Reference platform design for edge cloud in OPNFV

Project Proposal

https://wiki.opnfv.org/display/PROJ/Edge+cloud
Service Requirement for Edge

Service for Edge:
- User plane services: SAE-GW, UPF
- Low Latency Services: VR, automatic driving
- High Throughput services: AR, Video surveillance
- Services with huge requirement for multicast: IPTV
- High Speed Mobile Services: UAV
Network Structure of Telecom Cloud

Distance From UE

- 1km: 10us
- 10km: 50us
- 50km: 150-300us
- 200-300km: 1-2ms
- 500-1500km: 15-20ms
- 2000-3000km: 40-80ms

Number of Servers per DC

- 2018: 0
- 2020: 34
- 2025: 60
- 2018: 0
- 2020: 77
- 2025: 197
- 2018: 410
- 2020: 993
- 2025: 2109
- 2018: 274
- 2020: 1366
- 2025: 4636

UE to Access-level DC
- 1km
- 10km
- 50km

Access-level DC to County-level DC
- 10us
- 50us
- 150-300us

County-level DC to Municipal-level DC
- 1-2ms

Municipal-level DC to Provincial-level DC
- 15-20ms

Provincial-level DC to National/District-level DC
- 40-80ms

UE to Core
- 10us
- 50us
- 150-300us

Core
Features of Edge Cloud

Edge TIC is quite different from core TIC, especially county-level and Access-level edge TIC.

Features of Edge TIC:

- **Limited space and power resources**
- **Lightweight management**
  - Small scale of edge TIC nodes (less then 10 in AP)
  - No need to fully install management component
- **Unattended**
  - Remote & scattered location of edge TIC nodes
  - Remote orchestration & management are needed
- **Resource Heterogeneity**
  - Various services: MEC, CDN, 5G-UPF
  - Various infrastructure: VM, container, bare metal
- **Acceleration**
  - Low-delay, high-bandwidth services
  - FPGA, GPU, TPU
Open Questions for Edge (1/2)

- **Hardware:**
  - Do we need a specific design of hardware for edge?
  - Central offices for operations varies a lot. For central offices in AP, specifically designed hardware should be necessary due to limited space and power resources.

- **OpenStack:**
  - Light weight OpenStack is important for Edge
  - Remote provisioning (cell, Multi-region, or remote compute). For each solution, lots of detailed questions will be raised for integration.

- **SDN**
  - Do we need SDN at Edge?
  - Light weight SDN controller should be necessary for edge
  - How should SDN work with OpenStack in edge, when OpenStack may in a remote mode
Open Questions for Edge (2/2)

• **Network**
  - Does Edge still need spine-leaf?

• **Storage**
  - Do we need distributed storage or disk array necessary for edge? Or we just use local disk

• **Container**
  - Heterogeneous resources at edge, including VM, container and bare metal
  - How should we manage these resources? Using OpenStack or K8S or both?

• **Acceleration**
  - Lots of acceleration requirements for service at edge, including GPU, FPGA, smart NIC
  - A unified API for all different acceleration resources is necessary so that we can still have the agility feature for virtualization

• **Provisioning and operation**
  - Remote provisioning is a must for edge, therefore reliability and disaster recovery is important
Communities

Each community focuses on a certain NFV component. Not concentrate on edge. Need integrated edge platform to fill the gaps between those communities.
OPNFV Projects

Each project focuses on a certain study point. Edge requirements are not fully covered.

Need a new edge-focused project to combine them and cover those uncovered requirements for edge.

https://etherpad.opnfv.org/p/tsc_edge_cloud
Edge Cloud Proposal for OPNFV

• **Purpose for this project:**
  • Focusing on the NFV Platform integration for Edge cloud.
  • Platform for edge, which is homogeneous with core, so that unified orchestration and operation mechanism can be used.
  • Better trimmed platform to meet the specific need for edge services.

• **What we can do:**
  • **Requirement Analysis**
    • Analyze and conclude the requirement from multiple services (MEC, CRAN, vCPE, vOLT, vCDN, etc.)
    • Translate requirement of edge into deployment requirements including NFV/SDN component requirement (NFVO, VNFM, VIM, Hypervisor, VSW, HW, etc.)
  • **Reference platform design**
    • Define and release a limited number of scenarios for edge cloud taking consideration of the analyzed requirements.
  • **Upstream collaboration**
    • Collaborate with related communities (ONAP, OpenStack Akraino etc.) for requirement analysis and scenario design.
    • Output detailed requirements for components to relevant project/s.
  • **Testing strategy**
    • Define and develop test strategy and test cases for edge specific testing.
Upstream Collaboration

OpenStack
K8S
ONAP
ODL/ONOS
Akraino
ETSI MEC

Close collaboration with edge automation project
ONAP+K8S+OpenStack Remote Provisioning
Hybrid VIM Containerization
Close collaboration with EC WG
Light Weight SDN
Close collaboration with Akraino
Edge requirements

Continuous integration of upstream to deliver typical scenarios for edge

Requirement will go to upstream through close collaboration with upstream related WG/projects

OPNFV Edge Cloud Project
Integration
Testing

Edge Reference Platform
OPNFV Projects Cooperation

AUTO

Container4NFV

Clover

CRAN

ONAP+K8S+OpenStack
ONAP + Remote VIM

Edge hybrid VIM

Service requirements of containerization

Requirement as an edge service: e.g. hardware acceleration

Uncovered requirements: SDN, light weight management component

Functest/Yardstick

Test cases

Edge Cloud Project

Integration together with XCI and other installers

Testing

Edge hardware spec

Pharos

Edge Reference Platform
Plan for G release

• Requirement analysis

• Release scenario: ONAP orchestration of K8S & OpenStack (collaborate with AUTO)
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Thank You!