



On and off Premise Solution Validation on CORD

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The text 'NGCCO' is rendered in large, bold, 3D-style letters. Each letter is filled with a complex, glowing pattern of orange and red lines, resembling a network or data flow. The letters are set against a background of a city skyline at night, with lights and buildings visible through the semi-transparent parts of the characters.

NGCCO

NEXT GENERATION CENTRAL OFFICE

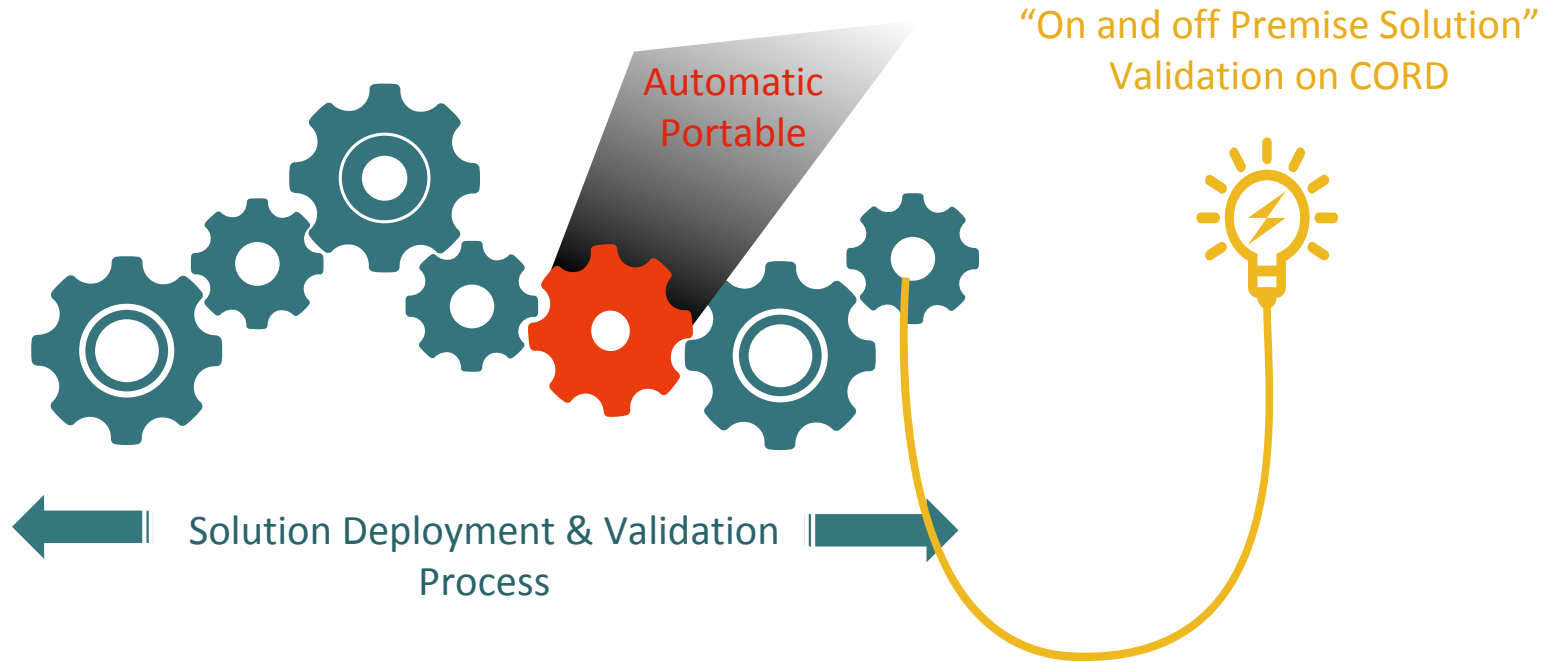
Motivation

- From the hardware perspective
 - Hardware from different vendors may not compatible with each other
 - Heterogeneous hardware will also increase the development effort

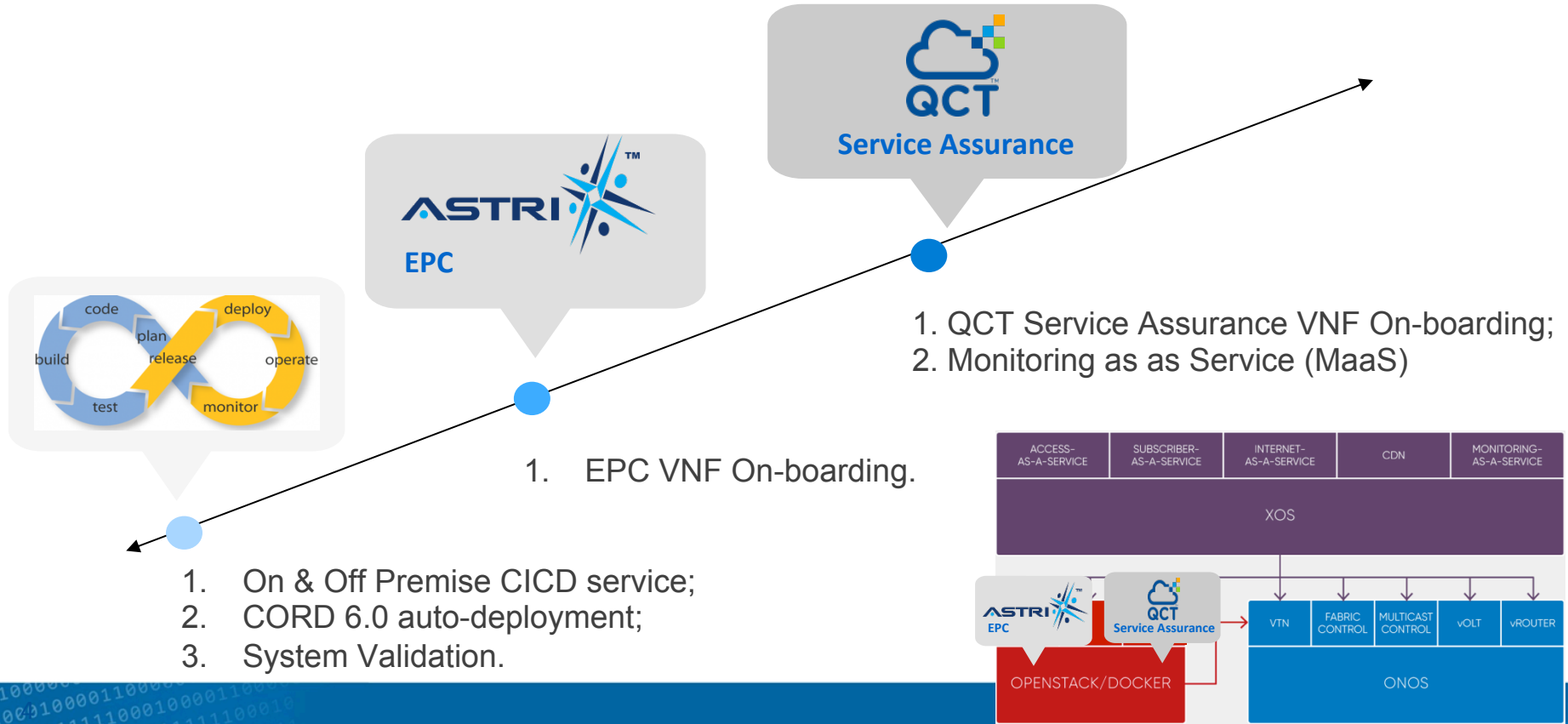
- From the software perspective
 - Deployment of CORD took a lot of time
 - New commit may affect the existing hardware



