



*The cloud-native footprint for 5G*

TELCO CLOUD

SDN

NFV

# Traditional Telecom operators are running their services across **several virtualization platforms**

- With very expensive integration efforts
- Inefficient use of space and power
- Impossible to manage the hardware obsolescence cycle

Vendor #1



Virtualization  
for 5G

Vendor #2



Virtualization  
for 4G

Vendor #3



Virtualization  
for VoLTE

Vendor #4



Virtualization  
for VAS

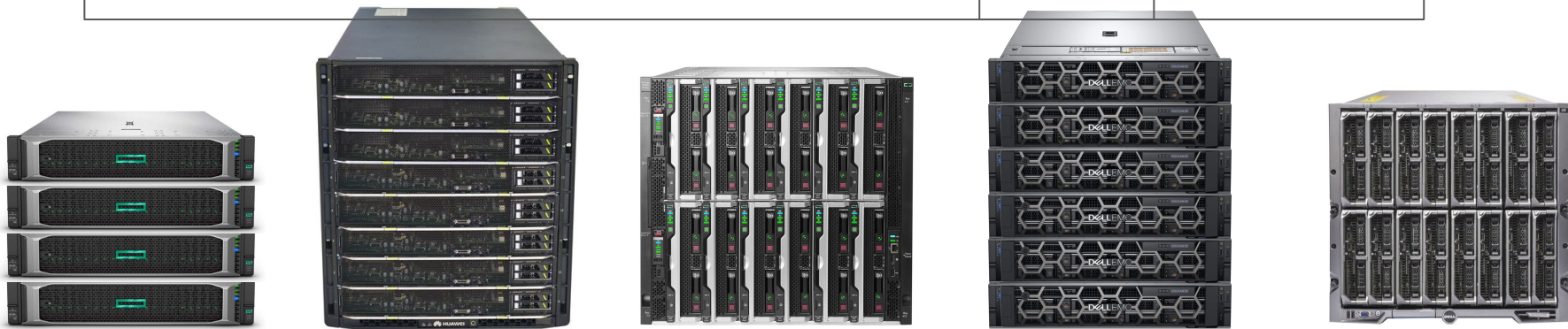
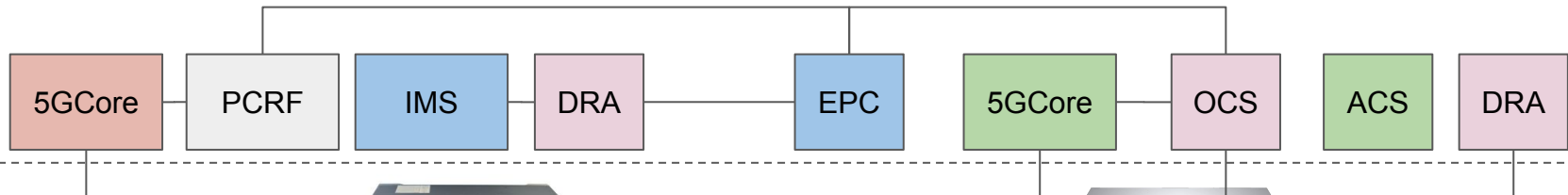
Vendor #5



Virtualization  
for TI

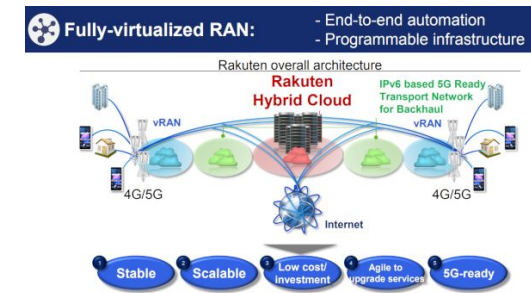
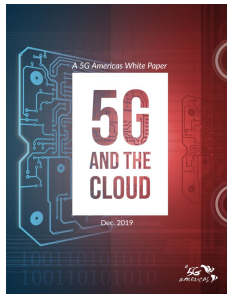
# Most **agile** operators, are benefiting from a **Telco Cloud** vision, where **infrastructure is shared**.

- Same infra, for all vendors and functions
- Everything is virtually integrated
- We don't care anymore about hardware generation



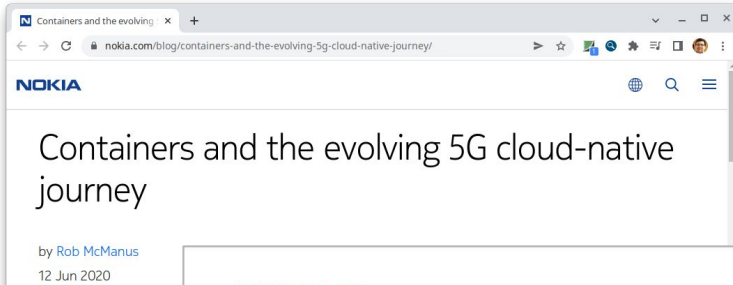
Unique Telco Cloud (distributed along the network)

# Telco is moving towards the **Network Cloudification**



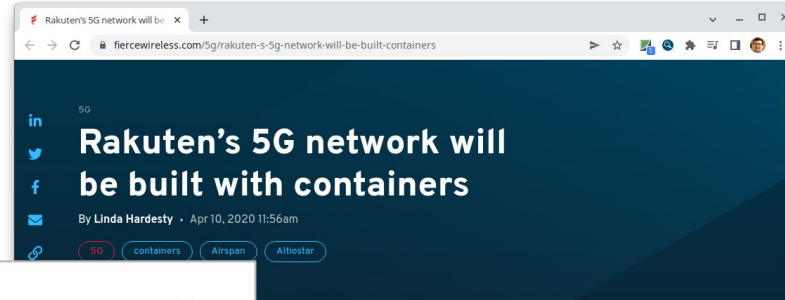
# Network Functions are moving to Containers

