

삼성 오픈소스 컨퍼런스

Treat Your Infrastructure like Cloud Native App

SK Telecom | ICT기술센터 Cloud Labs | 안재석



안재석

- SKT ICT기술센터 Cloud Labs, Cloud Native 개발팀장 (오픈소스SW 기반 개발)
- KT Next Generation Cloud 플랫폼 개발팀장 (오픈소스SW 기반 개발)

- OpenStack Foundation User Committee Member (2019~)
- OpenStack Korea Community Leader (2011~2013), Coordinator (2014~)
- Kubernetes Korea Community 운영진

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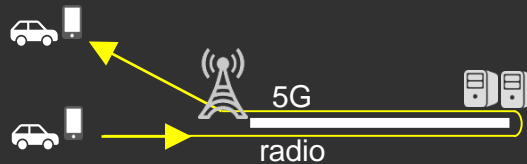
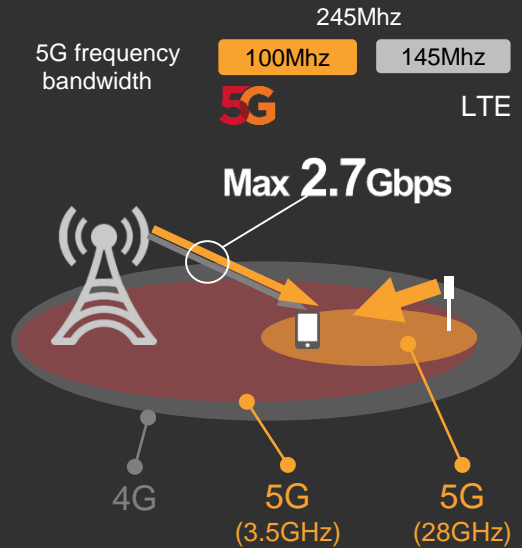
Telecommunication & Cloud Computing

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SKT 5G Features

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5G	5 ~ 20msec
4G	50 ~ 60msec

	5G	4G
Connection Density	$10^6/\text{km}^2$	$10^5/\text{km}^2$

① Higher speed

② Ultra-low latency

③ Massive connectivity

B2C Services

✓ Immersive, Interactive Service



Multiview for Mobile Games



Watch & Play



eSpace



Booster Park

B2B Services

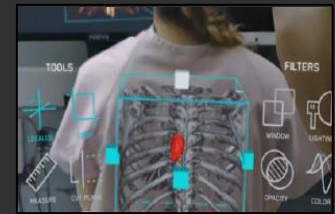
✓ C-ITS (Cooperative-Intelligent Transport Systems)



✓ Innovation of existing business



Smart Factory

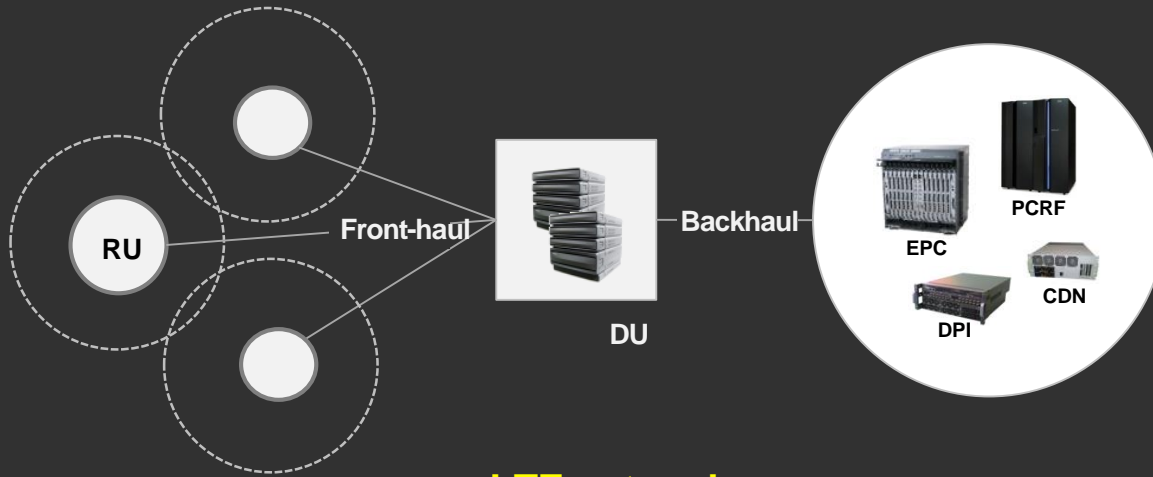


Smart Hospital

Network Evolution to 5G

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In 5G cloud moves to **edge** and is run with **cloud native architecture**

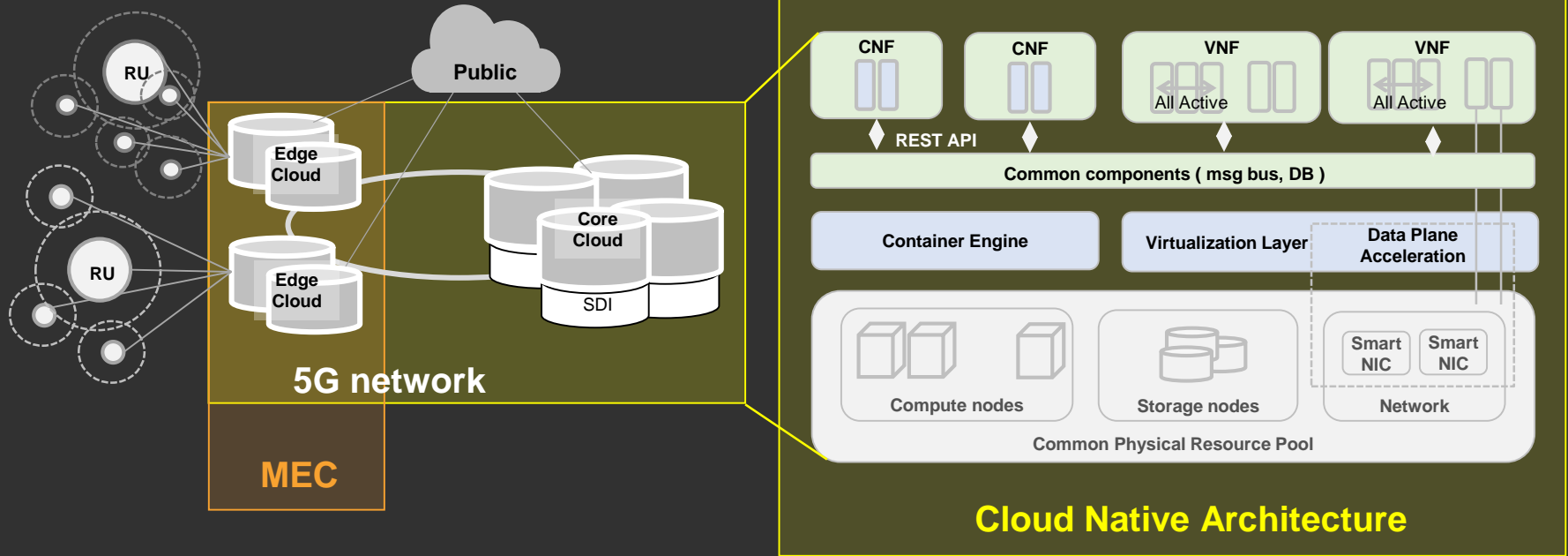


LTE network

Network Evolution to 5G

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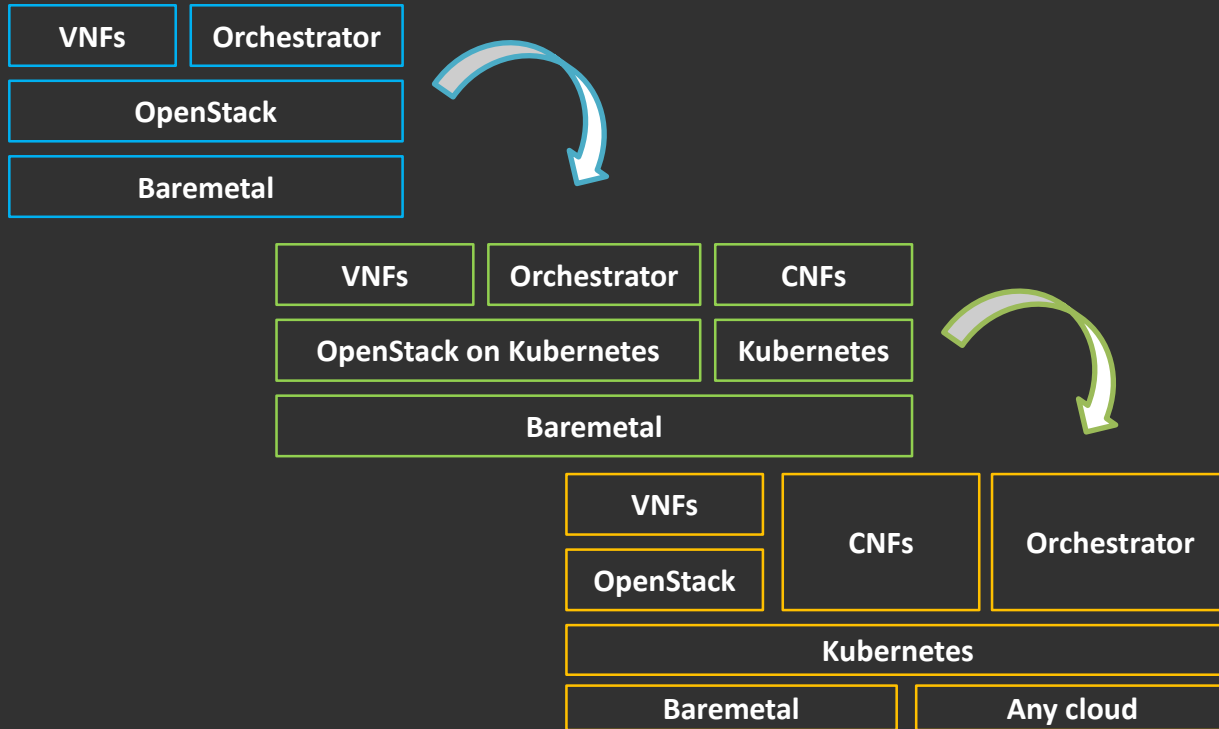
In 5G cloud moves to **edge** and is run with **cloud native architecture**



