
KubeCon
CloudNativeCon
North America 2022
BUILDING FOR THE ROAD AHEAD
DETROIT 2022
TiKV
TiKV
HELM

KubeCon | CloudNativeCon
North America 2022
BUILDING FOR THE ROAD AHEAD
DETROIT 2022

Implementing Private 5G Networks For Enterprises With Kubernetes

Christian Huebner
Amar Kapadia

KubeCon | CloudNativeCon
North America 2022
BUILDING FOR THE ROAD AHEAD
DETROIT 2022

KubeCon | CloudNativeCon

North America 2022

BUILDING FOR THE ROAD AHEAD

DETROIT 2022

October 24-28, 2021

Christian Huebner
Principal Architect
Mirantis

Amar Kapadia
Co-Founder
Aarna Networks

What is Private 5G?

Private 5G is a non-public network used by only one organization for its own purposes.

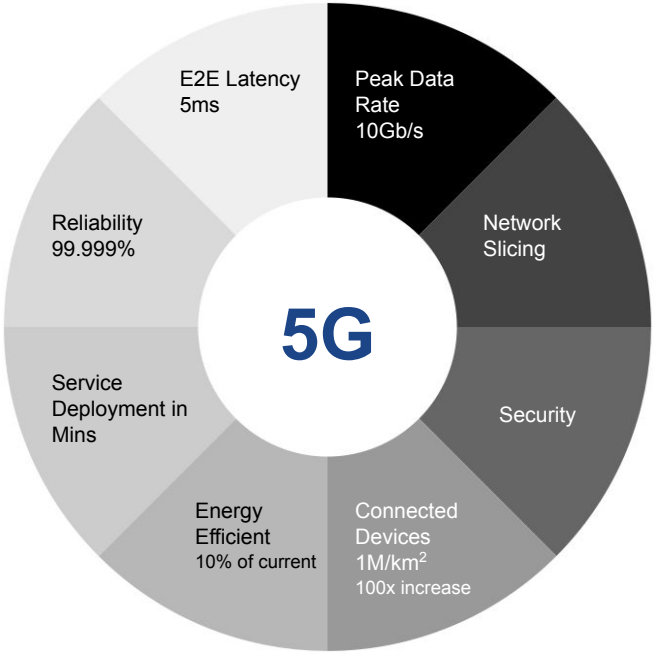
Private 5G is ideally suited for sensitive applications

It is expected to accelerate digital transformation in verticals such as Industry 4.0, retail, healthcare, V2X, smart cities/buildings, agriculture and more

Why Private 5G?

Private 5G has a number of attributes that are appealing for sensitive traffic making it an alternative to wired Ethernet

Private 5G uses the same underlying technology as Public 5G



Private 5G Implementation

NMS, Service Assurance

BBU

Packet Core

BEFORE

Service Management & Orchestration

5G RAN

5G Core

Edge Computing Apps

Kubernetes Clusters (enhanced for dataplane traffic)

Commodity servers, switches, storage

AFTER

Components of an ‘Enterprise Grade’ Design

- Lifecycle management
- Additional components
- Multi site
- Hardening
- Disaster Recovery
- Backup/Restore
- IdP/IAM (/SSO)
- Security/Compliance/Supportability
- Reliability
- SLAs
- Upstream bug fixing
- Customer desired ‘features’

- **Suitability for the required and desired use cases**
- **Initial and running Cost**

What do we Need to Make it Work?

Minimum requirements (non-HA)

- Deployment server
  - Server with CentOS 7 or Ubuntu 20.04
  - Orchestrator runs on Kubernetes <= v1.21
  - Nested deployment is acceptable for test/dev
- Edge K8s clusters
  - Runs on Kubernetes <= v1.21

In a Mission Critical world

Why we are talking about the infrastructure

- Industrial network solutions require different handling
- Reliability and Security are paramount for success
- High cost of breached SLAs
- High profile target for bad operators
- Time to repair in case of catastrophic failure

Kubernetes Layer Challenges

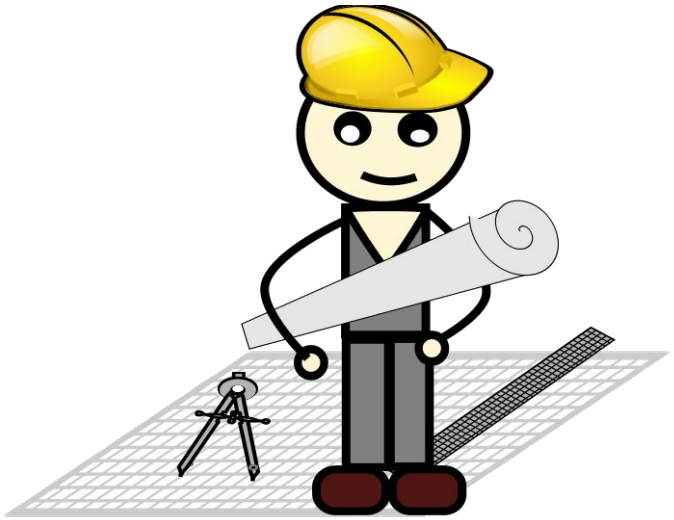
Upstream Kubernetes

‘Upstream’ build with ‘add features over time’