## So, **Kubernetes** is an essential part



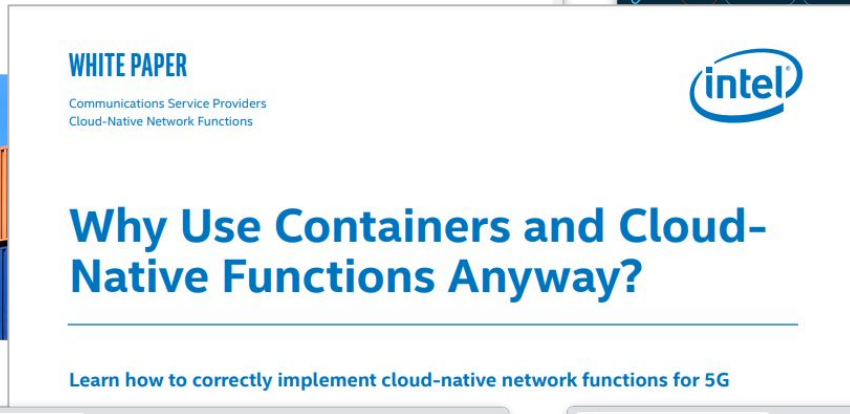
Containers and the evolving 5G cloud-native journey

by Rob McManus  
12 Jun 2020



Rakuten's 5G network will be built with containers

By Linda Hardesty · Apr 10, 2020 11:56am



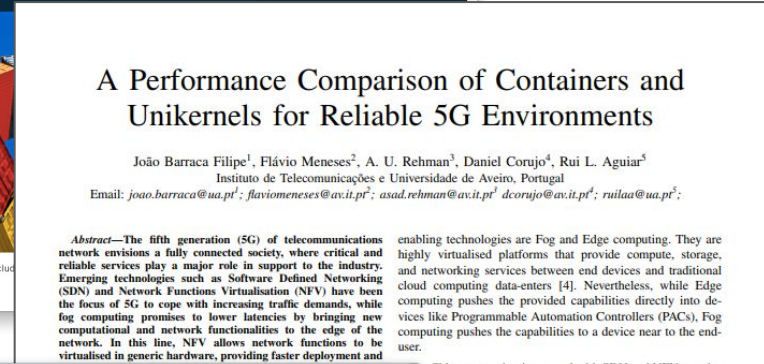
WHITE PAPER

Communications Service Providers  
Cloud-Native Network Functions

intel

### Why Use Containers and Cloud-Native Functions Anyway?

Learn how to correctly implement cloud-native network functions for 5G



### A Performance Comparison of Containers and Unikernels for Reliable 5G Environments

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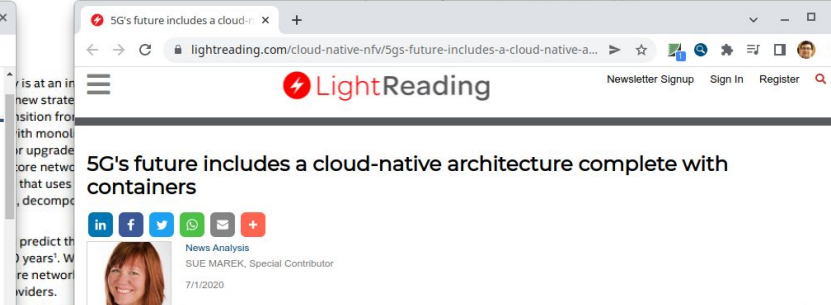
**Abstract**—The fifth generation (5G) of telecommunications network envisions a fully connected society, where critical and reliable services play a major role in support to the industry. Emerging technologies such as Software Defined Networking (SDN) and Network Functions Virtualisation (NFV) have been the focus of 5G to cope with increasing traffic demands, while fog computing promises to lower latencies by bringing near computational and network functionalities to the edge of the network. In this line, NFV allows network functions to be virtualised in generic hardware, providing faster deployment and



Containerizing the 5G Core

BY STEVE GLEAVE ON JUL 9, 2019 5:00:00 AM

Containers are a hot commodity for public cloud operators and enterprises, and the rate of adoption has ramped up over the last couple of years. While most telcos aren't among the early adopters, container technology and the supporting ecosystem are rapidly evolving to meet carrier-grade requirements. These developments look to be perfectly timed so that telcos can benefit from container technology in their 5G strategies. Indeed, 5G requires a totally new approach to building packet core



5G's future includes a cloud-native architecture complete with containers

News Analysis  
SUE MAREK, Special Contributor  
7/1/2020

g/Edge computing integrated with SDN and NFV can significantly reduce the latency in network processing and provide instantiation and reliable connectivity to the end user [5]. Critical and Reliable communications were and still are a concern of mobile operators, since they are crucial for the operation of Machine-Type Communications (MTC), as monitoring and control systems, vehicle-to-vehicle communication and cloud-based systems [6]. In this line, SDN and NFV play a major role in Critical and Reliable scenarios, enabling the ability to instantiate the necessary optimal network function at the right time and place.

This paper addresses the role and impact of 5G key enablers in reliable communications, by enhancing and integrating services and applications that have high reliability requirements in M2M scenarios. For this, we explore to implement a network function (NF) in a data-center to the end user with limited hardware resources, while it is used for traffic redirection on-the-fly when a NF function and/or update is required, ensuring a recovery mechanism for the reliability of the service. Finally, core and

# How can we adopt this network cloudification?



# OPEN TECHNOLOGIES are the solution

- To reduce integration and deployment costs
- To enable a multi-vendor functional network
- To eliminate vendor-lock-in
- To develop internal skills
- To create a strong negotiation position

10 OpenStack Projects

Nova	Murano
Cinder	Swift
Neutron	Neutron
Glance	Fuel
Horizon	Designate

3 Development Projects

AT&T's Global & Distributed Cloud

OpenStack-enabled Cloud

AT&T

# Whitestack has been enabling Open Technologies in production, in LATAM

## Telco Cloud

*High-Scale on-premises Private Telco Cloud.  
Enabled for 4G and 5G, lowest latency.*

SINCE 2018



openstack®



kubernetes

## Telecom

*Open Networking designs, leveraging commodity hardware, with the highest performance.*

SINCE 2019



TELECOM INFRA  
PROJECT



## Datacenters

*Servers designed by Facebook, to maximize density and reduce power consumption*

SINCE 2021



OPEN  
Compute  
Project®



## RAN

*Developing the standards and technologies for enabling a open / multi-vendor RAN.*

WIP





**Operators** are deploying open technologies in their networks (Fixed and/or Mobile)

**96% of CSPs implementing NFV strategies say OpenStack is essential to their success**

IoT/edge computing emerges as future use case among two-thirds of respondents.