Network Evolution to 5G

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Evolving VNF (VM only) to Hybrid (VM, Container, Baremetal)



NFV

Network
Function
Virtualization

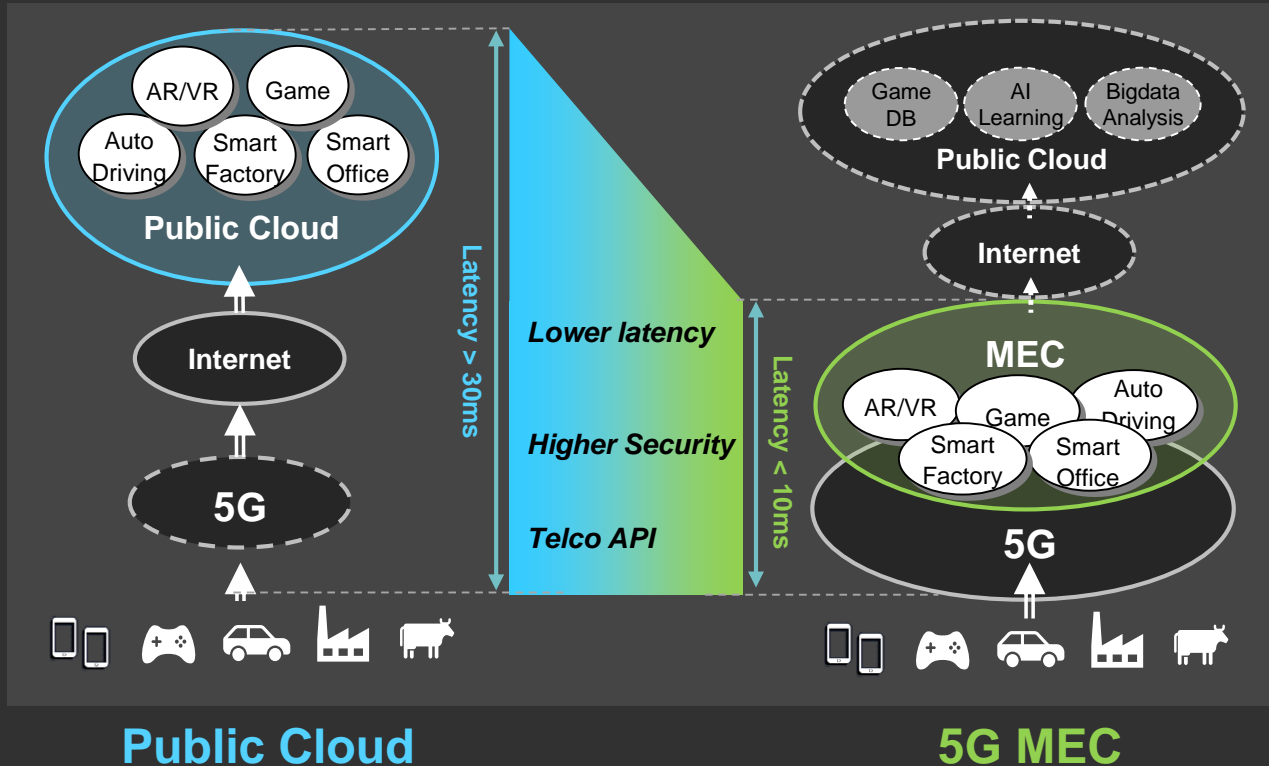
CNF

Containerized
Network
Function

Mobile Edge Computing (MEC)

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Provides **ultra low latency services** in 5G network **edge**



① Hyper Edge

Ultra Low Latency
(<10ms)

② Public Cloud Integration

Public Cloud Dev Env

③ Edge Specific Service

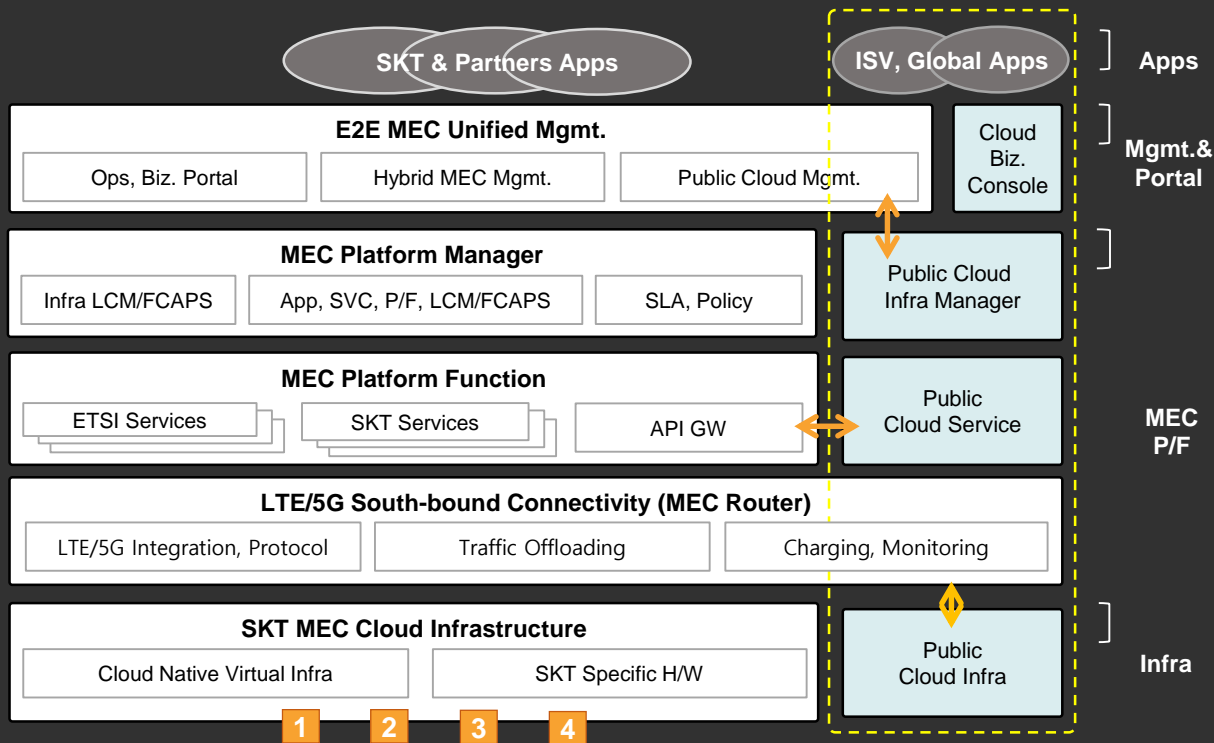
Innovative Telco Service

SKT MEC

MEC Architecture (To-Be)

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MEC cloud infrastructure **demands cloud native** technologies



- 1 SKT-All Container Orchestrator
- 2 Simple Overlay Network Arch.
- 3 Quantum Random Num. Gen.
- 4 AI Inference Accelerator

Cloud Native Infrastructure in SKT

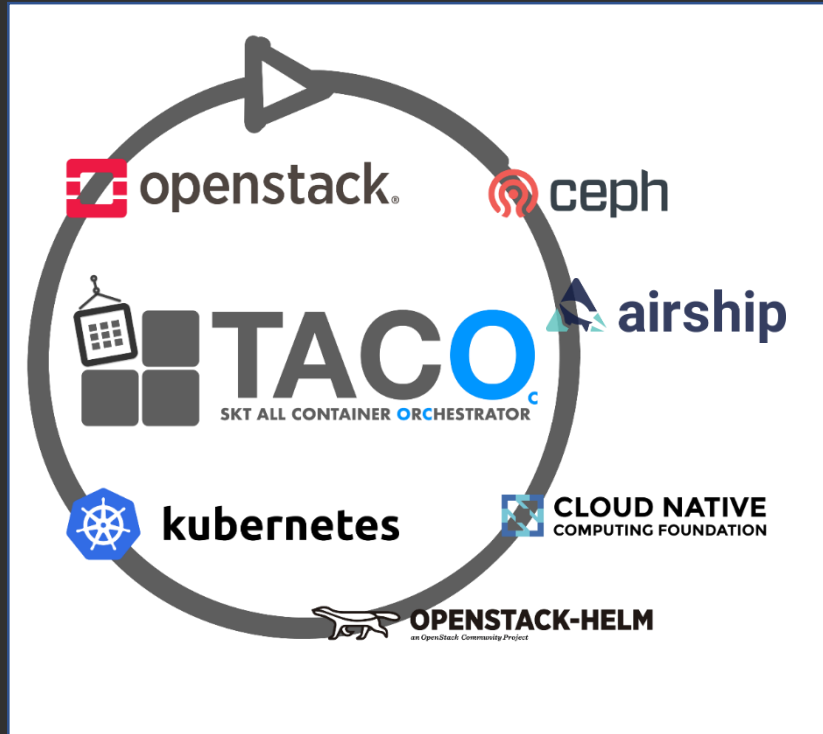
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TACO – Cloud Native Infrastructure Delivery

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TACO Treats **Telco Infrastructure** like a **Cloud Native Application**



