ONAP Close Loop Control for Edge Cloud with Distributed MultiCloud

Bin Yang, Wind River, ONAP Multi-VIM/Cloud PTL

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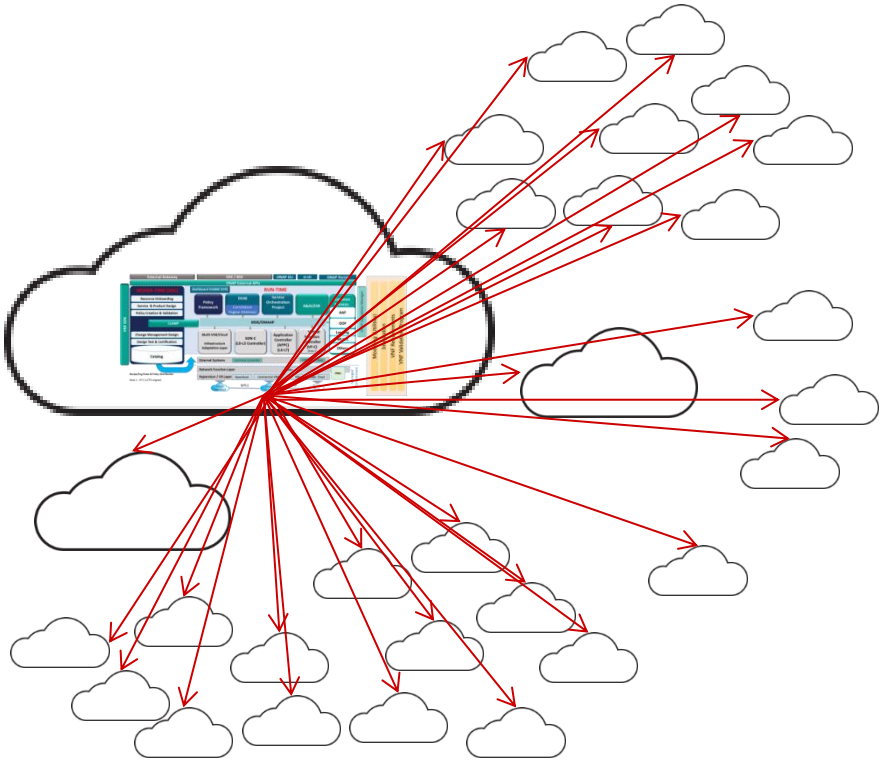
Agenda

- ONAP Multi-VIM/Cloud and Edge Automation

- Workshop: Close Loop Control for Edge Cloud with distributed MultiCloud

Challenges of Edge Automation

- Edge Infrastructure for NFV
  - Could consist of hundreds of physical data centers of small scale
  - With dynamic changes during their lifecycles
  - Comes with very limited resources which requires good utilization by various intelligent and automated orchestration
  - Requires near real-time close loop automation and aggregation of FCAPS data streaming
- The challenges
  - LCM of Edge Infrastructure: On-Boarding, De-Commissioning.
  - LCM of Resource of Edge Infrastructure: Discovery/Updating/Representing.
  - Increase resource utilization while remains flexible
  - Near real-time collecting/aggregating/reacting to FCAPS data/events