**verizon**<sup>v</sup>



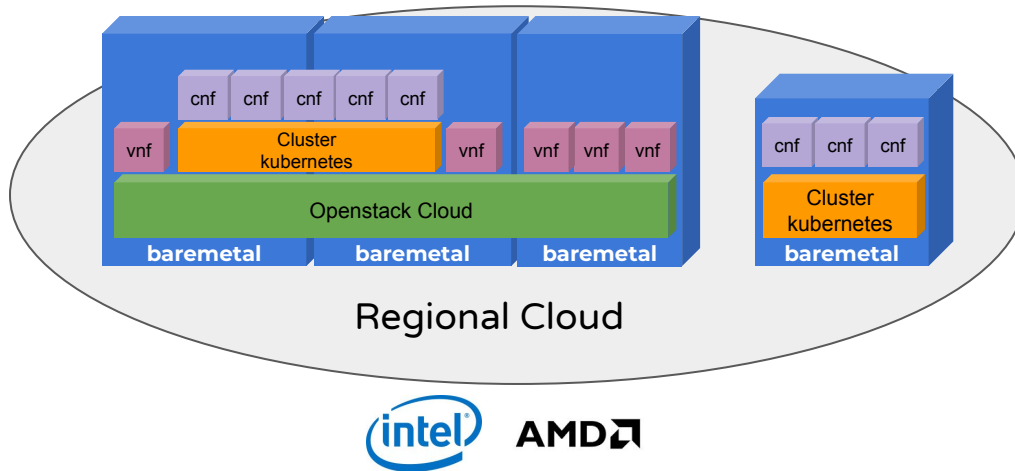
Our approach to **Deploying 5G**  
CNFs in a **truly open** Kubernetes  
multi-cluster

# Clusters for the **Edge** or **Cloud**

## Two options for the Cloud

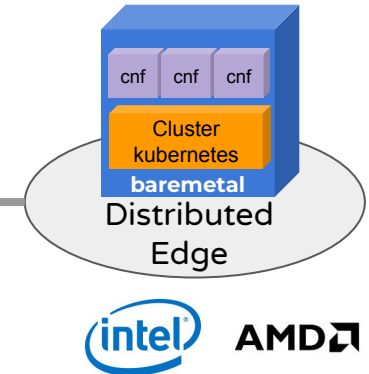
Cost efficient deployment, where several isolated clusters are deployed on shared hardware