Our Goal Begins From



QCT's value add-on in CORD Platform



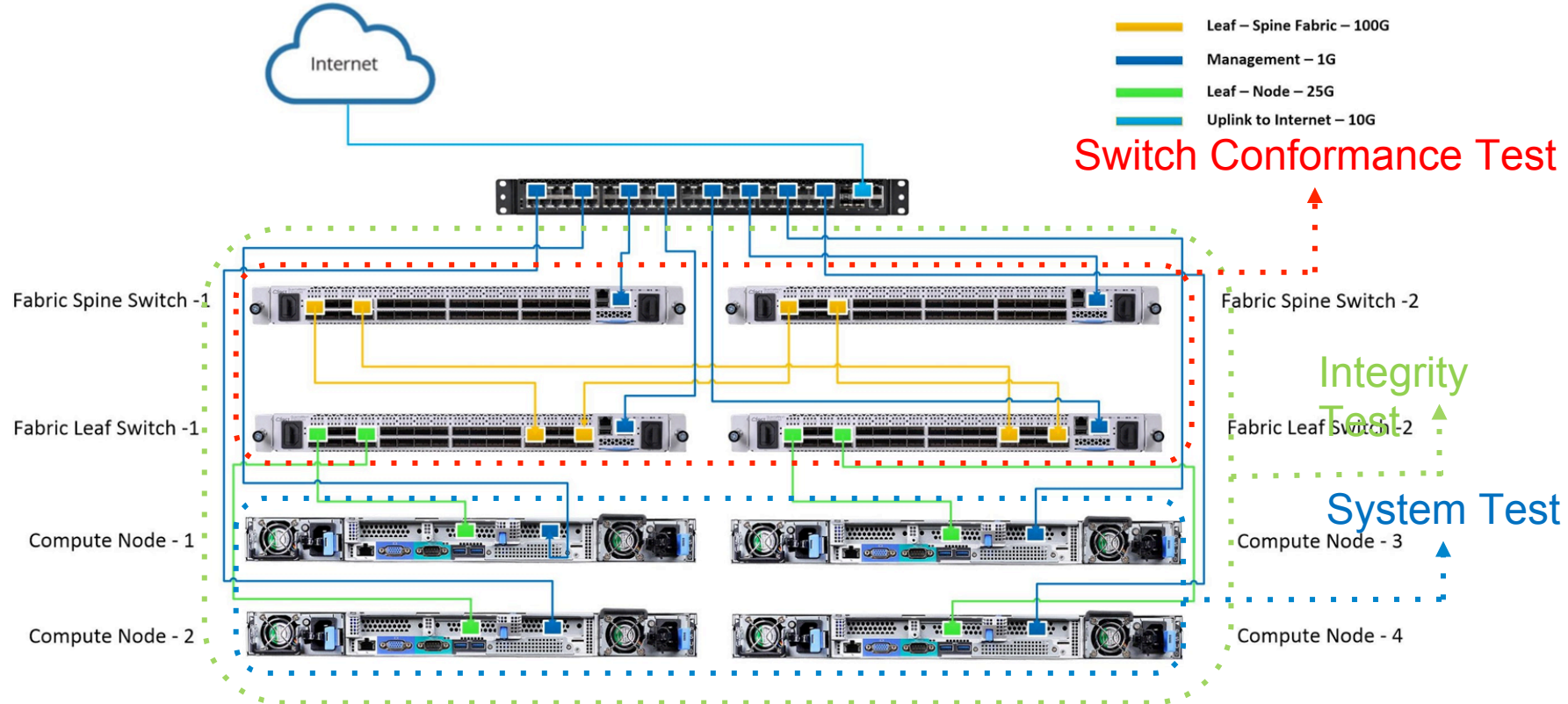
Why It Matters?

- “On and off Premise Solution Validation”

- Keep deployment up to date
 - Make sure the hardware is always compliant with latest code
- Manual works are not possible for daily deployment
 - Take a lot of time when we do the deployment each time
- Customer-side validation
 - Conformance test on customer-side
 - Portability is required
- Easily accelerate the partnership collaboration



QCT CORD Ready Pod Reference Architecture



QCT IX1 100G Switch Integration for CORD Fabric

- Base on M-CORD 6.0 to integrate our switch
 - Fabric service is not deployed by default
 - There is only one ONOS deployed for controlling OVS
 - VTN service
- In order to integrate QCT IX1 100G switch into M-CORD 6.0
 - Switch Certification Testing Process
 - Change TOSCA files in helm services
 - Include Fabric service
 - Change apps deployed on ONOS service (VTN)
- Allow Fabric service to be deployed with CORD