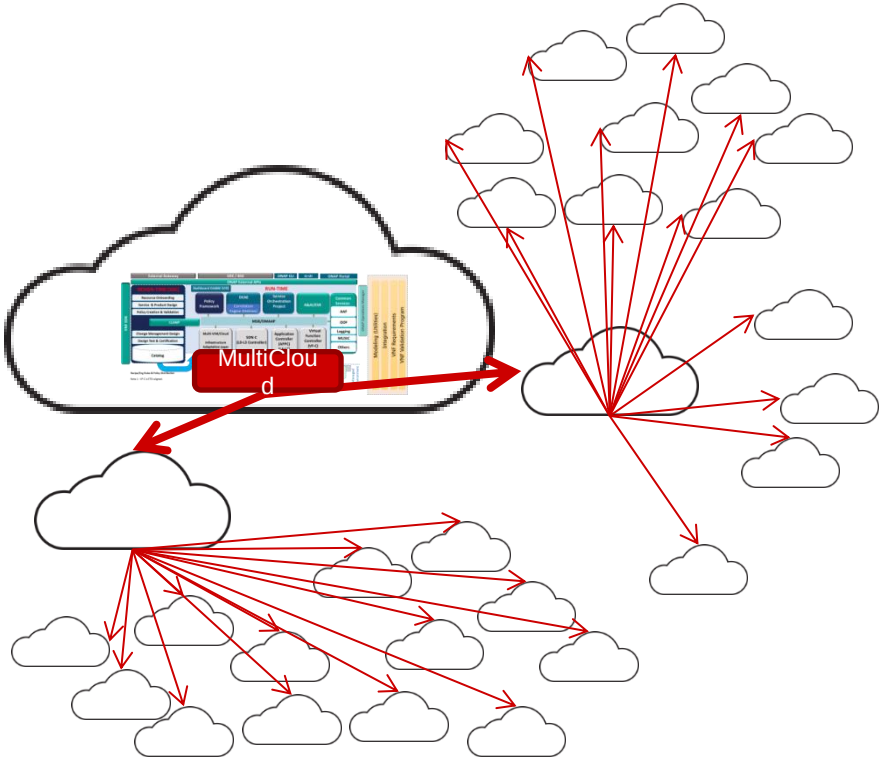


ONAP Multi-VIM/Cloud and Edge Automation

- Automating the on-boarding of Edge Clouds
- Automating the discovery/representation of Infrastructure Resources of Edge Clouds
- Supports to policy based VNF placement/homing to Edge Clouds
- Aggregates FCAPS data and Near real-time control on Edge Clouds

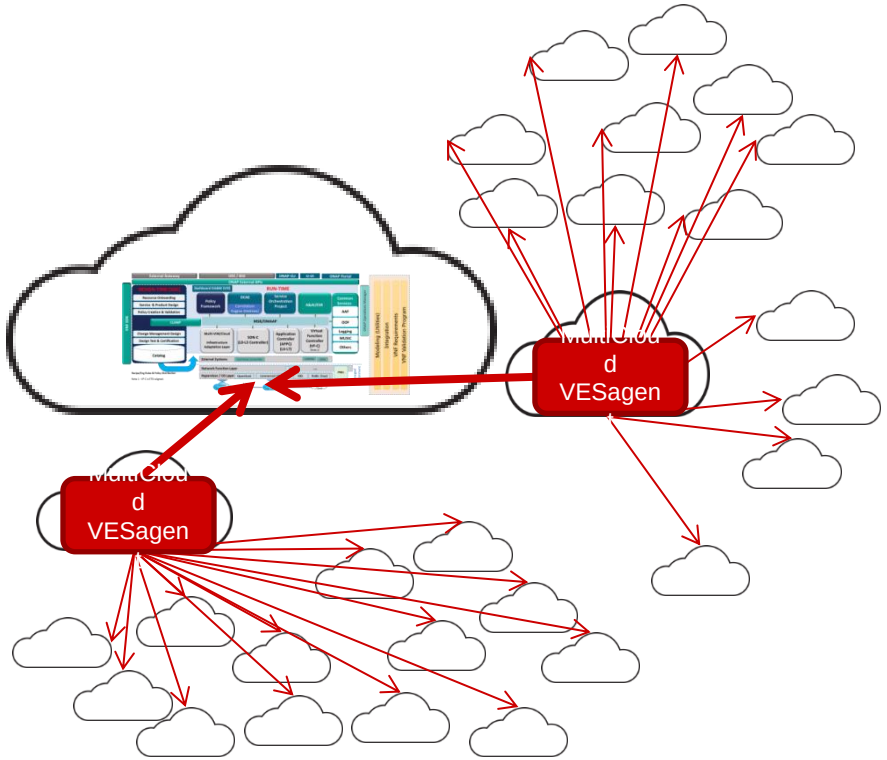
MultiCloud automates the on-boarding of Edge Clouds