Large dedicated Clusters directly on baremetal



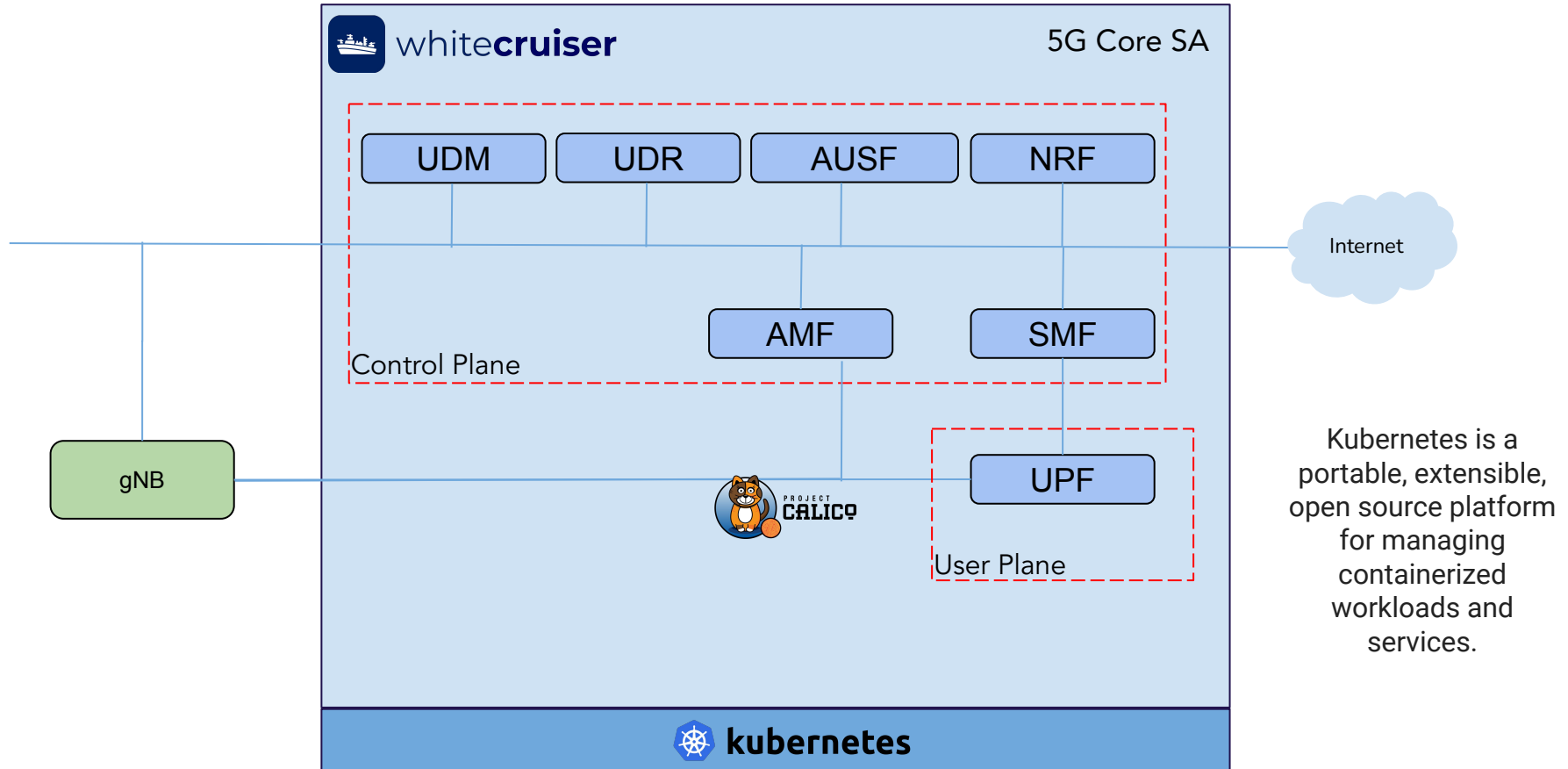
## Optimized for Edge

Containers directly on Baremetal, for a simplified deployment model



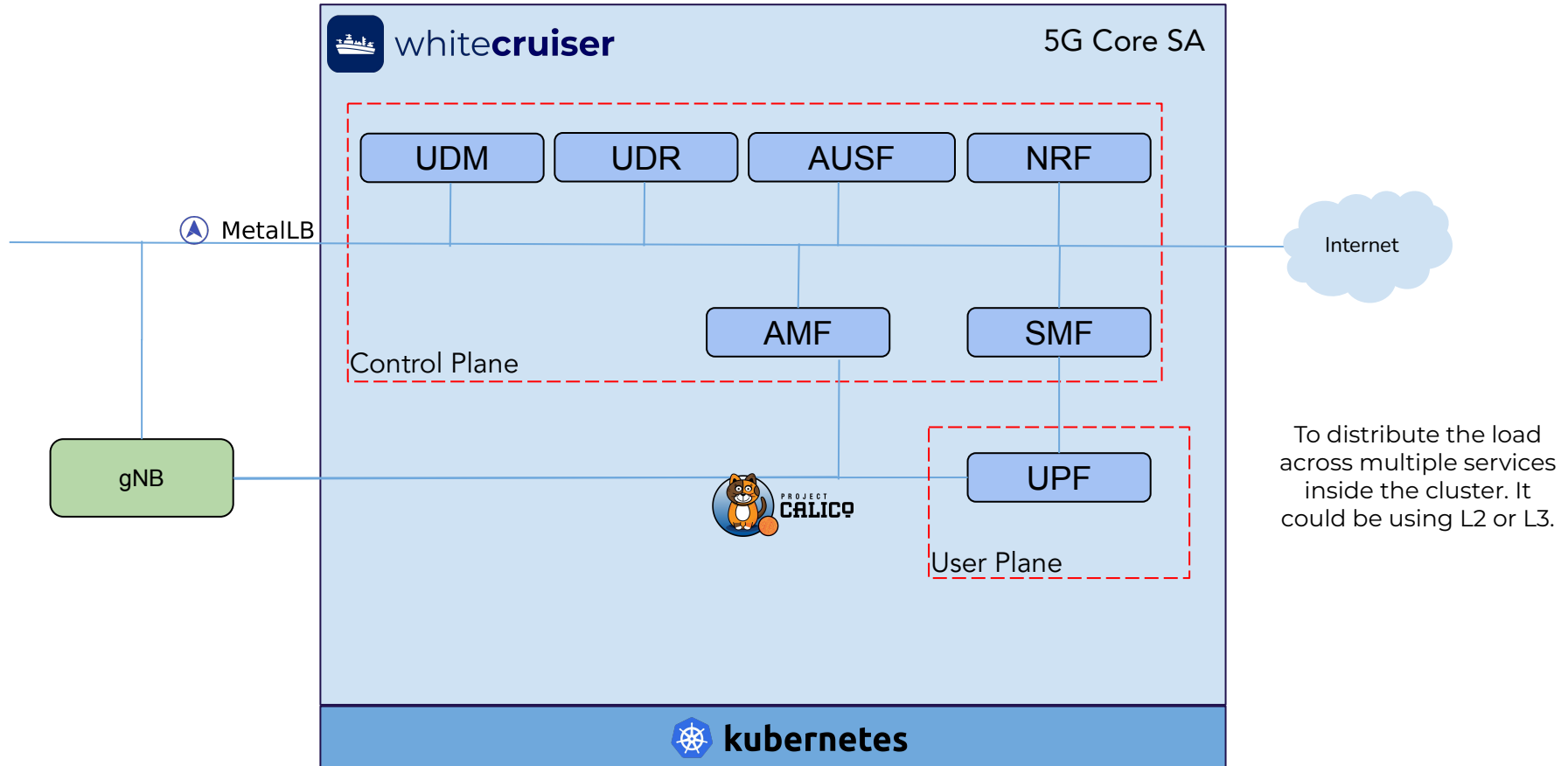
# The 5G footprint

## Containers orchestration