Switch Certification Testing Process

Fabric Ofstest

Conformance test with
QCT IX1 100G switch

ONOS/Segment Routing Integration Tests

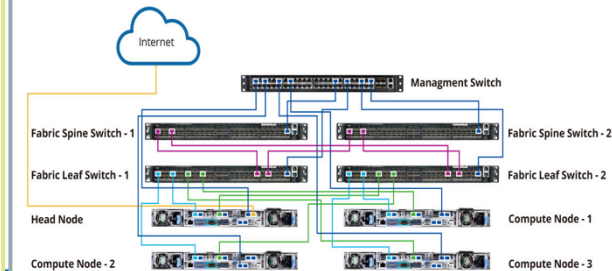
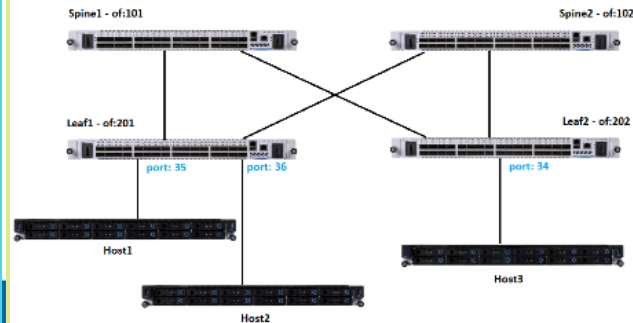
Connect 4 IX1 100G switches as
leaf-spine architecture

QCT CORD POD Auto-Deployment

Integrate IX1 into QCT CORD
Pod



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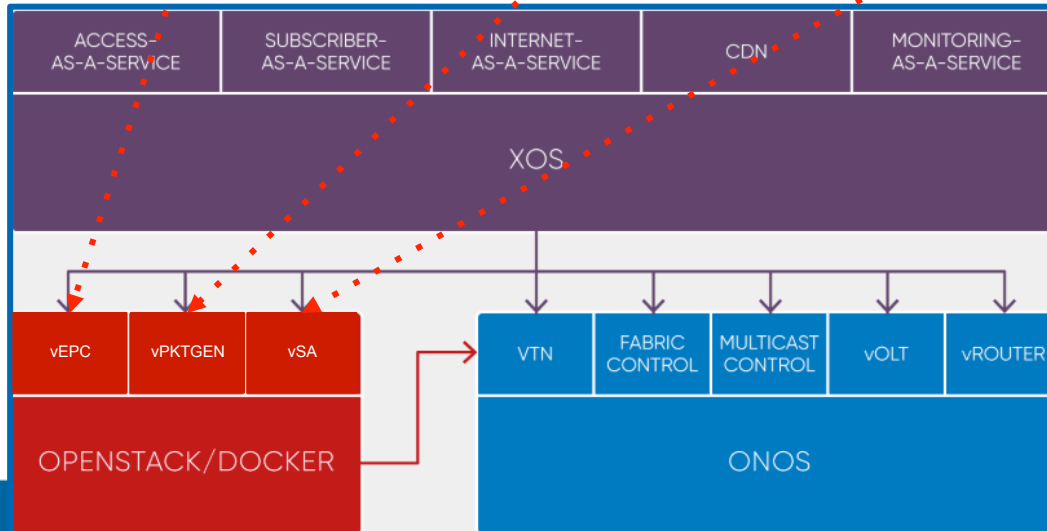
CORD-Tester Test Cases for System Test

- Extensible end-to-end system test suite targeting CORD POD
- Currently our system test cases include:
 - **Post Installation Tests**
 - **XOS Based Tests**



On-board VNFs (EPC, PKTGEN, SA)

- to Validate the Integrity of QCT CORD Ready Pod



System Architecture of QCT CORD Ready Pod



XOS (Service Orchestration)

