Akraino Private LTE/5G ICN - Release 4

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Akraino Private LTE/5G - Overview
Private LTE/5G ICN Stack

Upstream communities: ONAP, OPNFV, Many CNCF projects, EdgeXFoundry, FD.IO, DPDK, Linux, Openstack Ironic, OVS, Many ASF projects, OpenNESS, Intel Open Source, Tungsten Fabric

Centralized Infra Controller
(Leverage Cluster API + Workflow manager such as Argo/Tekton)

- Infrastructure Provisioning & Configuration
  - KUD
  - BPA RestAPIAgent controller
  - BPA controller
  - Metal3

Host Operating System
- Ubuntu
- CentOS
- Clear

Hardware
- S1
- S2
- S3
Partners

End Users:

- Airbus
- Globe
- Orange
- Tata Communications
- T-Mobile
- Verizon

Vendors:

- Aarna Networks
- ATS Systems
- Intel
- NetNumber
- Juniper Networks
- Polaris
- Rebaca Technologies
- Wavelabs
- FreedomFi
Akraino Private LTE/5G - Planned

● Goal
  ● Package and provide well tested Private LTE/5G stack over ICN BP

● Plan
  ● Integrate components needed for Private LTE/5G with Akraino ICN family
    i. Start with EPC - Facebook Magma
    ii. Subsequently transition to 5GC - Free5GC
  ● Show local breakout to edge computing
    i. Continue to support MICN apps: 360° video, EdgeXFoundry, AI/ML edge analytics
    ii. Tungsten Fabric for K8s networking needed for UPF and breakout
    iii. Tight integration with OpenNESS edge platform/controller
    iv. Network/app slicing

● Use cases addressed
  ● Long-range connectivity solutions instead of conventional ones like Wifi
  ● Novel cost-effective connectivity options
  ● Differentiated customer Quality of Experience (QoE)
Akraino Private LTE/5G - Planned

Scope for R4 release

- Integrate components needed for Private LTE/5G with Akraino ICN family
  - LTE - Facebook Magma
    1. Started port Magma to ICN and stalled due to roadmap changes to Magma
  - 5GC -
    1. Development
      a. Helm chart creation of UPF, SMF and AMF - In progress (Dev complete)
      b. Integration of EMCO Orchestrator for CNF orchestration - In progress (Dev complete)
      c. Support for other dataplanes
        i. Integration with Tungsten Fabric - Completed
    2. Testing
      a. Lab setup for testing - Currently leveraging UNH-IOL lab
      b. Simulators for testing
        i. Tool identification - Done
      c. Test plan - In progress

- Challenges
  i. Long term lab availability
High Level Diagram

- SAS (in cloud)
- LTE/5G CBRS RAN
- SP-GW/5G UPF
- Edge Apps
- SD-EWAN
- UE
- Network Edge#1
- Network Core

K8s
OpenNESS
SD-EWAN
vEPC/5GC
ONAP
Infra Orch
Enterprise Private 5G Usecase

EMCO (CNF Orchestrator)

K8s cluster 1

UESim

gNBSim

AMF

SMF

UPF

TF-K8s cluster 2

N1

N2

N3

N4

N6

DN

Orchestrate free5g in Cluster 2

192.168.2.2

192.168.2.2

192.168.2.3

192.168.2.10

192.168.2.xx Created by TF

N11

192.168.2.xx Created by TF

N11

K8s cluster 1

TF-K8s cluster 2

DN

Created by TF
Deployment Information

192.168.2.10

192.168.2.3

192.168.2.2

192.168.2.10
Activity list

- Helm Chart creation for 5GC
- Integration of TF
  - Config changes
- Orchestration of 5GC including network plumbing
- Installation of UE and gNB simulators
- Packaging
- Testing
- Documentation
Thank you