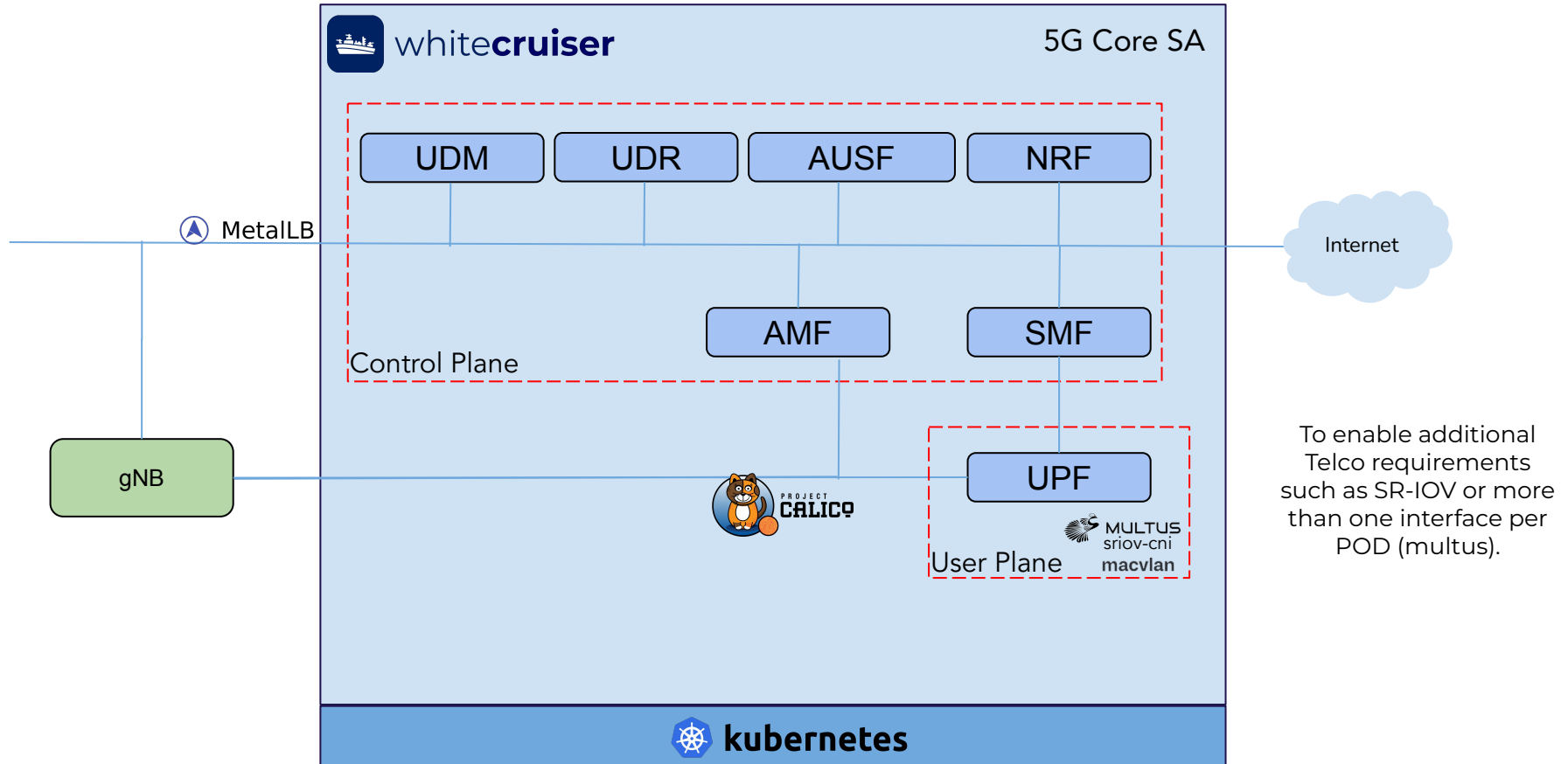
# The 5G footprint

## Load Balancing



# The 5G footprint

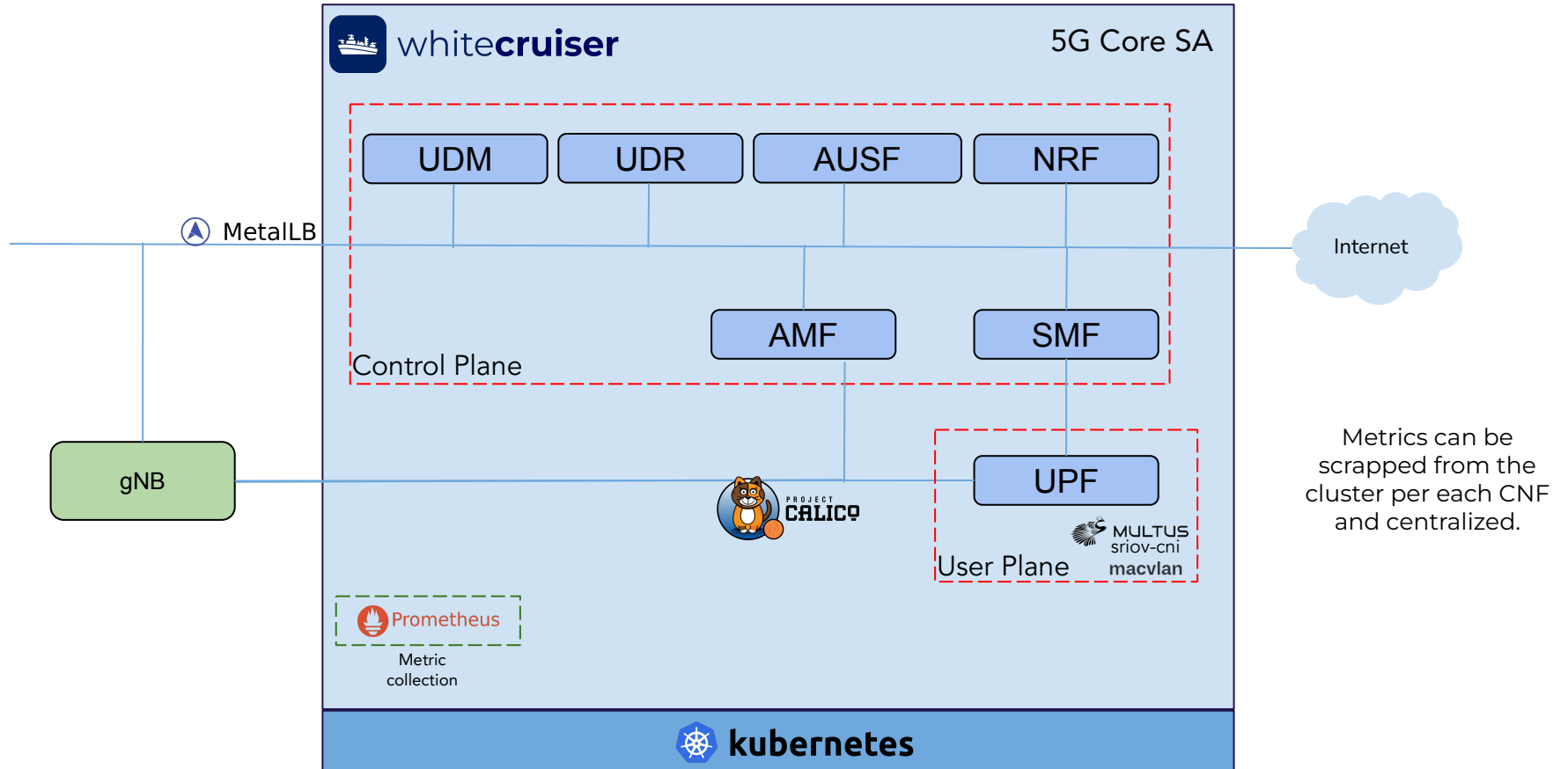
## Multiple CNI



To enable additional Telco requirements such as SR-IOV or more than one interface per POD (multus).