Openstack

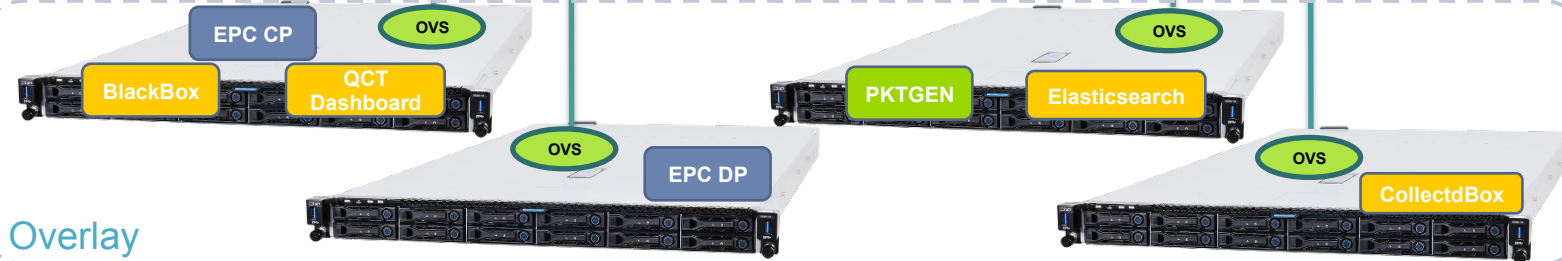
ONOS Controller Cluster

Kubernetes

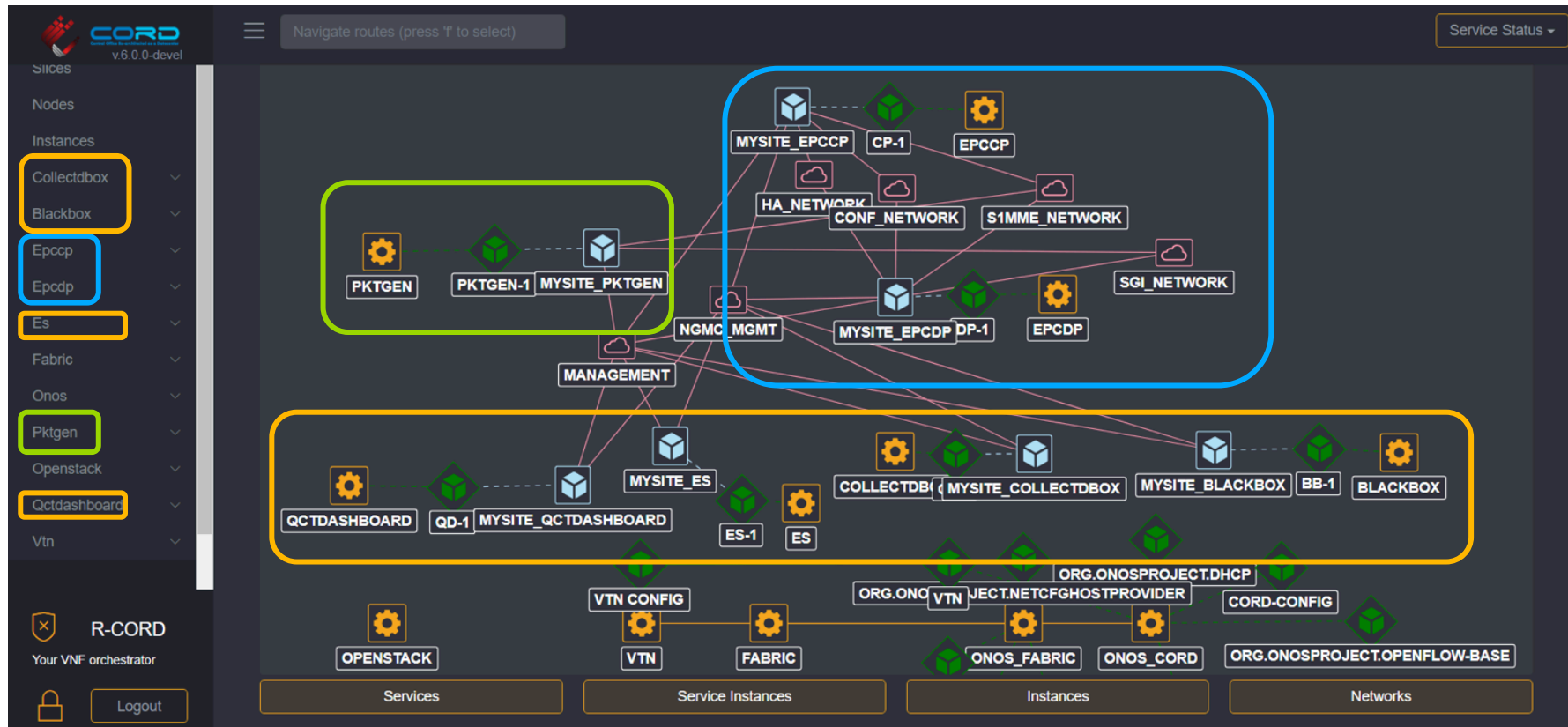
CORD-Fabric

Open Source
SDN-based
CLOS Networking

Underlay



High-Level Architecture on XOS GUI



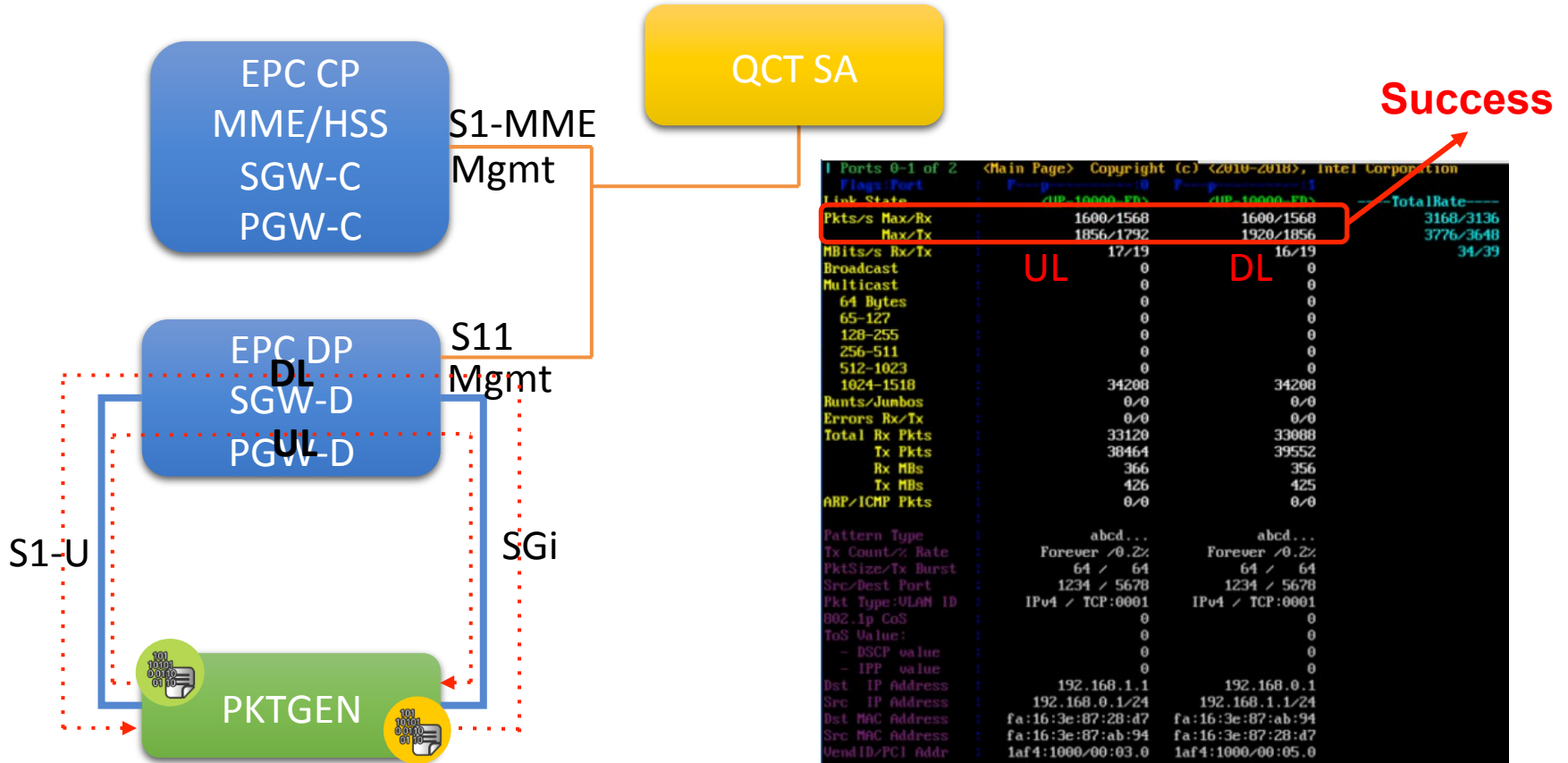
Instances Created in QCT CORD Ready Pod

The screenshot displays the R-CORD web interface. On the left is a navigation sidebar with categories like Core, Slices, Nodes, Instances, Blackbox, Collectdbox, Epcdp, Epccp, Fabric, Es, Onos, Pktgen, Qctdashboard, Openstack, and Vtn. The main area is titled 'Instances' and contains a table of instance details. At the top right of the main area, there is a 'Service Status' dropdown and an 'Add' button. Below the title is a search bar with the placeholder text 'Type to search...'. The table has columns for Actions, Backend handle, Backend status, Creator id, Deployment id, Flavor id, Id, Image id, Instance id, Instance name, Instance uuid, Isolation, Name, Node id, Number cores, Parent id, Policy status, Slice id, User data, and Vol. There are 8 rows of instance data.

Actions:	Backend handle	Backend status	Creator id	Deployment id	Flavor id	Id	Image id	Instance id	Instance name	Instance uuid	Isolation	Name	Node id	Number cores	Parent id	Policy status	Slice id	User data	Vol
Q x		✓	1	mydeployment	m1.xlarge	1	image_blackbox_v0.1.1	instance-00000041	mysite_blackbox-1	7a548426-3a0d-41ce-a8bf-dc3646ae9346	vm	mysite_blackbox	node1	0		✓	mysite_blackbox		