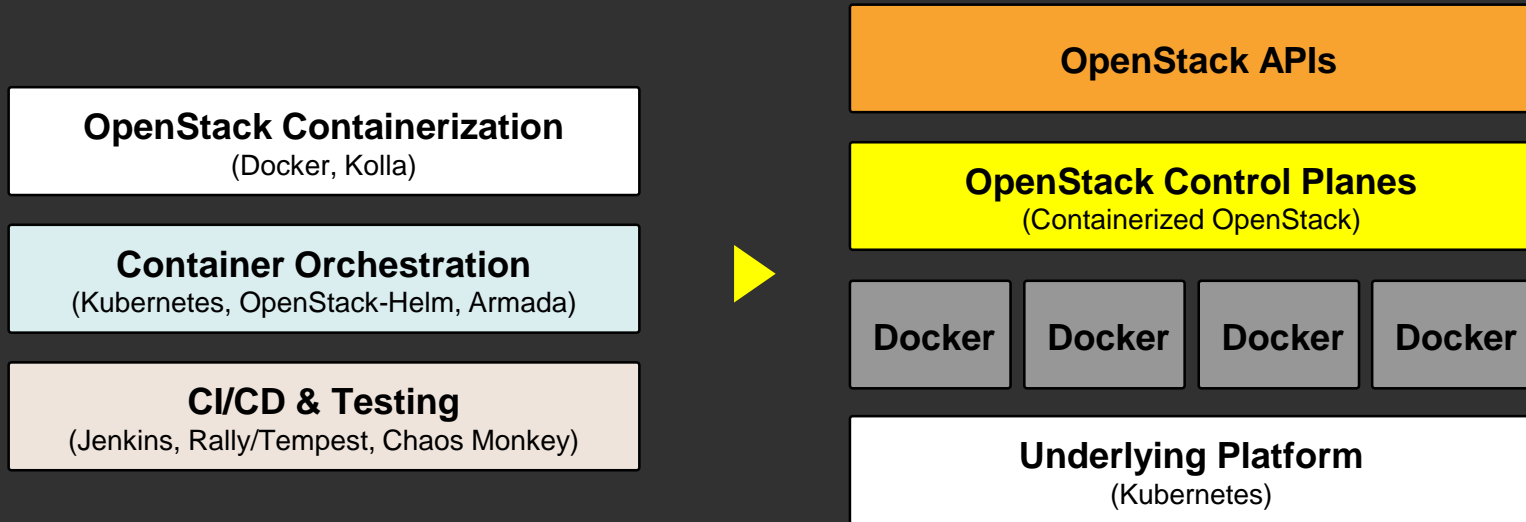
- Container-Based
- Declarative Management
- Predictable & Resilient
- Open Source SW

* **TACO**: SKT All **C**ontainer **O**rchestrator

TACO – Cloud Native Infrastructure Delivery

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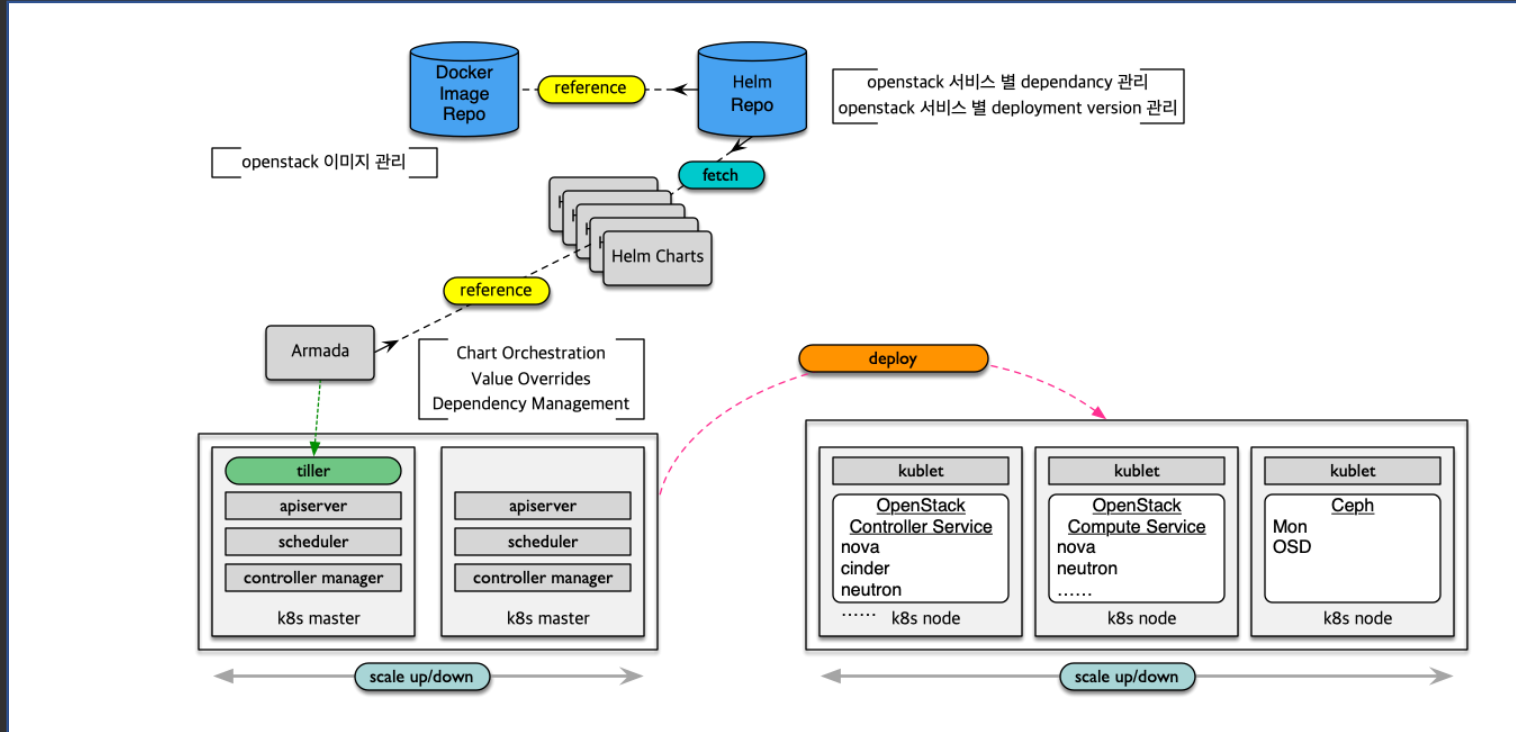
Initial Scope - OpenStack Delivery, leveraging Docker, Kubernetes, Helm with Continuous Integration / Development System & Operation Tools



TACO – Cloud Native Infrastructure Delivery

SOSCON2019

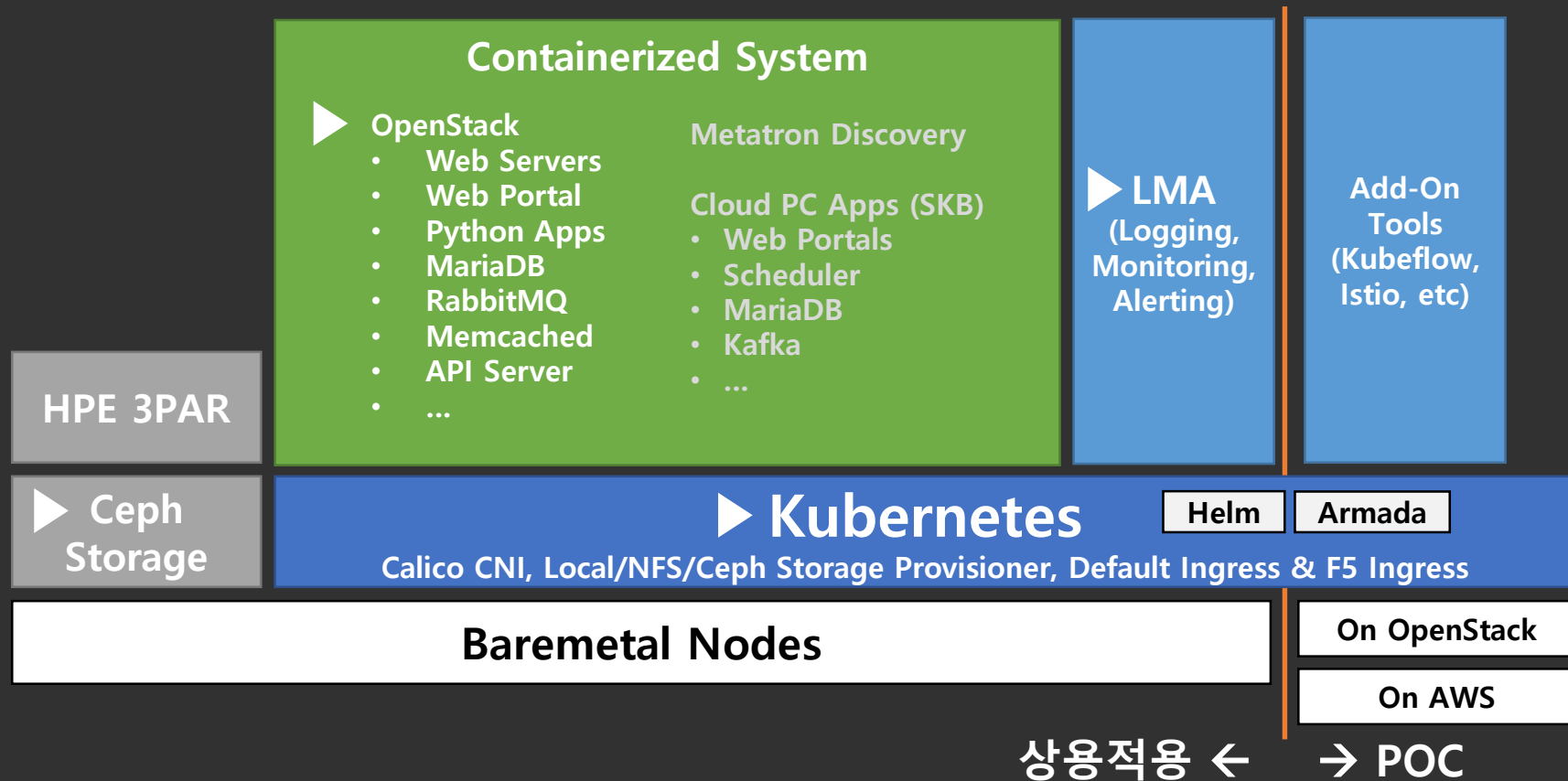
Initial Scope - OpenStack Delivery, leveraging Docker, Kubernetes, Helm with Continuous Integration / Development System & Operation Tools



TACO – Cloud Native Infrastructure Delivery

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Not Only OpenStack, But Also More Apps on Kubernetes



TACO – Cloud Native Infrastructure Delivery

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Generate Document

Submit Document

Automatically Deployed

```
---
metadata:
  schema: metadata/Document/v1
  name: mariadb
...
data:
  pod:
    replicas: 3
...
---
schema: armada/Manifest/v1
metadata:
  schema: metadata/Document/v1
  name: ha-manifest
data:
  release_prefix: ha
  chart_groups:
    - openstack-infra
    - openstack-services
    - logging-infra
    - monitoring-infra
...
---
```