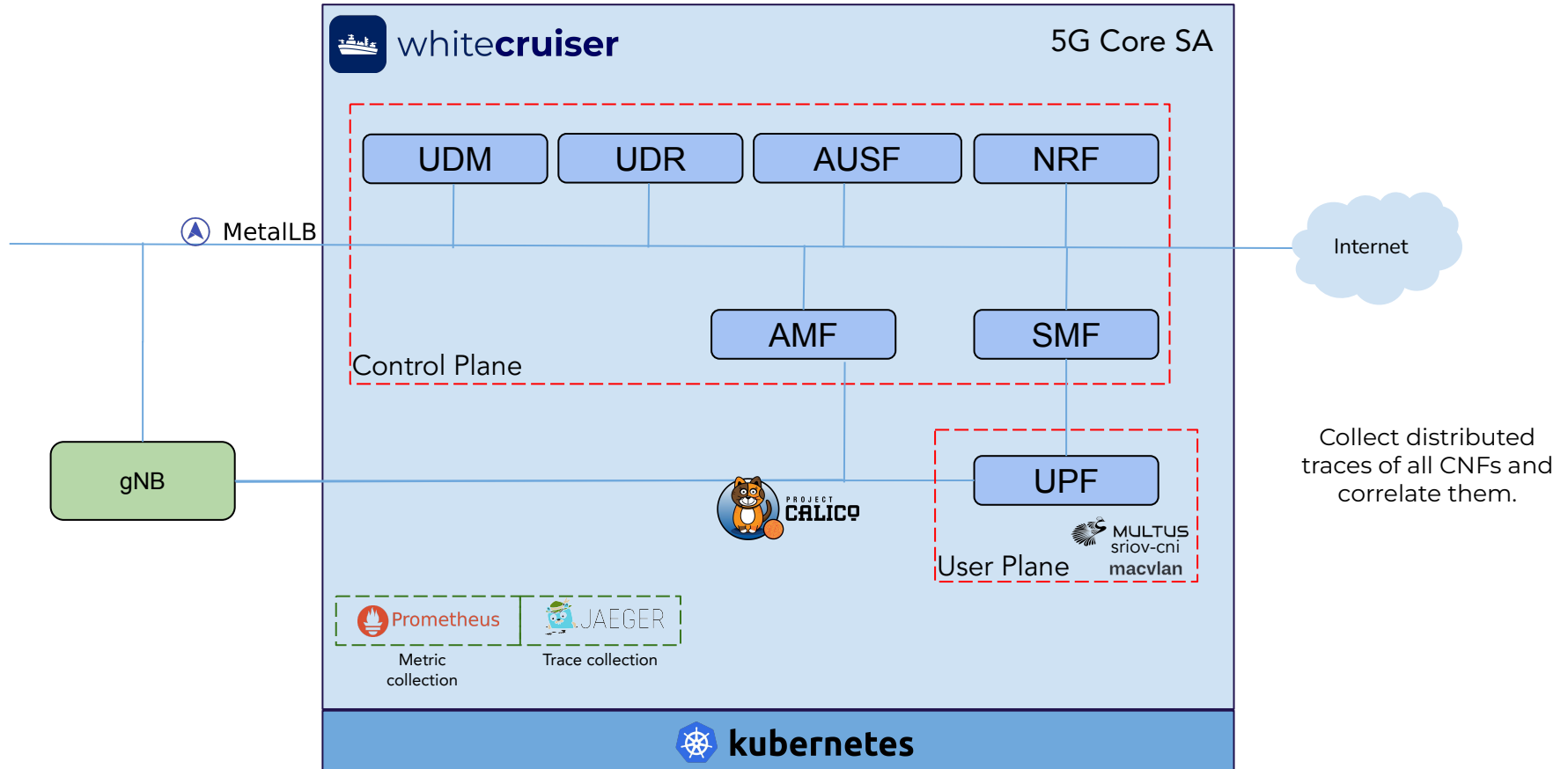
# The 5G footprint

## Metrics collection



# The 5G footprint

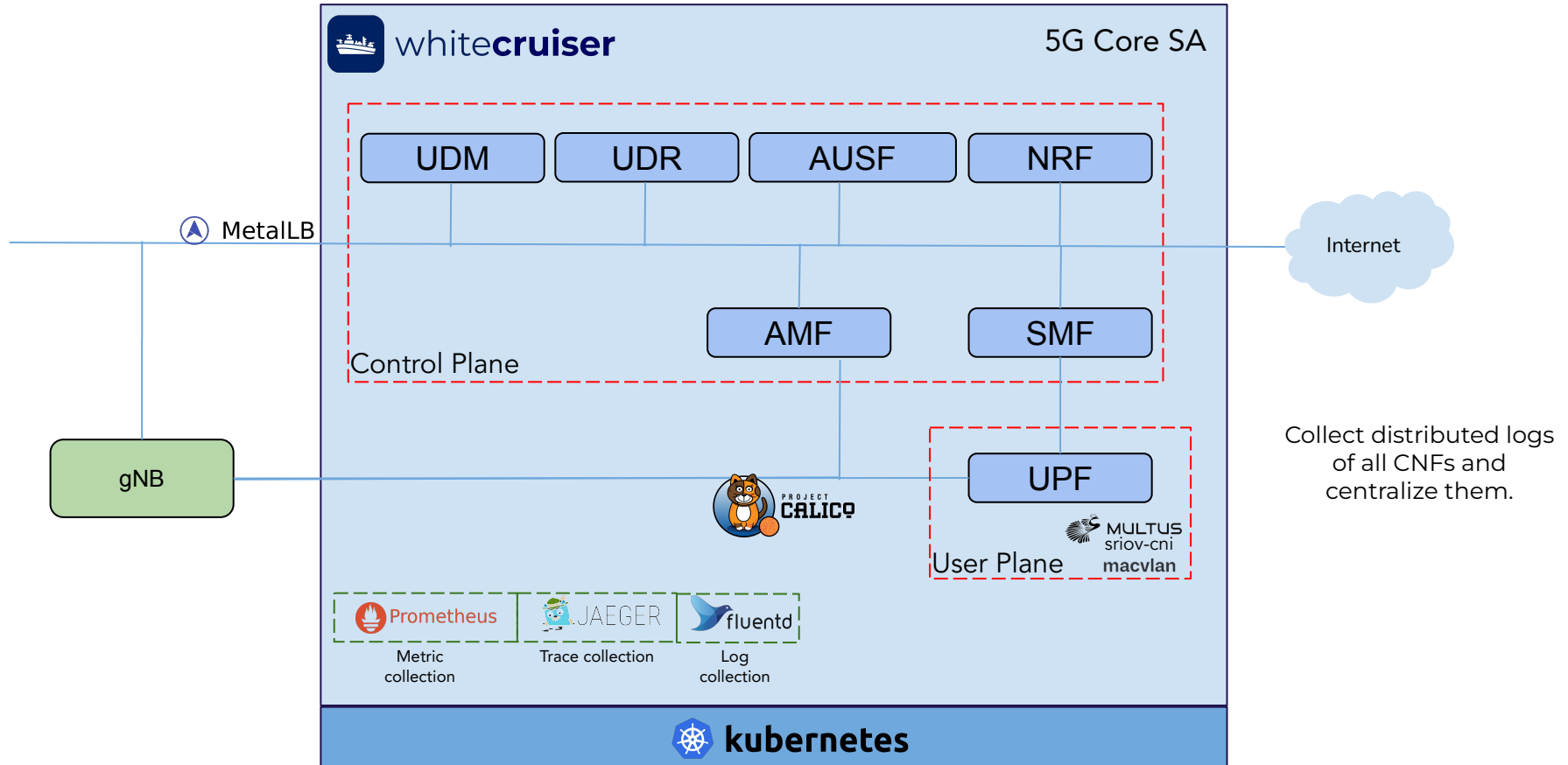