Q x		✓	1	mydeployment	m1.large	2	image_collectdbox_v0.1.1	instance-00000044	mysite_collectdbox-2	ac6bc674-4aa2-410c-86df-b8513ce56f86	vm	mysite_collectdbox	node3	0		○	mysite_collectdbox		
Q x		✓	1	mydeployment	m1.large	3	image_es_v0.1.1	instance-00000047	mysite_es-3	cd61b354-5ba9-459d-9236-06df8ae55670	vm	mysite_es	node2	0		✓	mysite_es		
Q x		✓	1	mydeployment	m1.large	4	image_qctdashboard_v0.1.1	instance-0000004a	mysite_qctdashboard-4	ab64b4dd-5dc9-4c4e-a0d5-909bf2936702	vm	mysite_qctdashboard	node1	0		✓	mysite_qctdashboard		
Q x		✓	1	mydeployment	m1.large	6	image_pktgen_v0.1.1	instance-0000004d	mysite_pktgen-6	644d3780-8fb-4f22-aabb-cc2755a06240	vm	mysite_pktgen	node3	0		○	mysite_pktgen		
Q x		✓	1	mydeployment	m1.xlarge	7	image_epcdp_v0.1.1	instance-00000053	mysite_epcdp-7	b2a4f688-6df6-410a-b972-de553b835c24	vm	mysite_epcdp	node2	0		✓	mysite_epcdp		
Q x		✓	1	mydeployment	m1.xlarge	8	image_epccp_v0.1.1	instance-00000050	mysite_epccp-8	44a6fe7f-36b2-4ac3-bb33-3a226e1875ea	vm	mysite_epccp	node1	0		✓	mysite_epccp		

R-CORD
Your VNF orchestrator
Logout

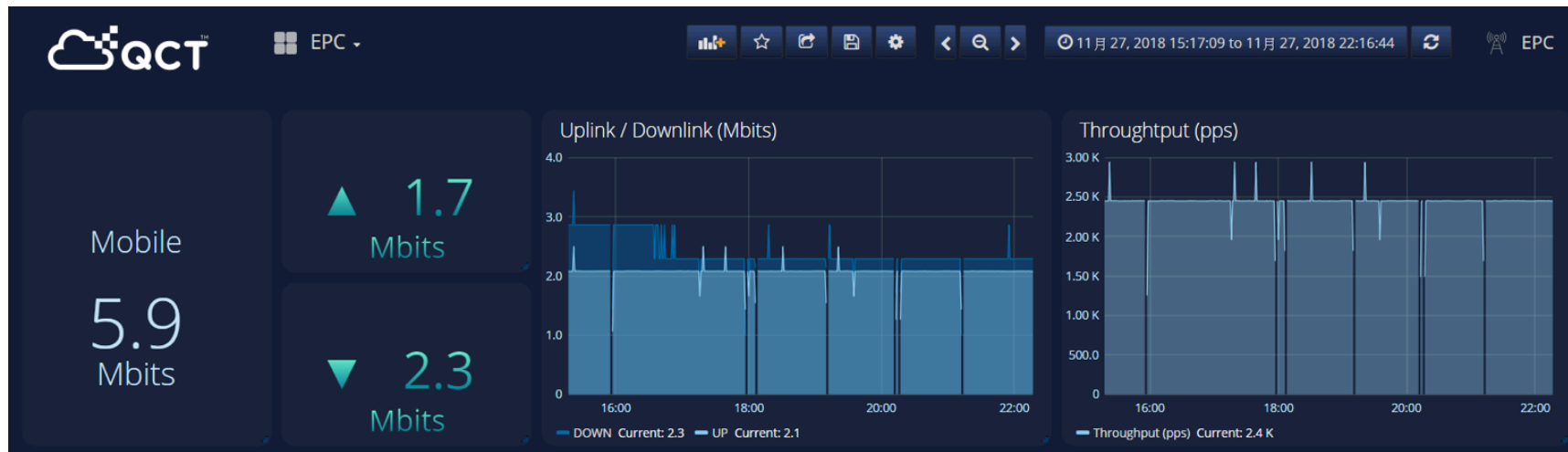
Network Topology Between VNFs



QCT Service Assurance in CORD






QCT Service Assurance in CORD



Let's Move to the Automation Details



Automation Tool Stack

- CI Server - [Drone](#) 
– Jenkins on [OpenShift](#) (CORD 5.0) 
- Configuration Tool - [Ansible](#) 



Why Drone?