- Edge Infrastructure with Hundreds of Physical Data Centers
  - Could be a burden for Infrastructure providers.
  - **Multi-Region** could be one of solution to mitigate the pain of O&M for Infra. Providers.
  - ONAP could leverage this multi-region solution to automate the on-boarding process of hundreds of Physical Data Centers into ONAP.
    - ONAP user will fill the access information for the primary region only
    - MultiCloud plugin will discover all secondary regions and register the corresponding cloud regions into AAI.
  - Will be realized in ONAP Multi-VIM/Cloud in Casablanca Release



MultiCloud aggregates FCAPS data and support NRT close loop control on Edge Clouds

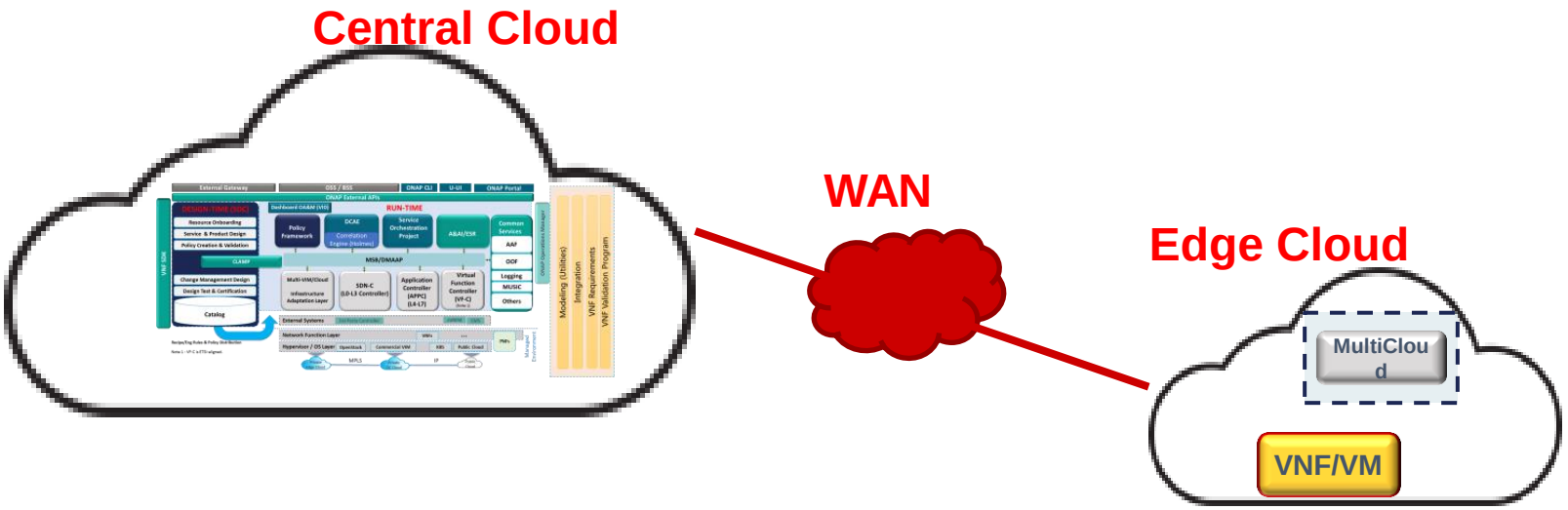
- MultiCloud@Edge
  - MultiCloud micro-services could be deployed approaching to edge infrastructures
    - Local cache of part of AAI inventory.
    - Synchronization
  - VESagent in the MultiCloud@Edge
    - Collect FCAPS data of local edge infrastructures
    - Aggregate the data and events according to configuration/policy rules
    - Convert data/events conforming to VES specs, send them back via DMaaP/RESP
    - Policy based Near Real-Time close loop control