## Traces collection





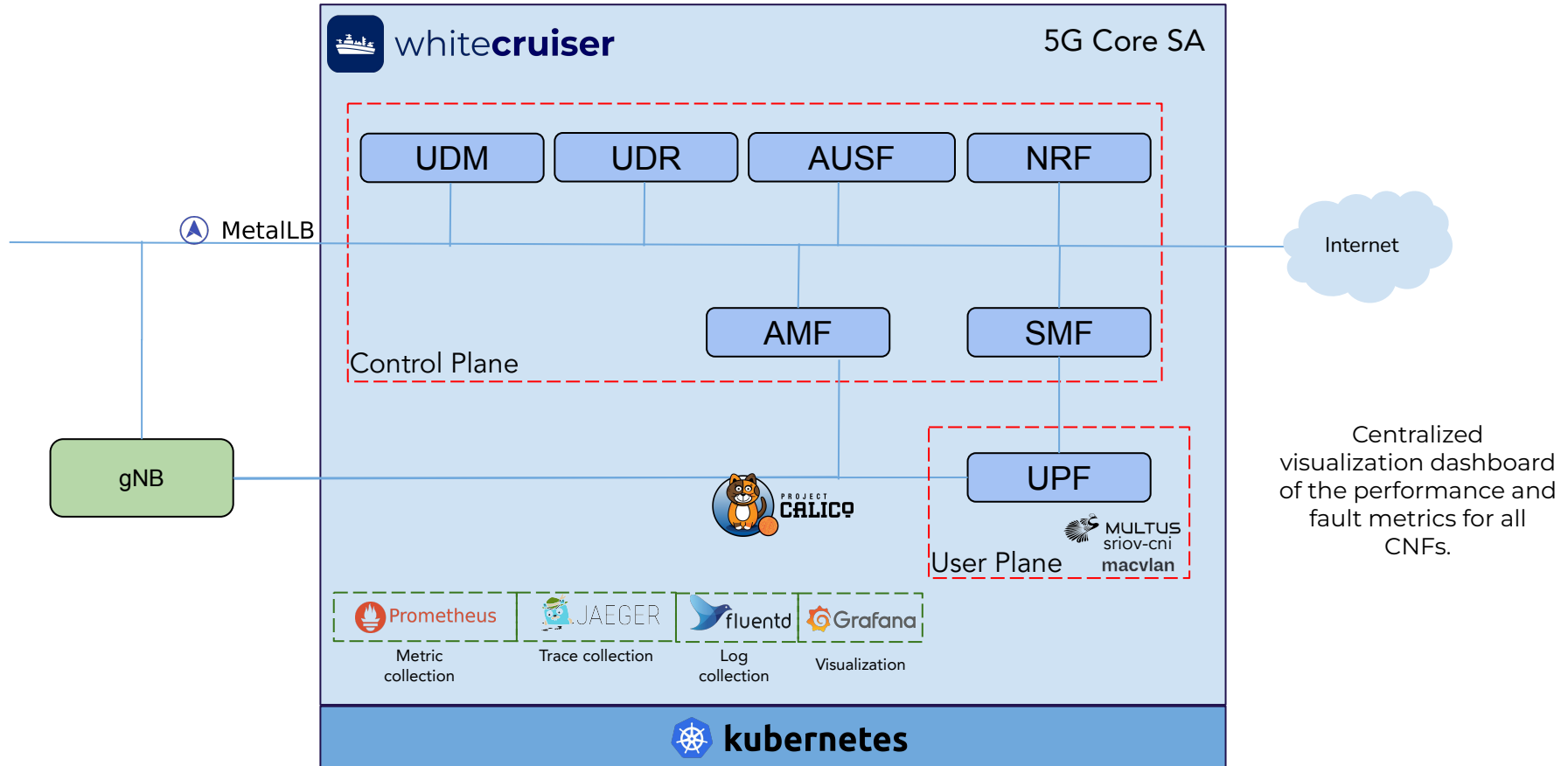
# The 5G footprint

## Logs collection



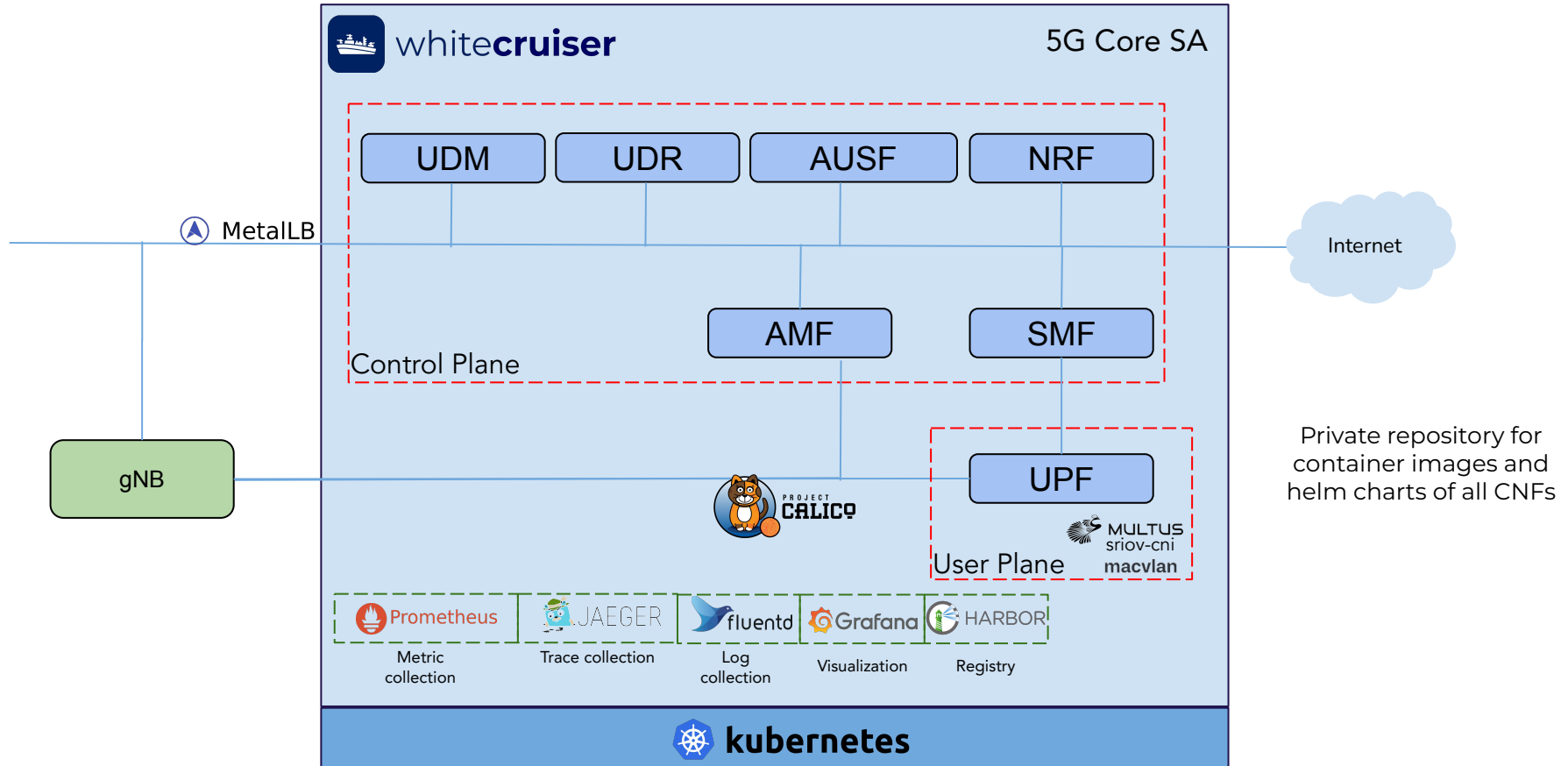