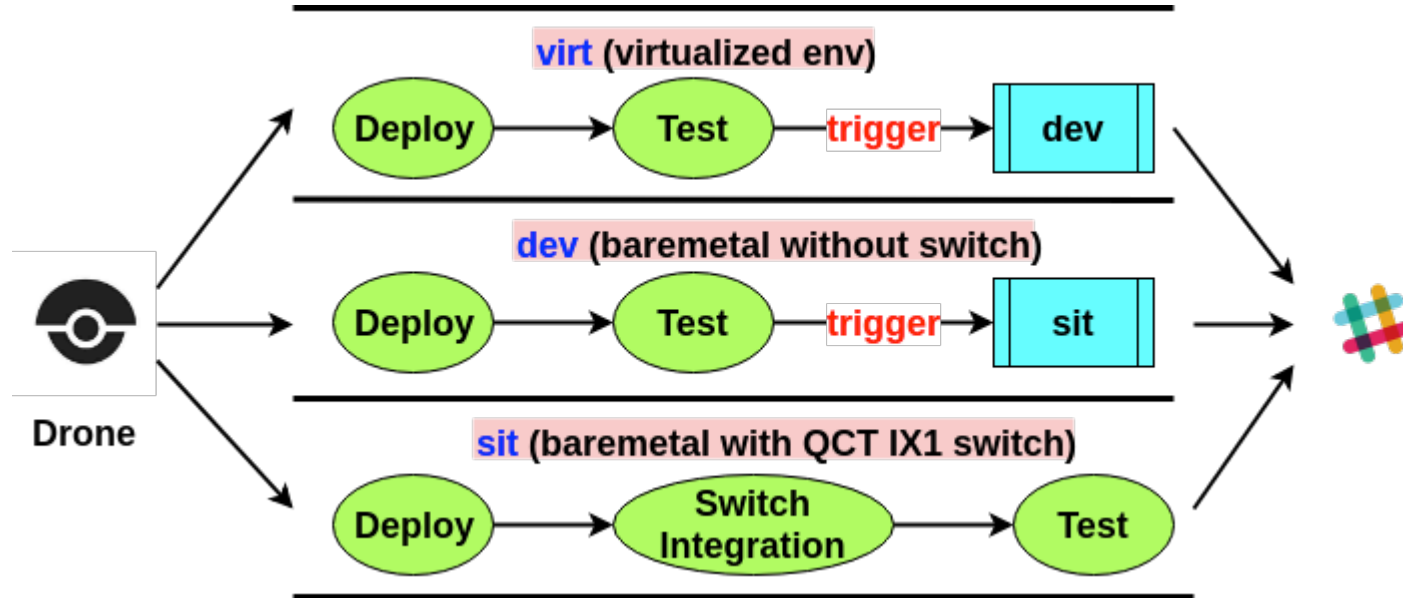
- Small amount of resource needed (written by golang)
- Docker is the only dependency
- Deployment(Drone) as code (with docker-compose)
- DinD (You could define different image for every job)
- **Portable** (with Drone CLI)

Why Ansible?

- Agentless
- Capable to configure multiple machines simultaneously
- Much more human-readable than shell script
- Modularized Design



Deployment Flow Overview



CORD Deployment Processes

- Provision OS
- Install Kubernetes (kubeadm, **not Gate-Based k8s**)
- Install OpenStack (openstack-helm & openstack-helm-infra)
- Install CORD (opencord/helm-charts)
- Physical Switch Integration & Connectivity Test
- Run CORD Tester
- VNF onboarding



Troubleshooting Experiences Sharing

- openstack-helm installation sticks occasionally
 - Local Registry Mirror by Harbor
- ExternalName doesn't work
 - ExternalName type Service only works with kube-dns, not CoreDNS
- Some services are not scheduled & working properly
 - Untaint NoSchedule attributes of master nodes
 - Duplicate label sets of gate-based k8s
- Cannot mount volumes from Ceph RBD
 - Ceph RBD client is needed in every node
 - ceph.conf in ceph-mgr pod in needed in every node
- Cord-tester crashes kube-dns
 - Move cord-tester to outside, not in any node.