Baremetal

Ceph
(Storage)

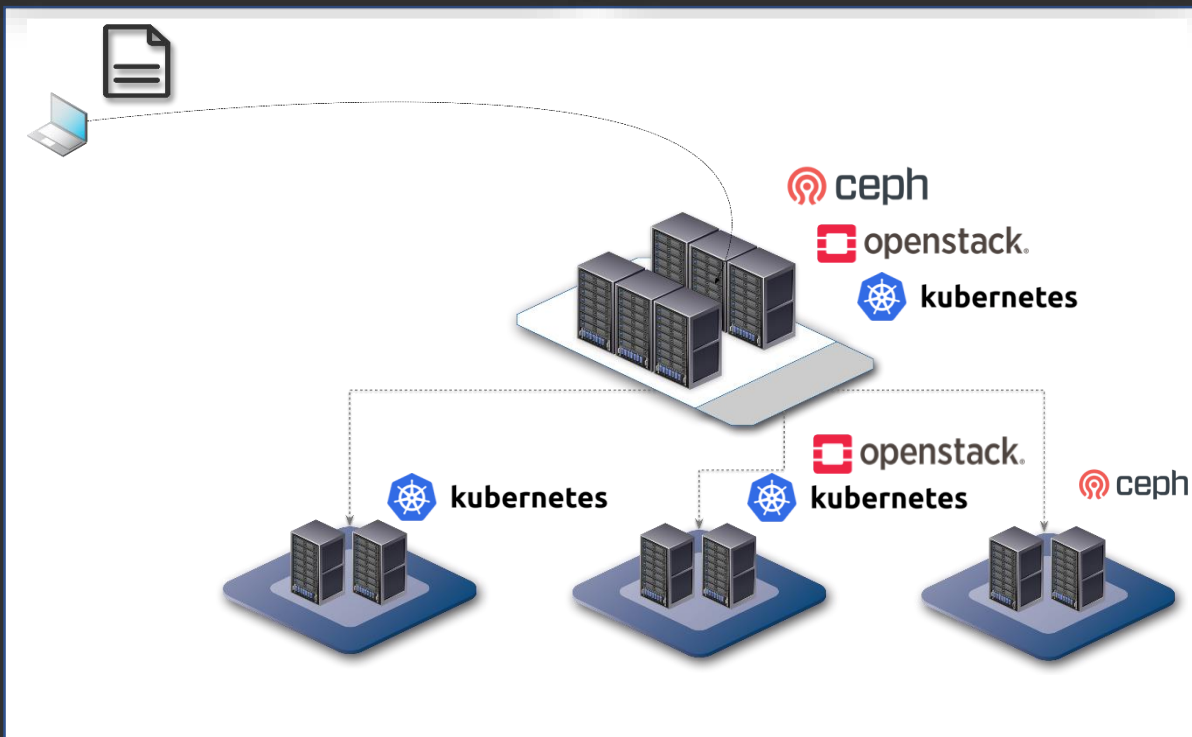
Kubernetes

OpenStack

SDN

Config

Security
Policy



Declarative Document (Manifest)

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- One manifests overrides all values

Mariadb chart

← override

```
schema: armada/Chart/v1
metadata:
  name: mariadb
data:
  namespace: openstack
  values:
    images:
      tags:
        mariadb: registry.cicd.stg.taco/mariadb:10.1.23
        test: registry.cicd.stg.taco/plke/ubuntu-source-kolla-toolbox:develop
    pull_policy: Always
  pod:
    replicas:
      server: 1
  volume:
    enabled: true
    class_name: ceph
  source:
    type: git
    location: https://tde.sktelecom.com/stash/scm/openstack/openstack-helm
    subpath: mariadb
    reference: master
  dependencies:
    - helm-toolkit
```

Etcd chart

← override

```
schema: armada/Chart/v1
metadata:
  name: etcd
data:
  namespace: openstack
  values:
    images:
      tags:
        etcd: registry.cicd.stg.taco/etcd:v3.2.5
        test: registry.cicd.stg.taco/plke/ubuntu-source-kolla-toolbox:develop
    pull_policy: IfNotPresent
  pod:
    replicas:
      etcd: 1
  source:
    type: git
    location: https://tde.sktelecom.com/stash/scm/openstack/openstack-helm
    subpath: etcd
    reference: master
  dependencies:
    - helm-toolkit
```

Rabbitmq chart

← override

```
schema: armada/Chart/v1
metadata:
  name: rabbitmq
data:
  release: rabbitmq
  namespace: openstack
  values:
    images:
      tags:
        rabbitmq: registry.cicd.stg.taco/rabbitmq:3.7
        dep_check: registry.cicd.stg.taco/kubernetes-entrypoint:v0.3.0
        test: registry.cicd.stg.taco/plke/ubuntu-source-keystone:0.1.0
    pull_policy: IfNotPresent
```

Declarative Document (Manifest)

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```
schema: armada/ChartGroup/v1
metadata:
  schema: metadata/Document/v1
  name: openstack-infra
data:
  description: "Openstack Infrastructure"
  sequenced: False
  chart_group:
    - ceph-provisioners
    - ingress
    - etcd
    - rabbitmq
    - memcached
    - mariadb
```

```
schema: armada/ChartGroup/v1
metadata:
  schema: metadata/Document/v1
  name: openstack-services
data:
  description: "Openstack Services"
  sequenced: False
  chart_group:
    - libvirt
    - openvswitch
    - keystone
    - glance
    - cinder
    - heat
    - nova
    - neutron
    - horizon
```

```
schema: armada/ChartGroup/v1
metadata:
  schema: metadata/Document/v1
  name: monitoring-infra
data:
  description: "Monitoring Infrastructure"
  sequenced: False
  chart_group:
    - grafana
    - prometheus
    - prometheus-alertmanager
    - prometheus-kube-state-metrics
    - prometheus-node-exporter
    - prometheus-openstack-exporter
```