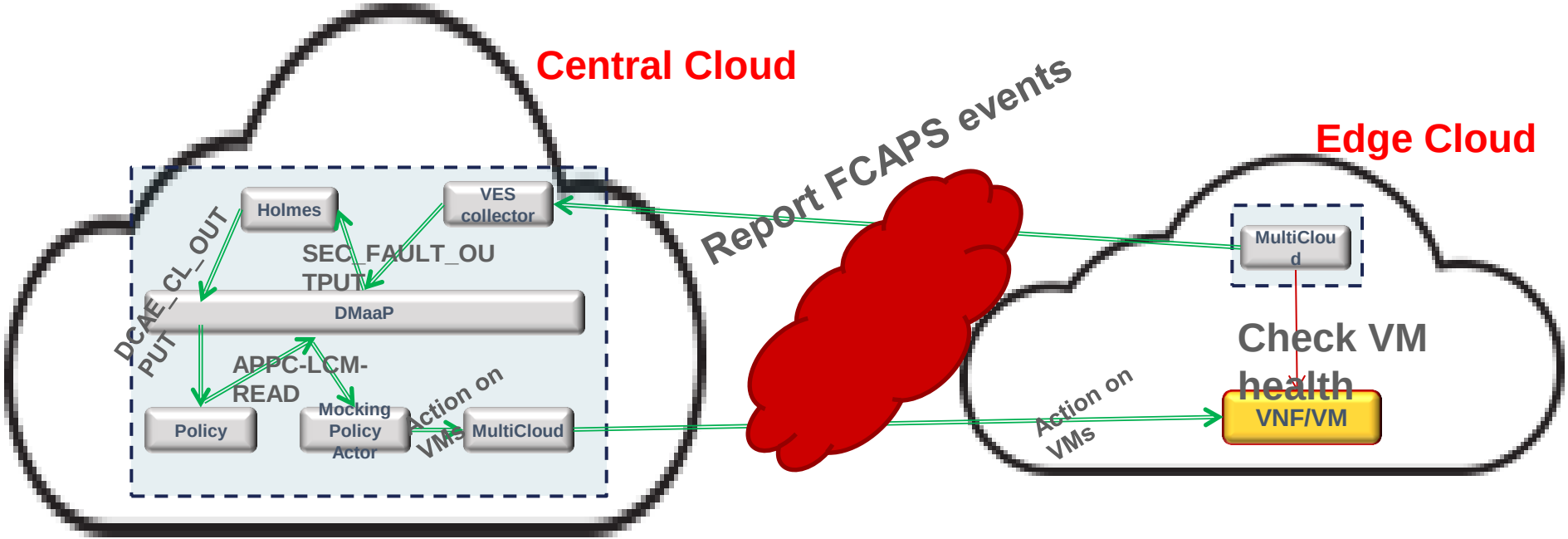
Workshop: Close Loop automation for Edge Cloud with distributed ONAP MultiCloud

- This workshop will
  - Showcase how **MultiCloud** could help ONAP to assure services by **close loop control over Infrastructure resources**
  - Be featured of **distributed MultiCloud on edge clouds** and the configurable **VESagent** to consolidate/aggregate telemetry data
  - PoC to evaluate how distributed MultiCloud to support edge automation by enhancing the close loop control over edge clouds
  - Walk you through the comprehensive process to **deploy** and **provision ONAP**, **orchestrate VNF** and **setup close loop control**.

Deployment Topology



Control/Data Flow for Close Loop Control



Recipes

- Infrastructures
  - Central Cloud powered by **Wind River Titanium Cloud**
    - Titanium Cloud is the Carrier Grade OpenStack distribution offered by Wind River
    - Upstreamed to Open Source Communities
      - OpenStack StarlingX project, LFN Akraino
    - Verified and validated with various Open Source community and 3rd party's offerings
      - ONAP, OPNFV, etc.
    - Most of ONAP Open Labs are powered by Titanium Cloud:
      - ONAP Integration lab
      - CMCC Open Lab and China Telecom Open Lab
  - Edge Clouds powered by **Wind River Titanium Cloud**, **Distributed Cloud mode**
    - Support distributed subclouds of small scale with HA, high performance, low latency features,
    - scalable from 1 or 2 hardware nodes to many.

Recipes

- Platform
  - Heat templates to deploy ONAP Beijing Release
  - Heat templates to deploy distributed ONAP MultiCloud services
  - Patches to enhance ONAP Robot scripts
  - Mocking Policy Actor to control infrastructure resource

Recipes

- VNF
  - vDNS heat templates

- Tools
  - POSTMAN
  - Curl

Step 1: Deploy ONAP instance to Central Cloud

- Provision OpenStack resources for ONAP instance
  - Admin creates tenant with user, allocate Quota. e.g. tenant “VIM”, tenant user: “demo”.
  - Admin creates flavors, e.g. m1.small, m1.medium, m1.large, m1.xlarge
  - Admin creates shared external network, e.g. “external”
  - Admin uploads images of ubuntu-14.04LTS and ubuntu-16.04LTS, e.g. “ubuntu-14-04-cloud-amd64”, “ubuntu-16-04-cloud-amd64”
  - Tenant user to create keypair,e.g. “onap_key”
  - Tenant user collects : keystone endpoint, OpenStack Region ID, dns list,
- Populate ONAP heat env file
  - Clone demo project
    - $ git clone -b beijing https://gerrit.onap.org/r/demo
  - Populate the parameters to “demo/heat/ONAP/onap_openstack.env”
    - With collected info
    - Further treaking:
      - dcae_deployment_profile: R2MVP
      - mvim_docker: 1.2.0-STAGING
      - mvim_openstack_docker: 1.2.0-STAGING

Step 1: Deploy ONAP instance to Central Cloud

- Deploy ONAP instance with heat templates
  - Login to horizon and download the access file, e.g. VIM-openrc.sh
  - Launch the ONAP with populated heat template
    - $ source VIM-openrc.sh
    - $ openstack stack create -t onap_openstack.yaml -e onap_openstack.env onap_beijing_heat
  - Wait till the stack is created completed
  - List all ONAP VMs and capture the floating Ips for each VM
    - $ openstack server list
- Healthcheck
  - Now ONAP is to booting up, check the status by robot script on the robot VM:
    - $ ssh -o StrictHostKeychecking=no -i /home/wruser/.ssh/onap_key ubuntu@<robot_vm_ip>
    - $ sudo docker exec -it openecompete_container /var/opt/OpenECOMP_ETE/runTags.sh -i health h -d ./html -V /share/config/integration_robot_properties.py -V /share/config/integration_preload_parameters.py -V /share/config/vm_properties.py

Step 1: Deploy ONAP instance to Central Cloud

- Portals access
  - If the healthcheck is passed, provision your local hosts resolving file like below:
    - $ cat /etc/hosts
      - 10.12.6.191 policy.api.simpledemo.onap.org
      - 10.12.7.24 portal.api.simpledemo.onap.org
      - 10.12.6.182 sdc.api.simpledemo.onap.org
      - 10.12.5.24 vid.api.simpledemo.onap.org
      - 10.12.6.175 aai.api.simpledemo.onap.org
      - 10.12.5.187 sdnc.api.simpledemo.onap.org
      - 10.12.6.199 so.api.simpledemo.onap.org
      - 10.12.7.25 msb.api.simpledemo.onap.org
      - 10.12.7.25 msb-discovery
  - Browse the portal GUI with url:
    - http://portal.api.simpledemo.onap.org:8989/ONAPPORTAL/login.htm
    - The user guide can be found:

Step 1: Deploy ONAP instance to Central Cloud

- Build and launch your own robot service
  - Login to Robot VM, build and lunch the robot service with following instruction:
    - https://github.com/biny993/onap-multicloud-edge-demo/blob/master/customizing-robot/readme.txt

- Build Mocking Policy Actor (multicloud-dmaapclient)
  - Login to Policy VM, build and launch mocking service with following instruction:
    - https://github.com/biny993/onap-multicloud-edge-demo/tree/master/docker4dmaapclient/readme.txt

Step 2: Deploy Distributed MultiCloud to Edge Cloud

- Provision the Edge Cloud
  - Similar to Central Cloud

- Populate heat env file
  - Download heat template from github
    - https://github.com/biny993/onap-multicloud-edge-demo/tree/master/multicloud-edge/heat
  - Populate the heat env file
    - aai1_ip_addr refers to floating IP of “vm0-aai-inst1” from ONAP on central cloud
    - dcae_ip_addr refers to floating IP of “vm0-dcae” from ONAP on central coud

- Deploy distributed ONAP MultiCloud to Edge Cloud
  - $ openstack stack create -t onap_beijing_edge.yaml -e onap_beijing_edge.env onap_edge_beijing_heat

- Healthcheck
  - Execute the same script as central ONAP,
  - Observe the healthcheck status for following components :
    - multicloud-framework
    - multicloud-titaniumcloud
    - msb

Step 3: Prior to VNF orchestration

- Prior to VNF orchestration:
  - Load default customer and distribute model
  - Create complex: clli3
  - On-board the edge cloud to ONAP as a cloud region
  - Register the cloud region to SO
  - Add a customer
  - Associate the cloud region with the customer
  - Instructions can be found
    - https://github.com/biny993/onap-multicloud-edge-demo/blob/master/vnf-orchestration/prior-vnf-orchestration.txt

Step 4: VNF orchestration: instantiate NS/VNF/VF module

- To orchestration a VNF:
  - Instantiate NS, add generic VNF by VID portal
  - Preload data for VF module by robot script
  - Add VF module with VID portal
  - Validate the VF module by OpenStack Horizon
  - Bridge heat resource into AAI
    - Curl command with postman
  - Instruction can be found:
    - https://github.com/biny993/onap-multicloud-edge-demo/blob/master/vnf-orchestration/vnf-orchestration.txt

Step 5: Setup Close Loop Control

- To setup the close loop control:
  - Provision mocking policy actor with curl command
  - Provison policy
    - https://wiki.onap.org/display/DW/ONAP+Policy+Framework%3A+Installation+of+Beijing+Controller+and+Policies
  - Provision holmes rules with curl command
  - Provision multicloud vesagent with curl command
  - Instruction can be found:
    - https://github.com/biny993/onap-multicloud-edge-demo/tree/master/close-loop

Step 6: Test and observe the Close Loop Control

- To test with this close loop:
  - Simulate VM failures
  - Observing the action upon the failed VM
  - Instruction can be found
    - https://github.com/biny993/onap-multicloud-edge-demo/blob/master/close-loop/closeloop_test_instruction.txt

Summary and Vision

- ONAP MultiCloud
  - Ready for distributed deployment to support edge automation
  - With the complete edge automation solution, it can not only aggregate the FCAPS traffic, but also enable the whole close loop on edge with lower latency to recover from a failure.
  - The VESagent will be enhanced and integrated with clamp/policy project to automate the provision
  - There should be a Policy Actor developed to allow policy control infrastructure resource via multicloud.

Q & A

- ONAP wiki
  - https://wiki.onap.org/
- ONAP discussion mail list
  - https://lists.onap.org/g/main
- Email:
  - bin.yang@windriver.com

WHEN IT MATTERS, IT RUNS ON WIND RIVER.