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
High Level POC Network

End to End Setup

RAN + UP + Edge Compute

Core Control Plane

RAN + Core User/Control Plane

5G PoP
KubeCon San Diego, USA

5G Lab
Kaloom Montreal, Canada

Eurecom
Sophia Antipolis, France
5G RAN + Edge Compute – San Diego
5G Core – NSA - Montreal
4G / 5G RAN & EPC – NSA - Eurecom
Software Stack

- Kubernetes
- Red Hat Enterprise Linux
- Private Cloud / Bare Metal

Monitoring

- Kubernetes
- CentOS
- Public Cloud
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

4x10 GbE
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 Akraiino 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
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- [7]: https://5g-ppp.eu/5g-victori