```
schema: armada/ChartGroup/v1
metadata:
  schema: metadata/Document/v1
  name: logging-infra
data:
  description: "Logging Infrastructure"
  sequenced: False
  chart_group:
    - ldap
    - elasticsearch
    - fluent-logging
    - kibana
```

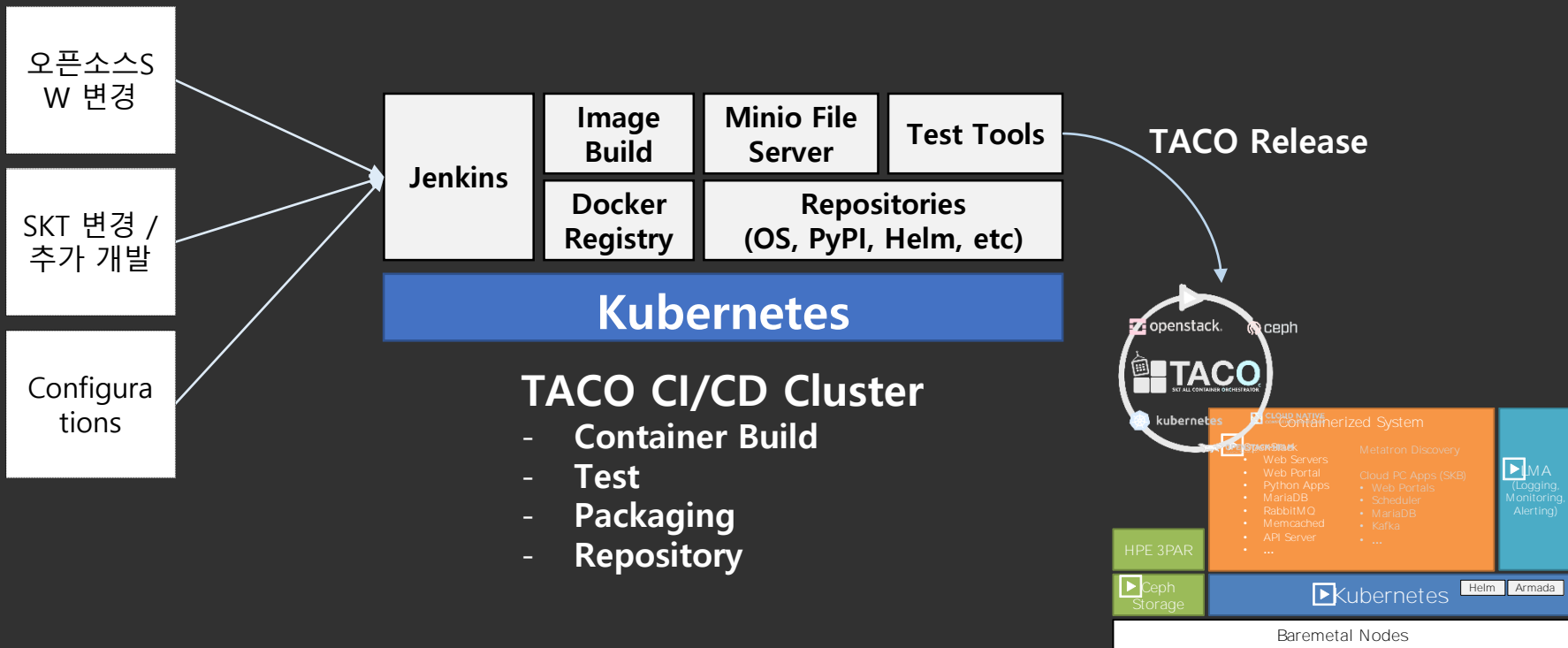
```
schema: armada/Manifest/v1
metadata:
  schema: metadata/Document/v1
  name: ha-manifest
data:
  release_prefix: ha
  chart_groups:
    - openstack-infra
    - openstack-services
    #- logging-infra
    #- monitoring-infra
```

SK TELECOM

INFRASTRUCTURE
DELIVERY

TACO – Continuous Integration

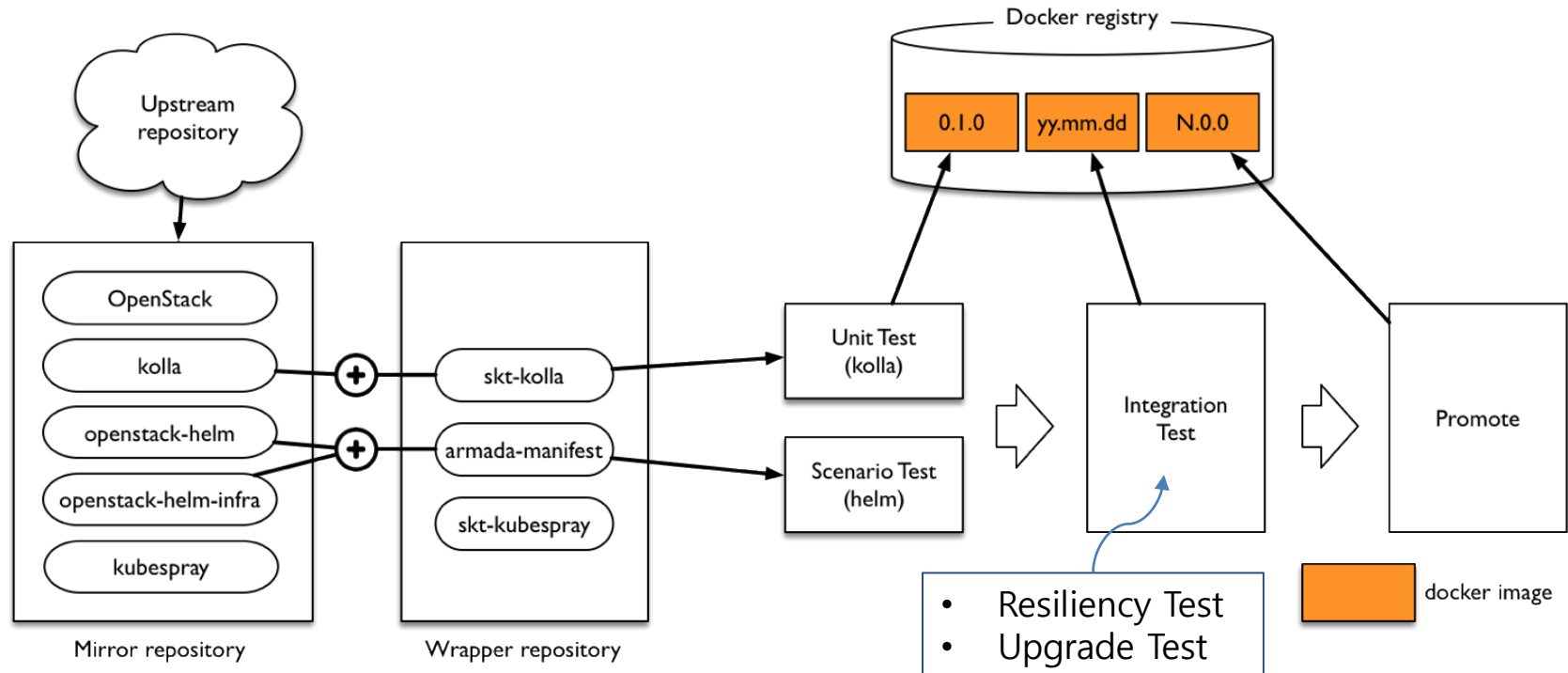
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TACO – Continuous Integration

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- Pipeline flows: build -> unit test -> integration test -> promote (release)

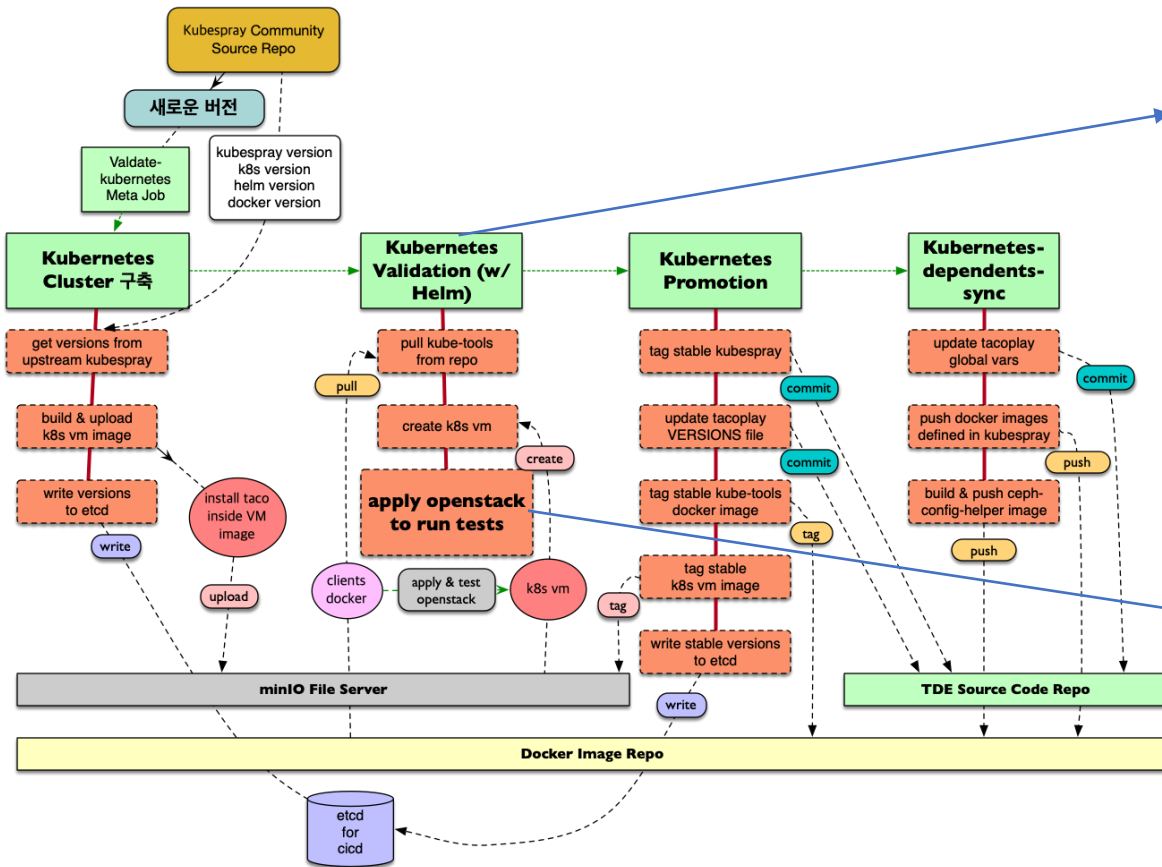


TACO – Continuous Integration

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현재는 특정 시나리오
기준 기능 검증으로 진행,
필요시 Sonobuoy 같은
Kubernetes conformance test
적용도 가능

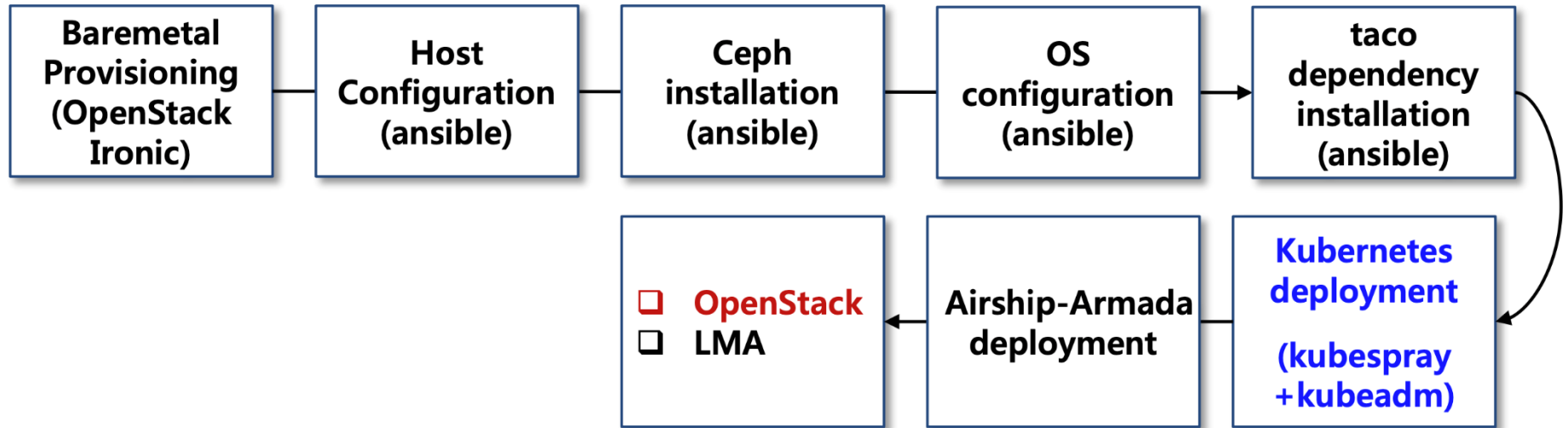
Kubernetes 기능 검증을
위한 시나리오는
요구사항에 맞추어 변경
가능



TACOPLAY – Continuous Delivery

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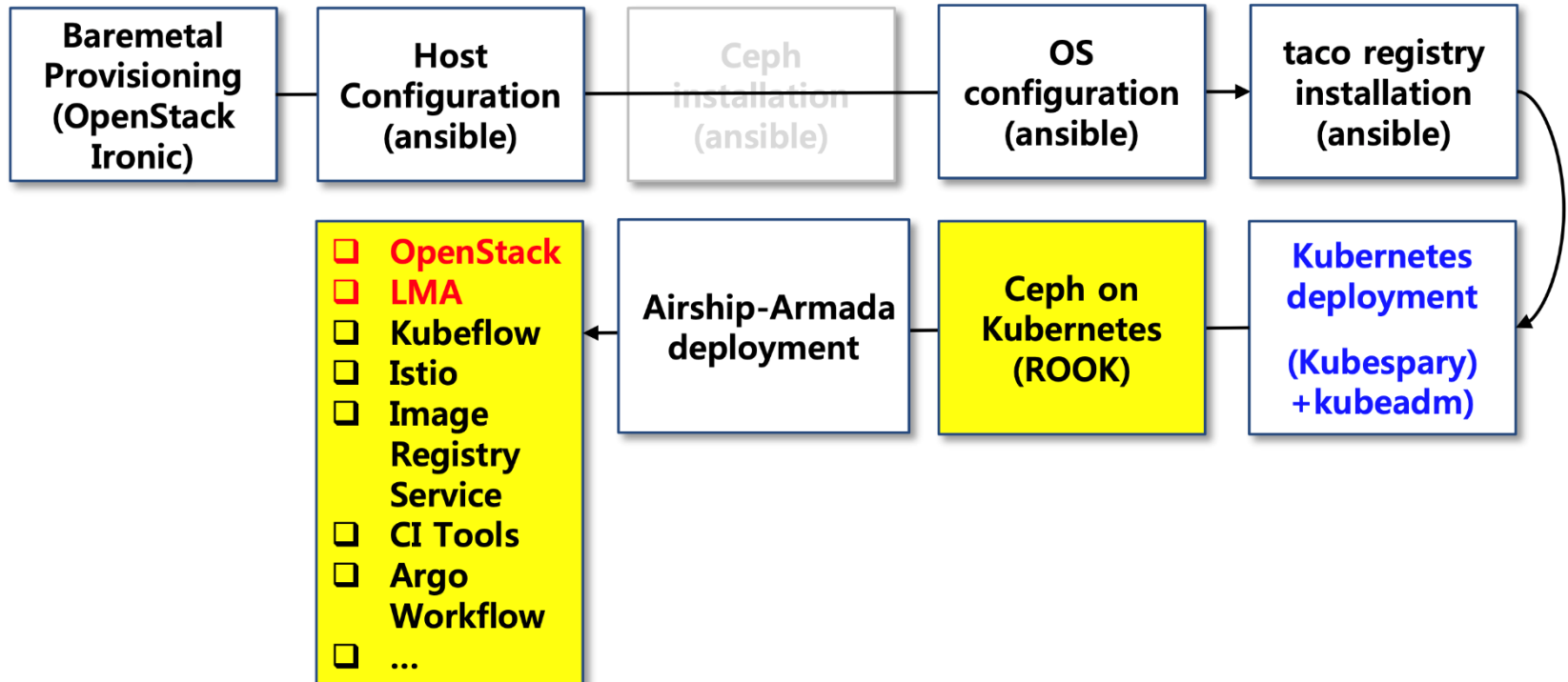
```
$ ansible-playbook -u taco -b -i inventory/new_env/hosts.ini site.yml
```

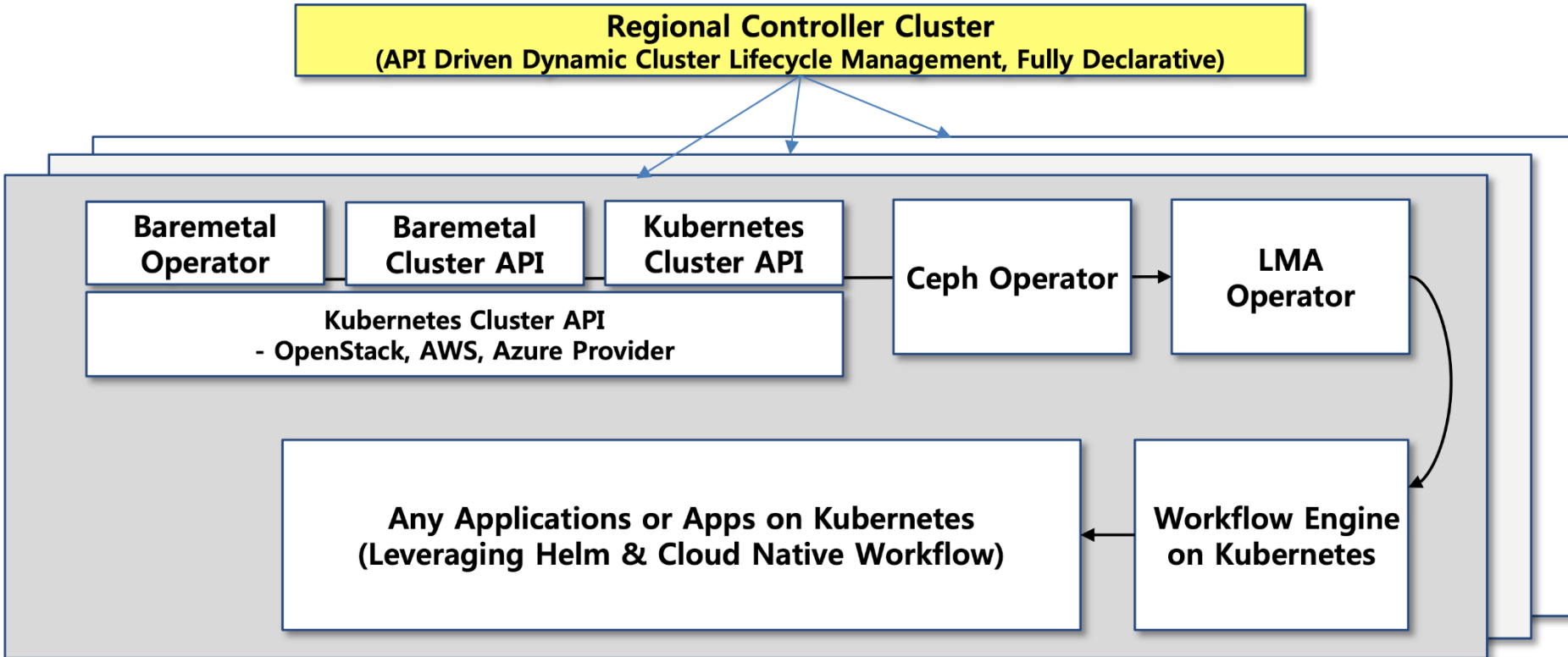


TACOPLAY – Continuous Delivery

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```
$ ansible-playbook -u taco -b -i inventory/new_env/hosts.ini site.yml
```