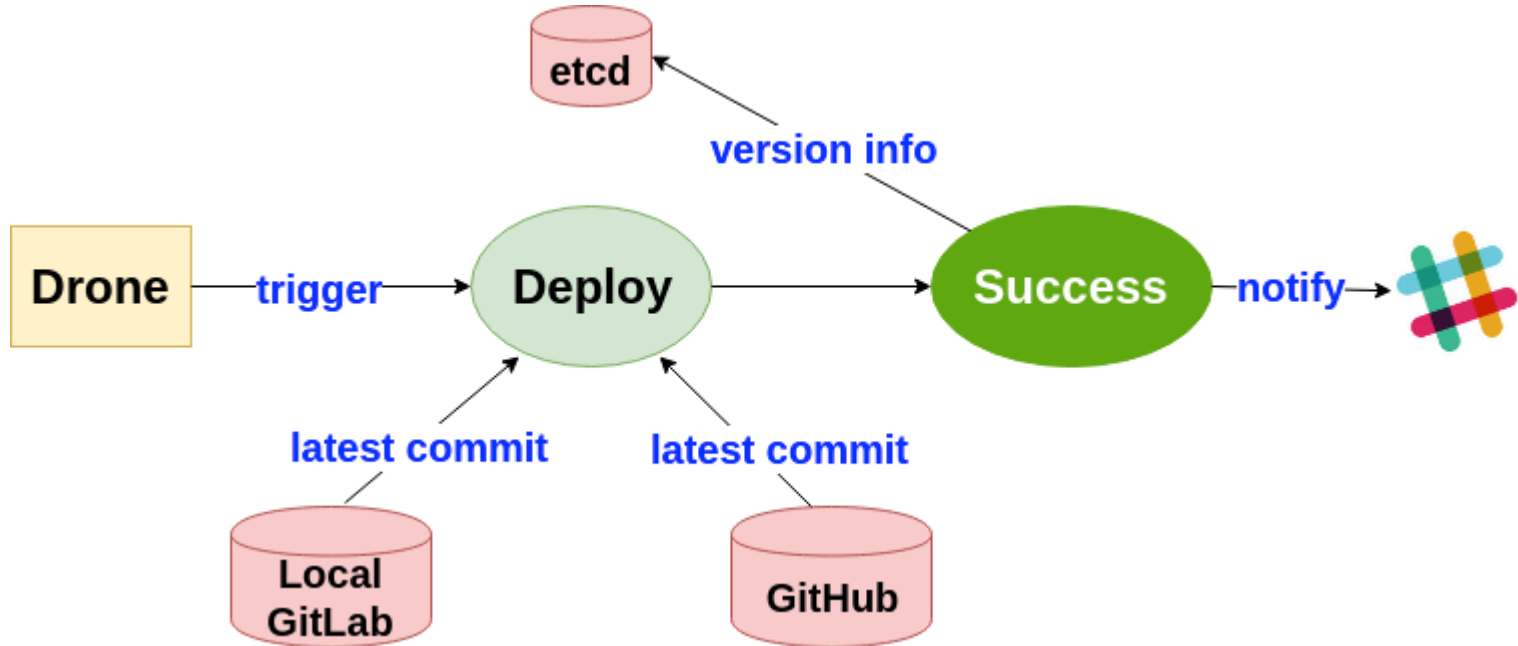


Two More Features

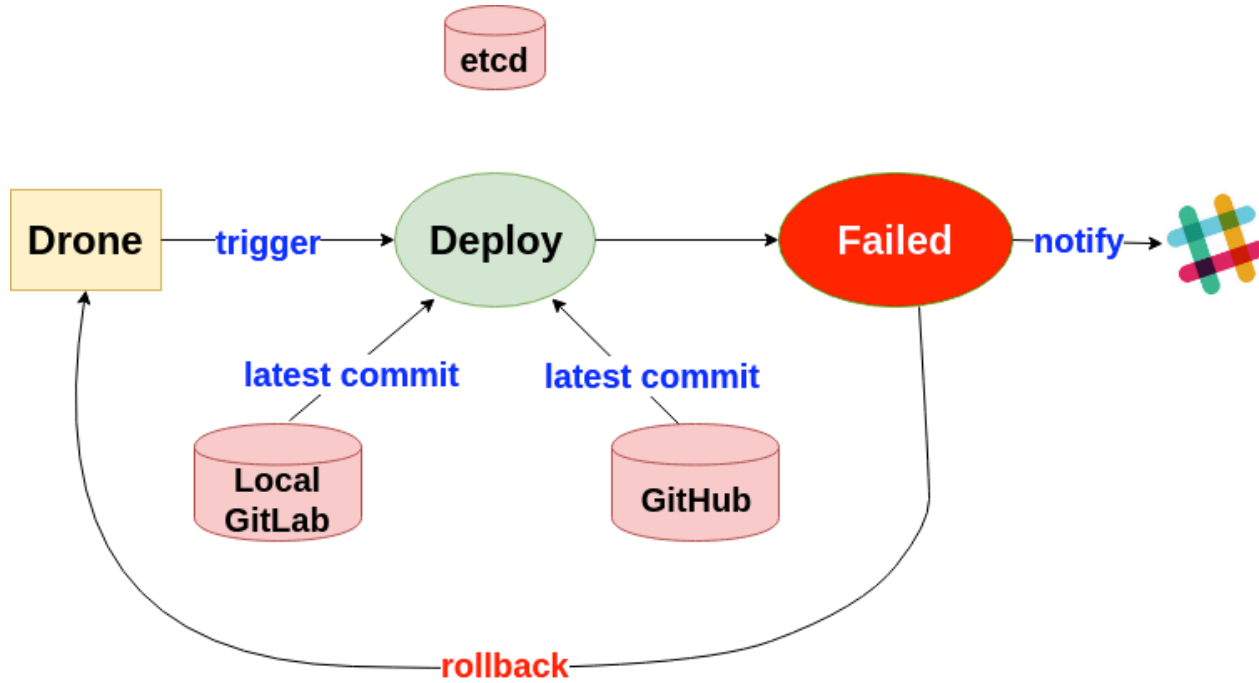
- Rollback
- API tests summary consolidation



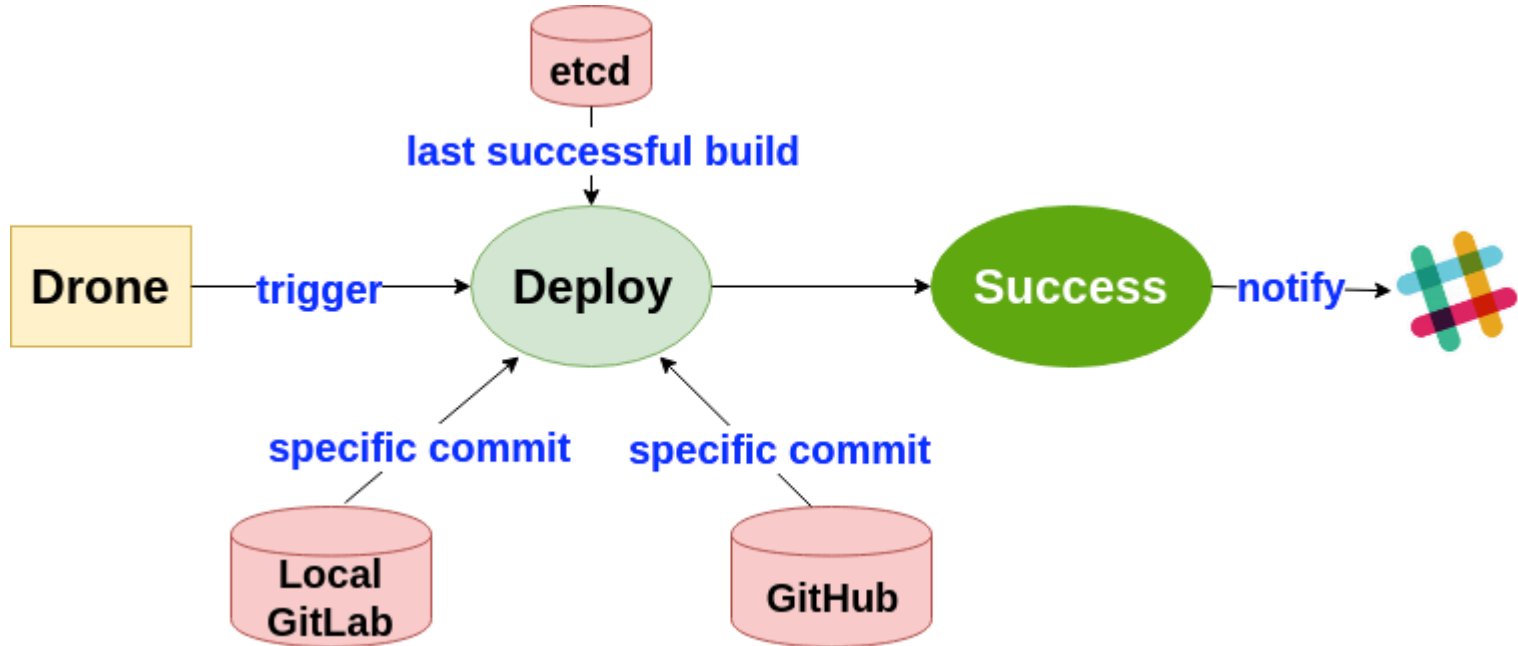
Deployment Flow Diagram (Success)



