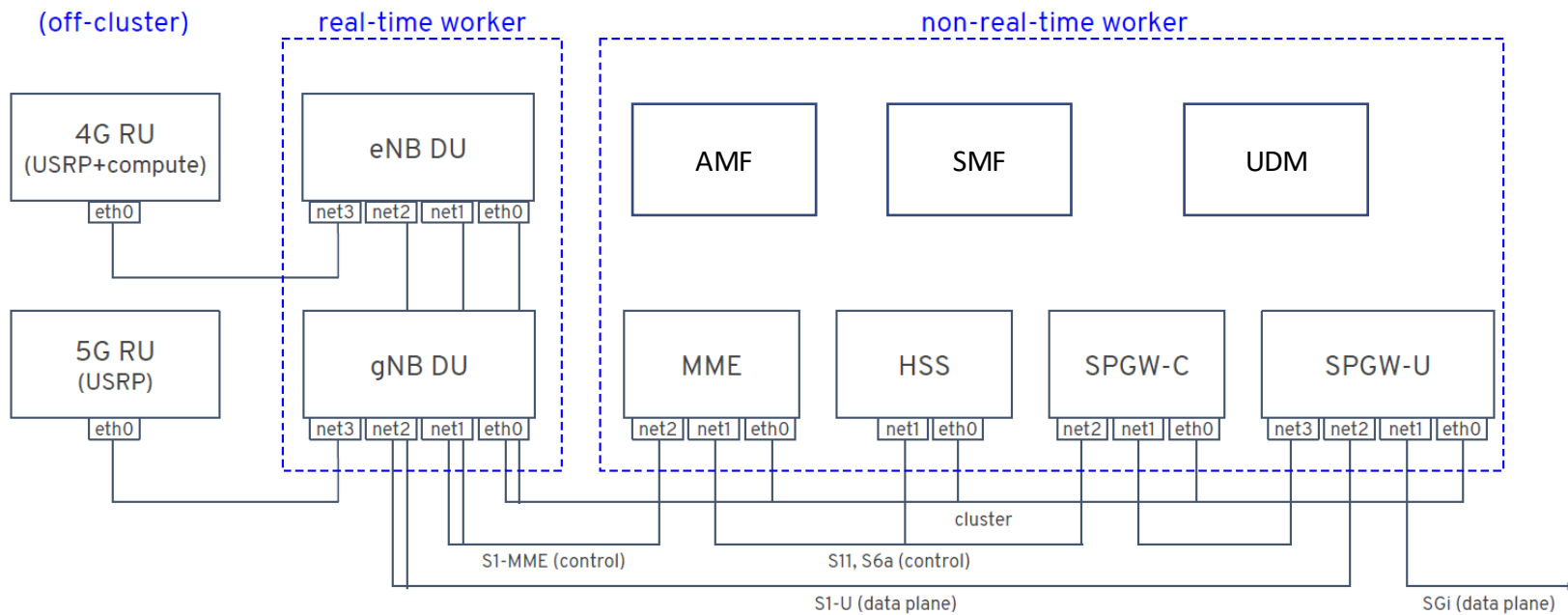
- Proof of Concept for native cloudification on our existing 4G / 5G code base
- On 4G LTE network:
 - As per video, 4G attachment and video browsing
 - Using a IP phone app (Zoiper), video conferencing with the RH team in San Diego
- On 5G incomplete gNB – NR UE
 - Real-Time assumptions are correct

What We Learned

- We really need to improve the robustness of:
 - Low-End RRU
 - Incoming commercial RRU with Benetel
 - Our complete SW Stack
 - Long-run tests in CI / CD

What new for Next Year KubeCon?

- Doing a full 5G NSA or SA call!!!



References

- [0]: <https://wiki.akraino.org/display/AK/Provider+Access+Edge+%28PAE%29+Blueprint>
- [1]: <https://github.com/OPENAIRINTERFACE/openair-k8s>
- [2]: <https://github.com/OPENAIRINTERFACE/openair-cn>
- [3]: <https://github.com/OPENAIRINTERFACE/openair-cn-cups>
- [4]: <https://gitlab.eurecom.fr/oai/openairinterface5g>
- [5]: <https://5g-ppp.eu>
- [6]: <https://5g-ppp.eu/5g-eve>
- [7]: <https://5g-ppp.eu/5g-victori>