Multiple Kubernetes Cluster Lifecycle Management

Airship – Toward Next Generation

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Airship v2.0 - Components Cluster API

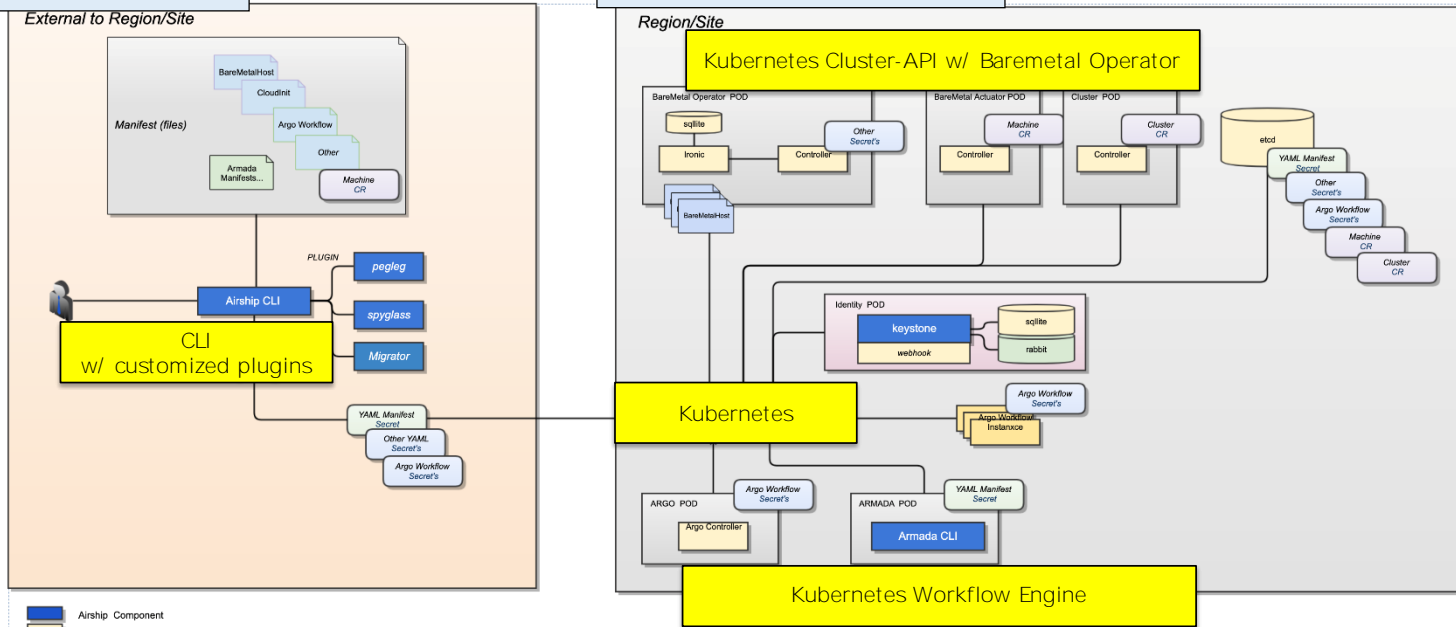
Created on May 2, 2019

Centralized LCM

Multiple Regions/Sites

External to Region/Site

Region/Site



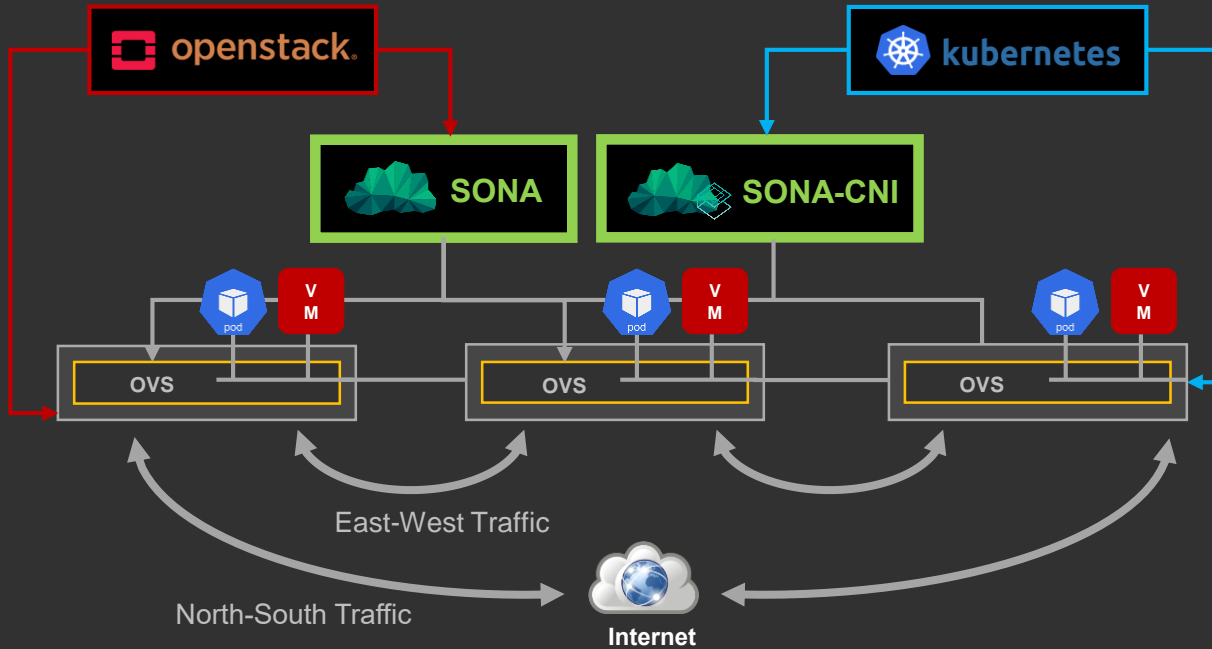
- Airship Component
- Existing Community Component
- Airship Data Element - CNCF YAML Artifact
- Airship Data Element - Airship YAML Artifact