- Easy to get started
- Quickly built
- On existing hardware (or cloud?)
- Suitable for DevOps context
  - Emphasis on DevOps, because the environment is never really *finished*
- Inexpensive until it isn’t
- **You are going to be responsible 24/7**

Kubernetes Comes in Many Shapes

Full featured environment designed in-house

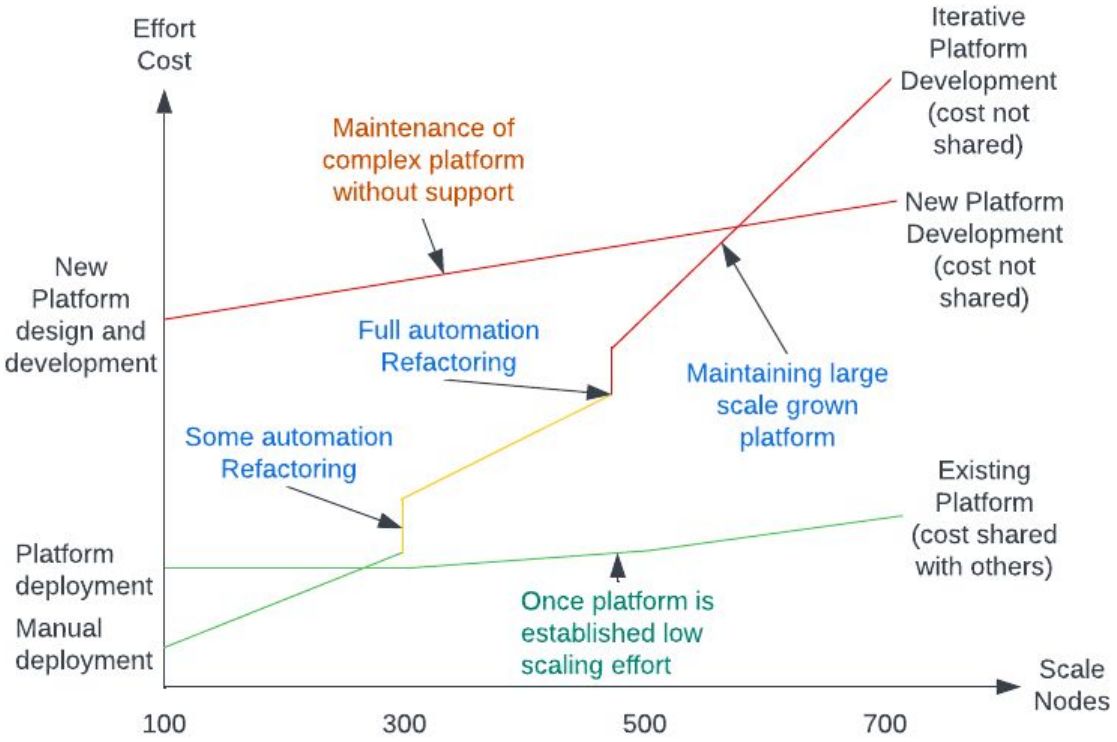


- Can produce good results
- Very high cost up-front
- Requires a lot of manpower
- Slow to market
- Hard to change design if requirements change
- Suitable for long term project with high time tolerance
- Running cost for support and maintenance

Kubernetes Comes in Many Shapes

Commercial solution

- Typically more expensive up-front
- Less expensive over time
- Fast to market
- **Benefit from development cost sharing**
- Available 24/7 support
- Typically the easiest way to an Enterprise Grade solution



So What to do?

- Discuss with application/component vendor
- Assemble requirements from all stakeholders
- Acquire commercial architecture support
- Create a plan
- Do the math
- Be sure you have a solution for each of the ‘enterprise’ items
- Are you in the business of maintaining a Kubernetes platform?

Service Management & Orchestration Challenges

What is Orchestration of Private 5G?

- By functionality
  - Orchestration & day 0 configuration
  - Day 1 & 2 configuration & LCM
  - Open loop automation
  - Closed loop automation
- By type
  - Public 5G (e.g. RAN, Core, transport)
  - Private 5G (e.g. RAN, Core, transport, UE, gateway, SD-WAN)
  - MEC applications
  - Infrastructure
  - Network slicing

New Orchestration Requirements

Cloud Native

CNFs | CNAs | Occasional VNFs

Diversity

Network services | Infra | MEC Apps

Scale

10s K sites | 10s of vendors | Dynamic

The Role of Open Source

- Open source is increasingly the reference implementation for open standards e.g. O-RAN-SC
- Open source reduces vendor lock-in/vendor dependence (vendor distros can provide support)
- Open source allows users to influence the functionality they want
- Open source is secure

Key Orchestration Open Source Projects

O-RAN Software Community (ORAN-SC)

DEMO

KubeCon | CloudNativeCon
North America 2022

BUILDING FOR THE ROAD AHEAD

DETROIT 2022

Please scan the QR Code above to
leave feedback on this session