Edge cloud

Project Name:
- Proposed name for the project: Reference platform design for edge cloud in OPNFV
- Proposed name for the repository: edgecloud

Project description:

With the emergence of 5G and other technologies, new services with high throughput and low latency, such as AR/VR, automatic drive, etc., make edge cloud an important rising scenario for Telco Operators. The so called edge clouds may include customer premises equipment, access-level DC, county-level DC and municipal-level DC. Multiple new services and applications from both telco operators and 3rd party companies will be deployed at the edge to enable new services and enhance customer experience. Therefore, operators have to re-design or reconstruct their edge central office to deliver these diversified new services, and in the meantime reduce their CAPEX and OPEX. Edge clouds share a similar but simplified NFV+SDN architecture as the core DC but has more implementation constraints and complexity due to limited physical space and power, more distributed heterogeneous environments and stricter service requirements.

Carrier-scale edge cloud has the following features:
- Limited physical DC environment: limited space and power resource
- Remote & scattered location: closer to the users, unattended O&M
- Large amount: tens of thousands of edge cloud sites scattered all over the country, while the number of core sites are less than a hundred
- Small scale: less than 10 in AP possible
- Special traffic-forwarding/processing services require acceleration: low-delay, high-bandwidth services such as MEC, CDN, 5G-UPF
- Resource heterogeneity: various infrastructures including VM, container and bare metal

These features lead to a bunch of requirements of architecture of edge cloud, which requires specific design. In the meantime, we also hope the architecture of edge should stay as close to core as possible, so that we could maintain the whole network, from core to edge, in a unified way.

This project will focus on a Reference Platform for edge cloud, and is intended to output a limited number of scenarios specifically designed for edge, which will meet the varied requirement from End Users.

Objectives:

1) Requirements analysis.
   - Analyze and conclude the requirements of multiple edge services (MEC, CRAN, vCPE, vOLT, vCDN, etc.)
   - Translate edge-service requirements into deployment requirements including NFV/SDN component requirements (NFVO, VNFM, VIM, Hypervisor, VSW, HW, etc.)
   - Guide evolution of Pharos specification suitable for edge cloud scenarios.

2) Scenario design
   - Define and release a limited number of scenarios for edge cloud taking consideration of the analyzed requirements

3) Upstream collaboration
   - Collaborate with OpenStack, ONAP, Akraino, ODL and other related community for requirements analysis and scenario design
   - Output detailed requirements for components to relevant project/s.

4) Testing strategy
   - Define and develop test strategy and test cases for edge specific testing (e.g. low latency requirement of the stack in edge, performance in specific edge scenarios, and etc.)
   - Tests developed may also be used by Dovetail if OVP is extended to include edge platforms.

Scope:

- The project will focus on design and development of reference platform of edge cloud in OPNFV.
- Scope includes NFVI, VIM, MANO.
- The scope excludes developing edge VNFs or Apps.

Testability:

- OPNFV CI/CD and testing methodologies will be extended with use cases specific to the types of edge stack that has been defined by this project

Documentation:

- Requirement analysis for edge cloud
- Architecture design for edge cloud
- Scenario description for edge cloud
- Upstream analysis for edge cloud

Dependencies:

- It’s expected that some opensource and standard projects will be used to drive the deployment of edge cloud. The edge cloud project will seek to leverage standards-based and open-source that can be integrated into OPNFV edge solutions.
- Related OPNFV projects
• DPACC
  - Cooperate with DPACC project in edge cloud usecases. Integrate the acceleration architecture desinged DPACC into edge scenarios. Test the specific scenarios to see if the DPACC acceleration architecture can meet the edge cloud requirement

• Clover
  - Cooperate with Clover project on edge VNF containerization. It can be foreseen future edge will include app deployed as containers. It is necessary to work with clover project to work out the detailed requirements and architecture for containerized app deployed in edge.

• Container4NFV
  - Collaborate with the container4NFV project on edge scenarios. Making sure the edge cloud will coordinate with both K8S and Openstack.

• Auto
  - Cooperate on the edge scenarios. Integrated with ONAP to realize the edge cloud orchestration. Work out the orchestration schema of ONAP with both VM and container in scope

• OpenStack
  - Cooperate with OpenStack community especially the edge computing WG to verify and explore more on remote management like multi-region, cell and so on. Cooperate with Cyborg project to help the acceleration in edge cloud.

• ONAP
  - Cooperate with ONAP to realize the orchestration of edge scenarios and global orchestration.

• Akraino
  - Cooperate with Akraino with edge cloud reference platform. Output platform design and integrated scenarios to Akraino and reduce vendor-lock in for edge cloud.

Committers:

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Planned deliverables (Outputs):

- Requirement for edge cloud
- Architecture design for edge cloud
- Typical integrated scenarios for edge cloud
- Upstream analysis
- Test case for edge

Proposed Release Schedule:

- First release in G release (if possible)

Related discussion links and slides

https://etherpad.openforge.org/p/edge_cloud_discussion_in_ONS2018
https://etherpad.openforge.org/p/edge_cloud_meeting_minutes

Project Proposal slides
20180502_Edge Cloud_requirement.pdf
https://etherpad.openforge.org/p/edge_cloud_requirements

Key Project Facts
Project Name: Reference platform design for edge cloud in OPNFV
Repo name: Edgecloud
Lifecycle State: Incubation
Primary Contact: fuqiao@chinamobile.com
Project Lead: TBD
Jira Project Name: Same as Project name
Jira Project Prefix: Edgecloud
mailing list tag [Should match Jira Project Prefix]
Committers: