



ONAP Close Loop Control for Edge Cloud with Distributed MultiCloud

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

Gil Hellmann, Wind River, VP, Global Solutions Engineering

Sept. 2018 Open Networking Summit Europe



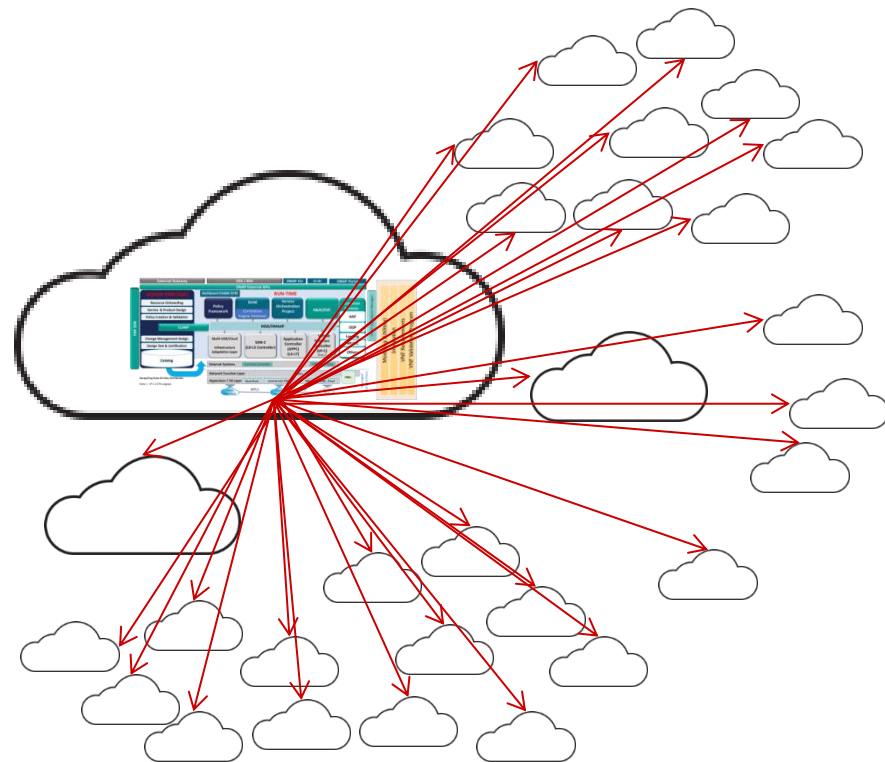
**WHEN IT MATTERS,
IT RUNS ON WIND RIVER.**

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

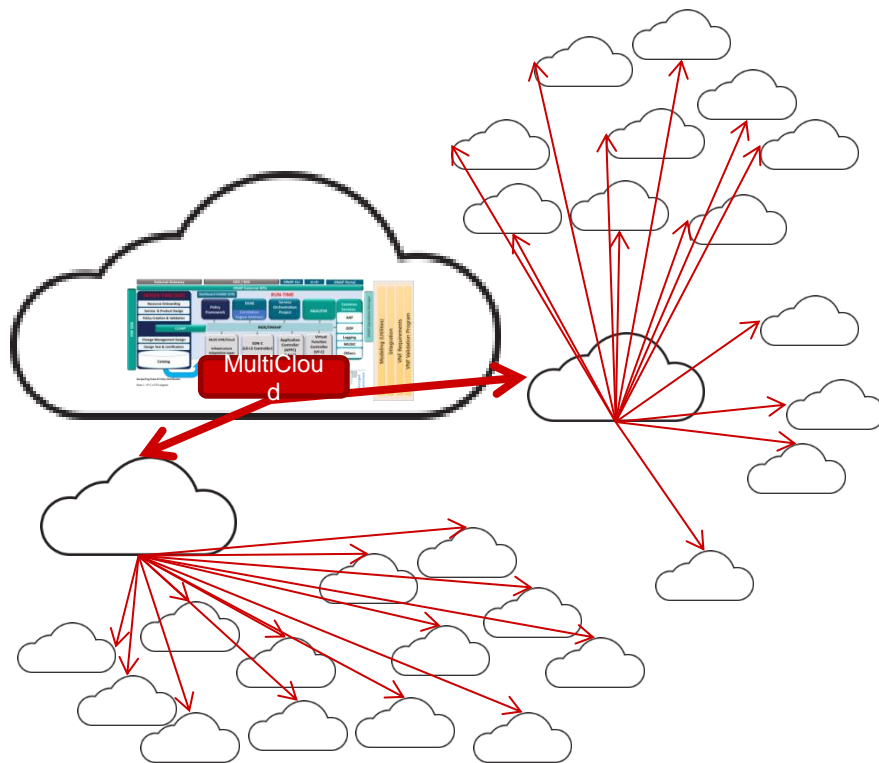


ONAP Multi-VIM/Cloud and Edge Automation

- 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

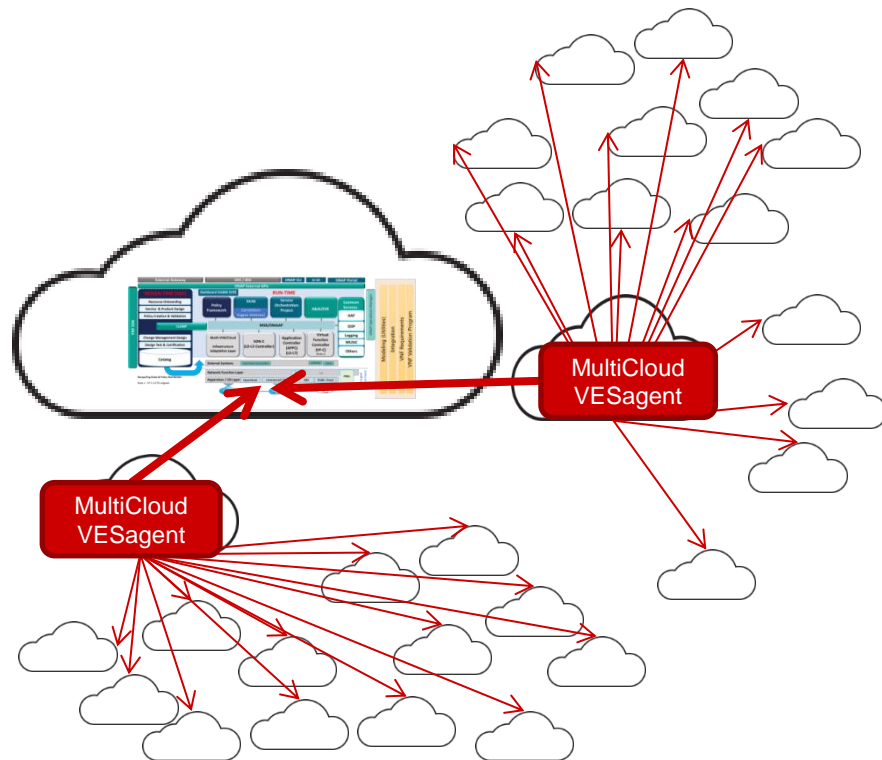
- Edge Infrastructure with Hundreds of Physical Data Centers
 - Could be a burden for Infrastructure providers.
 - **Multi-Region** could be one of solution to mitigate the pain of O&M for Infra. Providers.
 - ONAP could leverage this multi-region solution to automate the on-boarding process of hundreds 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

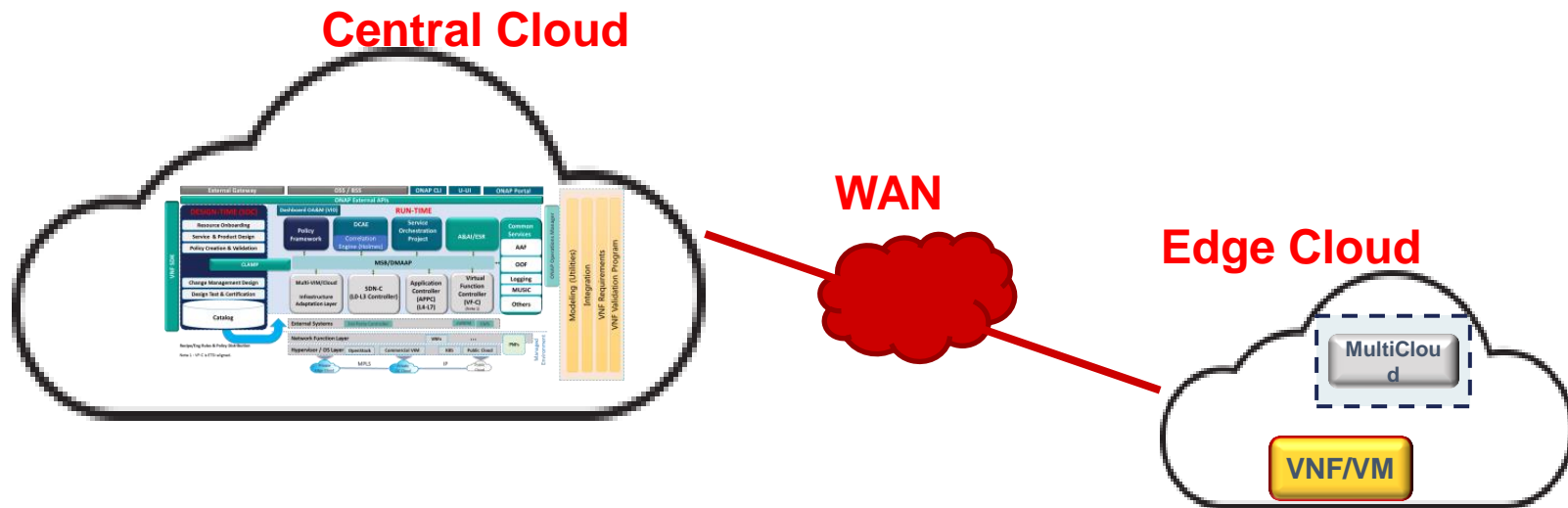
- MultiCloud micro-services could be deployed approaching to edge infrastructures
 - Local cache of part of AAI inventory.
 - Synchronization
- VESagent in the MultiCloud@Edge
 - Collect FCAPS data of local edge infrastructures
 - Aggregate the data and events according to configuration/policy rules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



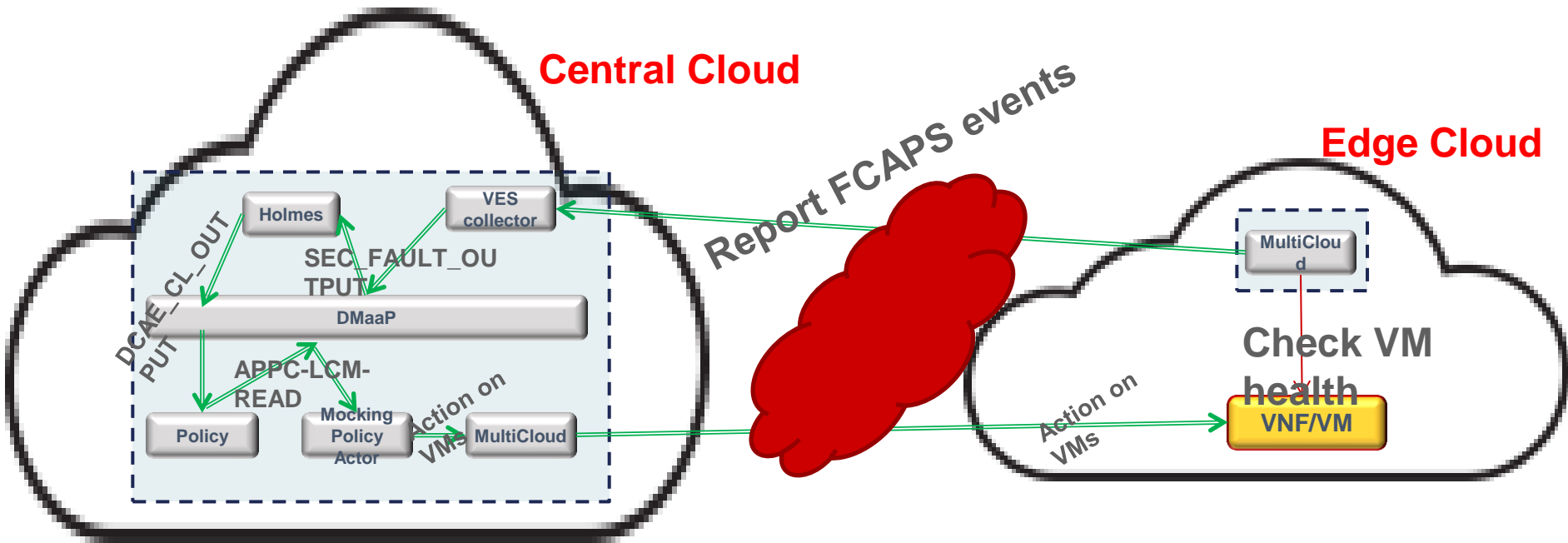
Workshop: Close Loop automation for Edge Cloud with distributed ONAP MultiCloud

- 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 tweaking:
 - dcae_deployment_profile: R2MVP
 - mvim_docker: 1.2.0-STAGING
 - mvim_openstack_docker: 1.2.0-STAGING
 - Or leveraging the tweaked templates
 - <https://github.com/biny993/onap-multicloud-edge-demo/tree/master/onap/heat>

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 openecomp_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.simplesdemo.onap.org

- 10.12.7.24 portal.api.simplesdemo.onap.org

- 10.12.6.182 sdc.api.simplesdemo.onap.org

- 10.12.5.24 vid.api.simplesdemo.onap.org

- 10.12.6.175 aai.api.simplesdemo.onap.org

- 10.12.5.187 sdnc.api.simplesdemo.onap.org

- 10.12.6.199 so.api.simplesdemo.onap.org

- 10.12.7.25 msb.api.simplesdemo.onap.org

- 10.12.7.25 msb-discovery

- Browse the portal GUI with url:

- <http://portal.api.simplesdemo.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
 - With Titanium Cloud in Distributed Cloud mode, provisioning via system controller will be applied to all managed edge clouds.
- 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 cloud
- 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
 - Conduct the healthcheck:
 - <https://github.com/biny993/onap-multicloud-edge-demo/blob/master/multicloud-edge/healthcheck.txt>

Step 3: Prior to VNF orchestration

- Prior to VNF orchestration:
 - Load default customer and distribute model
 - Create complex: cli3
 - 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
 - Provision 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@egde 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 in future, 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 multcloud.

Q & A

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