- Kubernetes Operator
: Metal³ (Metal Kubed), Rook, Prometheus/ES Operator, etc
- Kubernetes Cluster-API & Kubeadm
- Workflow & GitOps CICD
: Argo Workflow, Argo CD

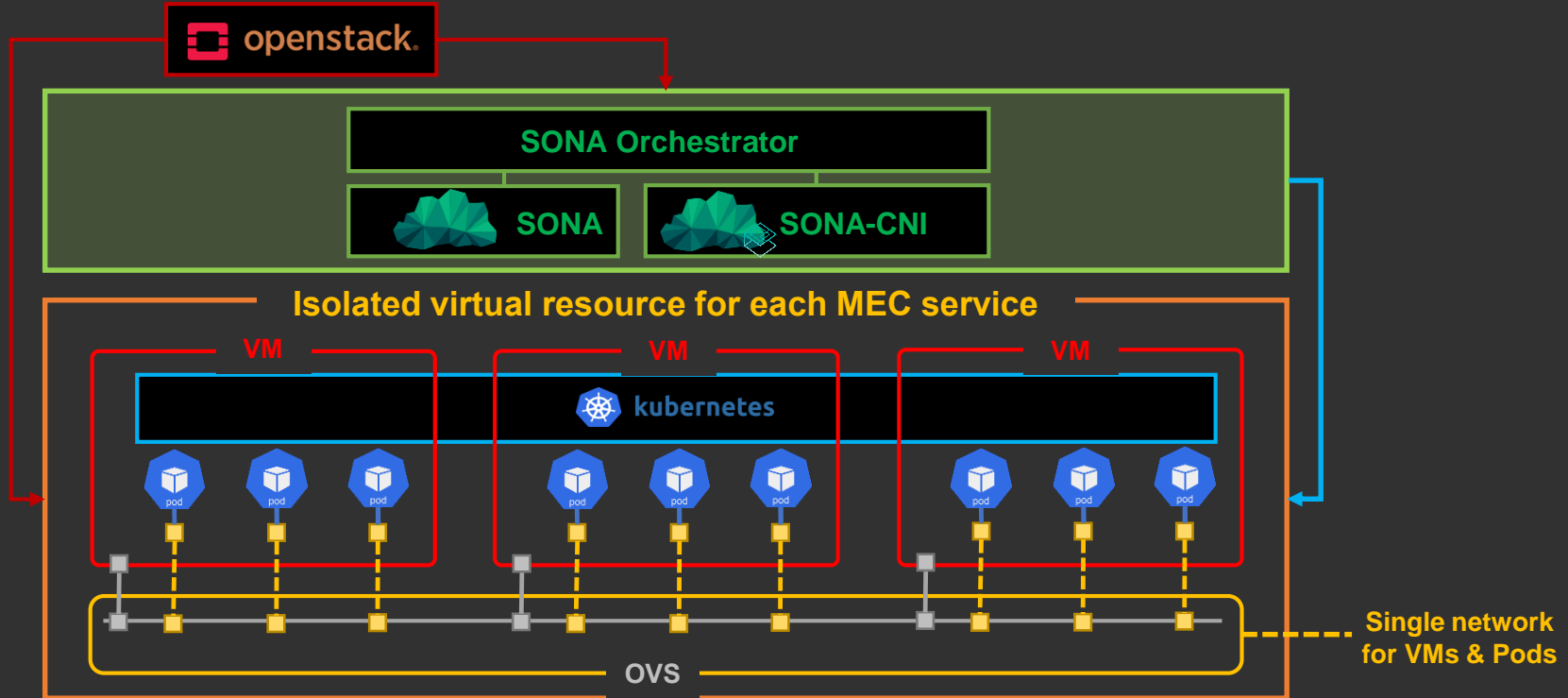
SONA & SONA-CNI : SKT's SDN Solutions

SDN based *carrier-grade virtual network* solution for OpenStack & Kubernetes



SONA SDN Orchestrator

"Kubernetes on VM" for **resource isolation** with single virtual network for VMs and containers for **high performance**



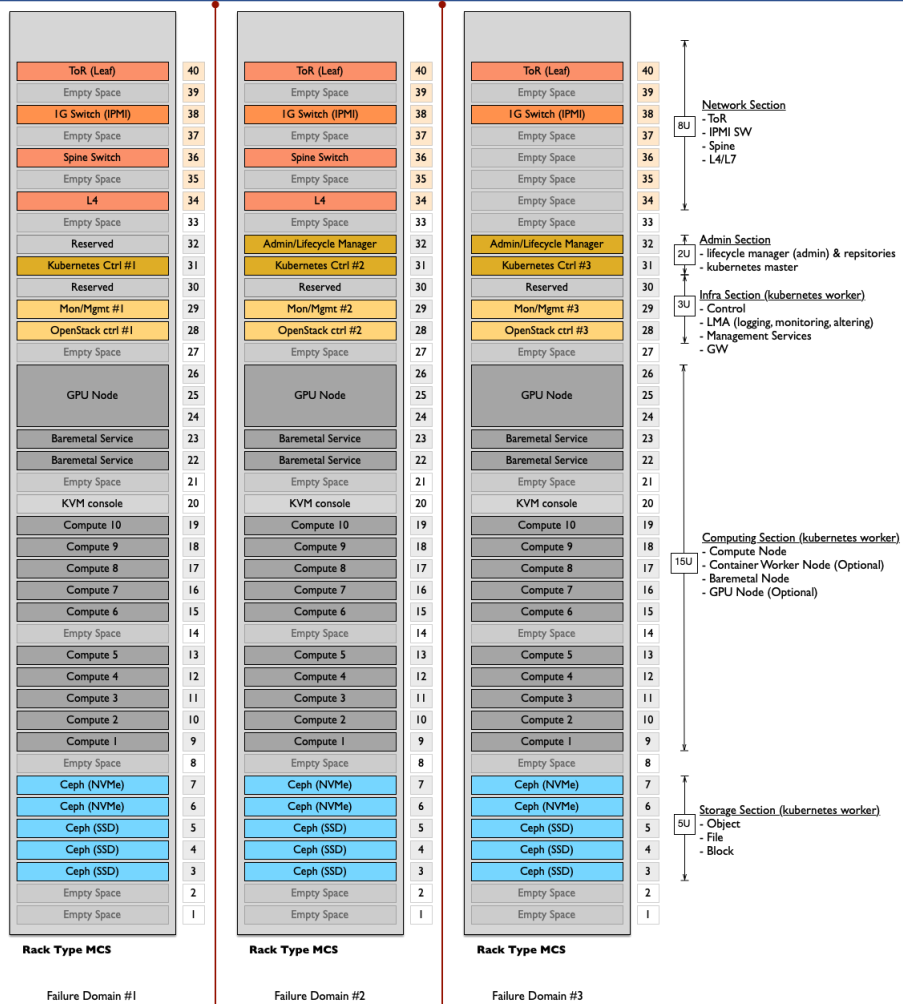
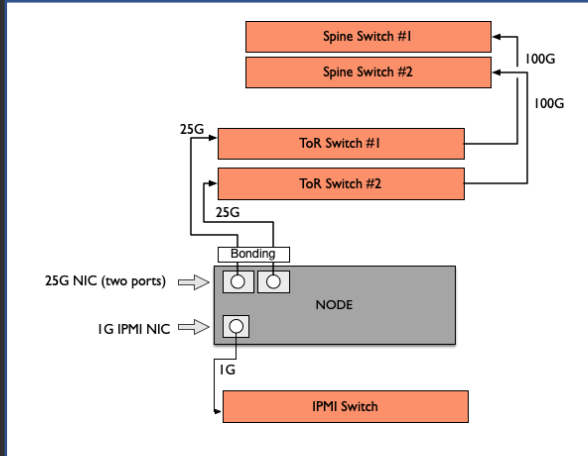
Use Cases

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Type/Workload	Infrastructure Delivery
ML Infrastructure (GPU)	Kuberentes
Analytics (GPU & CPU)	Kubrernetes
Telco (VIM)	OpenStack
IT (SKT Private Cloud)	OpenStack
Big Data Platform	Kubernetes
VDI (Virtual Desktop)	OpenStack & Kubernetes
OSS/BSS	OpenStack

Use Case: Rack Configuration



Telco Needs “Open Collaboration” to Realize its Cloud Vision

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airship

Making lifecycle management for open infrastructure simple, repeatable & resilient

SKT Co-Founded
(TACO Development)



kata
containers

Secure, lightweight
CRI compatible
virtualized containers



openstack.

Programmable infrastructure for VMs, containers and bare metal

SKT Participated
(TACO Development)



STARLINGX

Edge cloud computing
Infrastructure for high performance, ultra-low latency applications



CI/CD platform for gating changes across multiple systems/repos



kubernetes



Prometheus



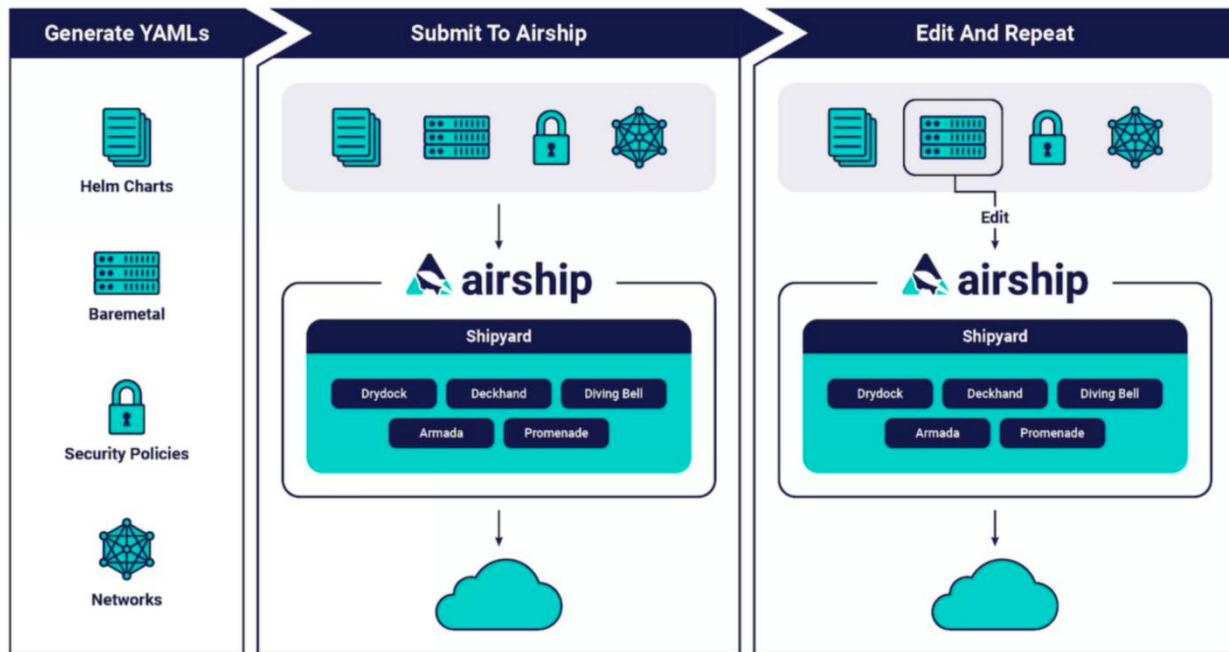
Grafana



ceph



Airship is a collection of loosely coupled but interoperable open source tools that declaratively automate cloud provisioning.



Airship Core Principle

Focus

The focus is a declarative platform to introduce OpenStack on Kubernetes (OOK), and the lifecycle mgmt. of the resulting cloud, with the scale, speed, resiliency, flexibility & operational predictability demanded of network clouds.

Key Tenets

DECLARATIVE



Sites are declared using YAML, including both hard assets & soft assets. You manage the document and Airship implements it.

CONTAINER BASED



Containers are the unit of software delivery for Airship. This allows progress from dev, to testing, and production with confidence.

ONE WORKFLOW



One workflow that handles both initial deployments and future site updates with virtually no difference in interacting with the two

ARCHITECTURALLY FLEXIBLE

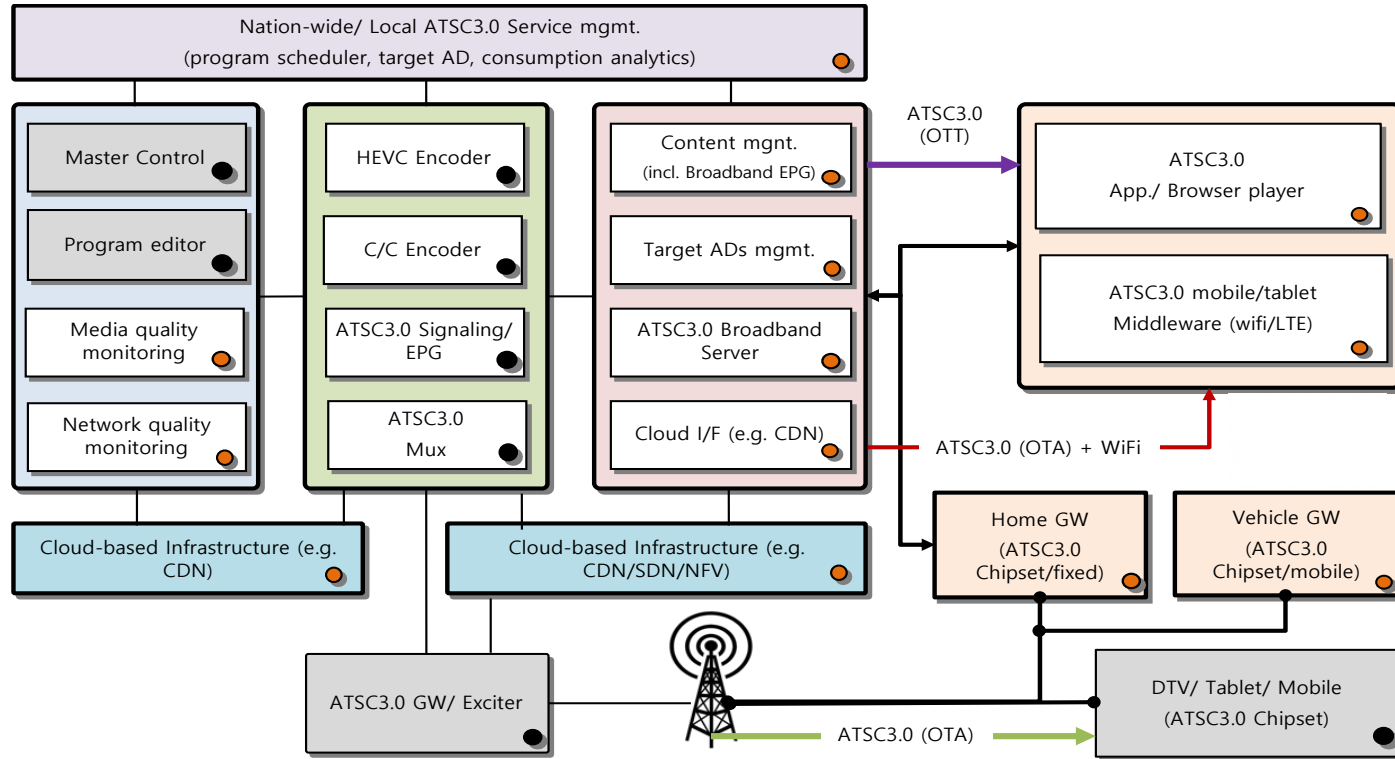


Airship manages our entire cloud platform, not just OpenStack including small and large environments



Expanding More (ATSC 3.0 – Media/Broadcasting)

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NBMP & Open Infrastructure

Founding Leader
(SKT & MPEG)



airship

simple, repeatable &
resilient lifecycle
management for open
infrastructure

Co-Founded
(SKT / AT&T)



kata
containers

Secure, lightweight
CRI compatible
virtualized containers



openstack.

Programmable infrastr
ructure for VMs,
containers and bare
metal

Active
(SKT)



STARLINGX

Edge cloud computing
Infrastructure



CI/CD platform for
gating changes across
multiple systems &
repos

- NBMP: Network Based Media Processing (MEC for Media)

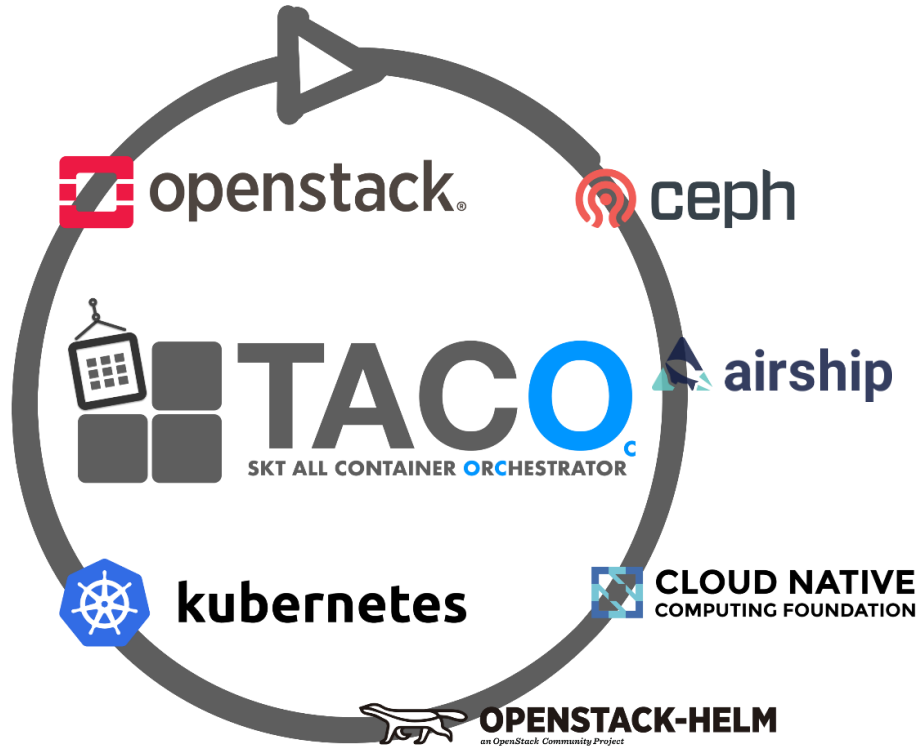
(
NBMP
&
Open
Infrastructure

Create New components for NBMP (Lead by MPEG Community)
NBMP Workflow Manager, Function Repository, Function Template

Extend and Integrate with existing projects (Lead by SKT)



Integrate “TACO & SONA” into the project (Contributed by SKT)



July 2019

Open Code and Document

- blog (<https://openinfradev.github.io/>)
- documentation (<https://taco-docs.readthedocs.io/ko/latest/>)
- github source repo (<https://github.com/openinfradev>)

Find collaborators and forming initial ecosystem

Late 2019 ~ Early 2020

Build Community

**Evolve to OSF Project
(with Airship & NBMP Effort)**

Collaboration without Boundaries

Thank you

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