Deployment Flow Diagram (Failed)



Deployment Flow Diagram (Rollback)



Test Summary Consolidation

QCT CORD Test Summary

Environment: [sit](#)
Build No: [072](#)
Status: [Passed](#)
Elapsed time: [0:00:37](#)

Test Name (click to open test report)	Total	Pass	Fail	Pass Rate
cord-api:Ch_SanityInstance	6	6	0	100.0%
cord-api:Ch_SliceTest	3	3	0	100.0%
cord-api:Ch_ServiceTest	8	8	0	100.0%
cord-api:Ch_SiteTest	8	8	0	100.0%
cord-api:Ch_SanityFlavors	6	6	0	100.0%
cord-api:Ch_NodeTest	6	6	0	100.0%
cord-api:Ch_UsersTest	9	9	0	100.0%
cord-api:Ch_DeploymentTest	6	6	0	100.0%
cord-api:FabricConfig	10	10	0	100.0%
Total	62	62	0	100.0%

Current Status of Daily Deployment

- Kubernetes: **1.12.2**
- openstack-helm: **branch master**
- openstack-helm-infra: **branch master**
- opencord/helm-charts: **branch cord-6.0**



Future Plans

- Keep CORD POD deployment up to date. (**master branch**)
- Replace regular daily build with **gitwatch** trigger
- Add more and more tests
- Onboard more and more VNF & validation



Summary

- QCT provide a one-stop-shop service for CORD environment
- Switch certification testing process can be more mature by working with CORD Certification Brigade
- Easily accelerate the partnership collaboration to evaluate their services on CORD
- Integrate physical RAN for more complete end-to-end use case
- Automation helps
 - Greatly saving time for deployment
 - Developers can focus on things are truly important
 - Accelerate test & validation
- Portable automation does matter to our clients

Any Question?





NGCO

NEXT GENERATION CENTRAL OFFICE

CENTRAL OFFICE TRANSFORMATION WITH QCT NGCO SOLUTION

What | QCT "NGCO Launch" Event

Where | QCT US Solution Center
1010 Rincon Cir. San Jose, CA 95131

When | January 24th, 2019, 9:30 - 16:00

BRIEF AGENDA FOR THE DAY

- Doors will open at 8:30 am for registration
- Keynote presentations through the day
- Telco Industry EXPO
- Networking with industry experts

We are pleased to invite you to join our **QCT “NGCO Launch” Event**, on **Thursday, January 24, 2019** at **QCT Solution Center in San Jose, California**. This event is to officially introduce Intel NGCO architecture based on QCT infrastructure, also to showcase our latest solutions collaboratively developed with strategic VNF partners, and explore more advanced technologies around the 5G era at this event, previewing what will be presented at MWC 2019 in Barcelona, Spain.

We look forward to seeing you!

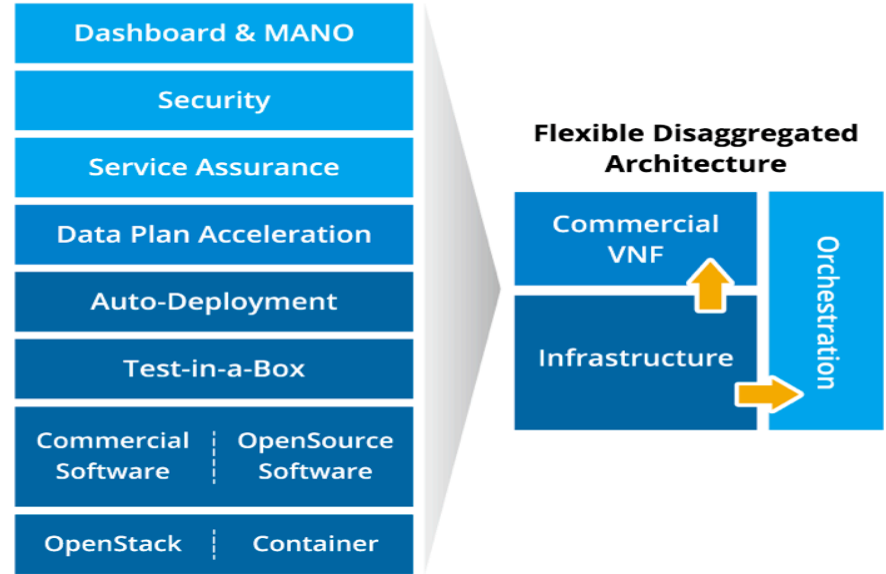
Partner speakers include:



and more...



QCT NGCO Architecture



Registration Site QR Code



REGISTRATION CODE: **GUE19**





THANK YOU

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