# The 5G footprint

## Data visualization



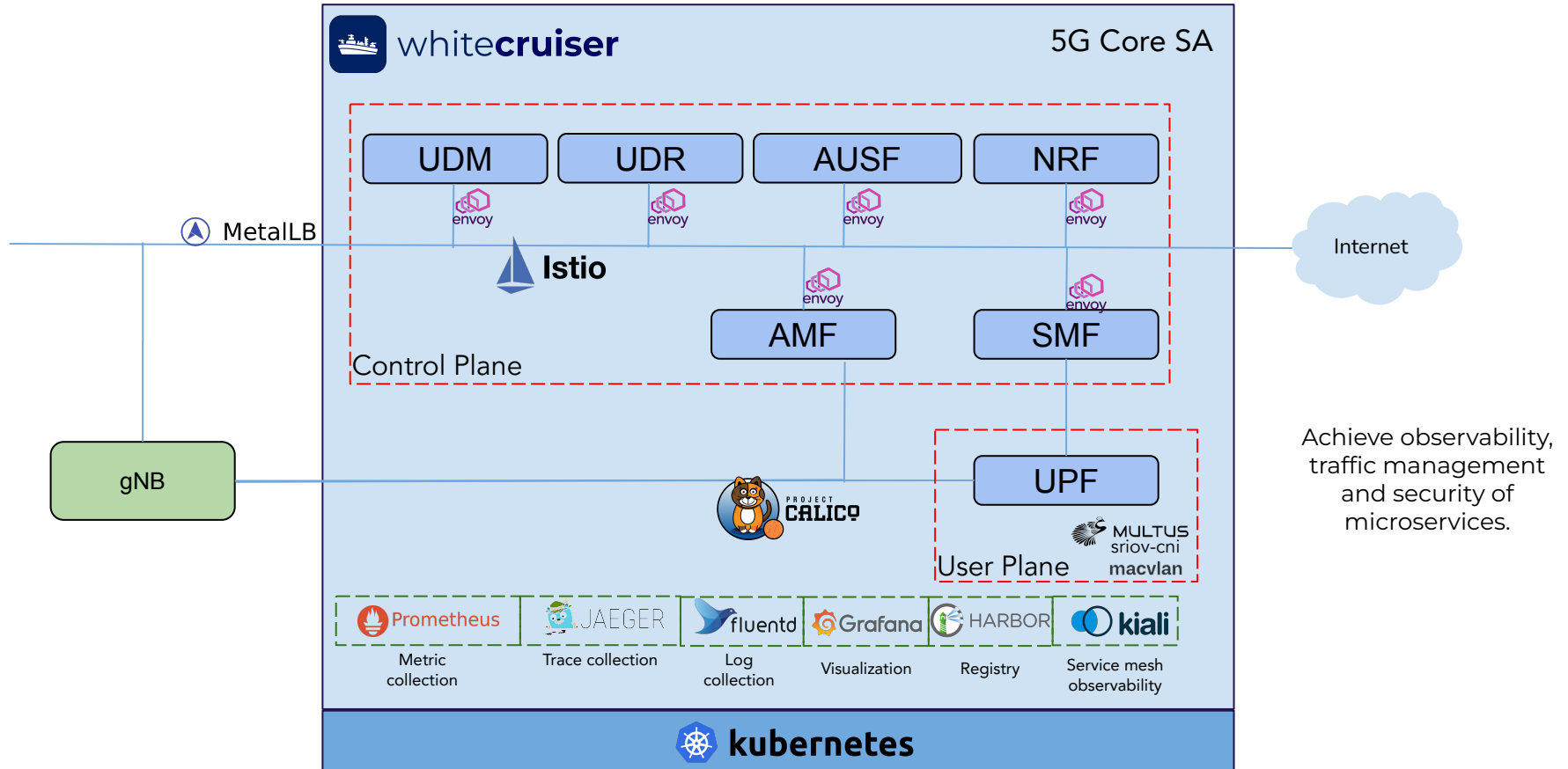
# The 5G footprint

## Container images & charts registry

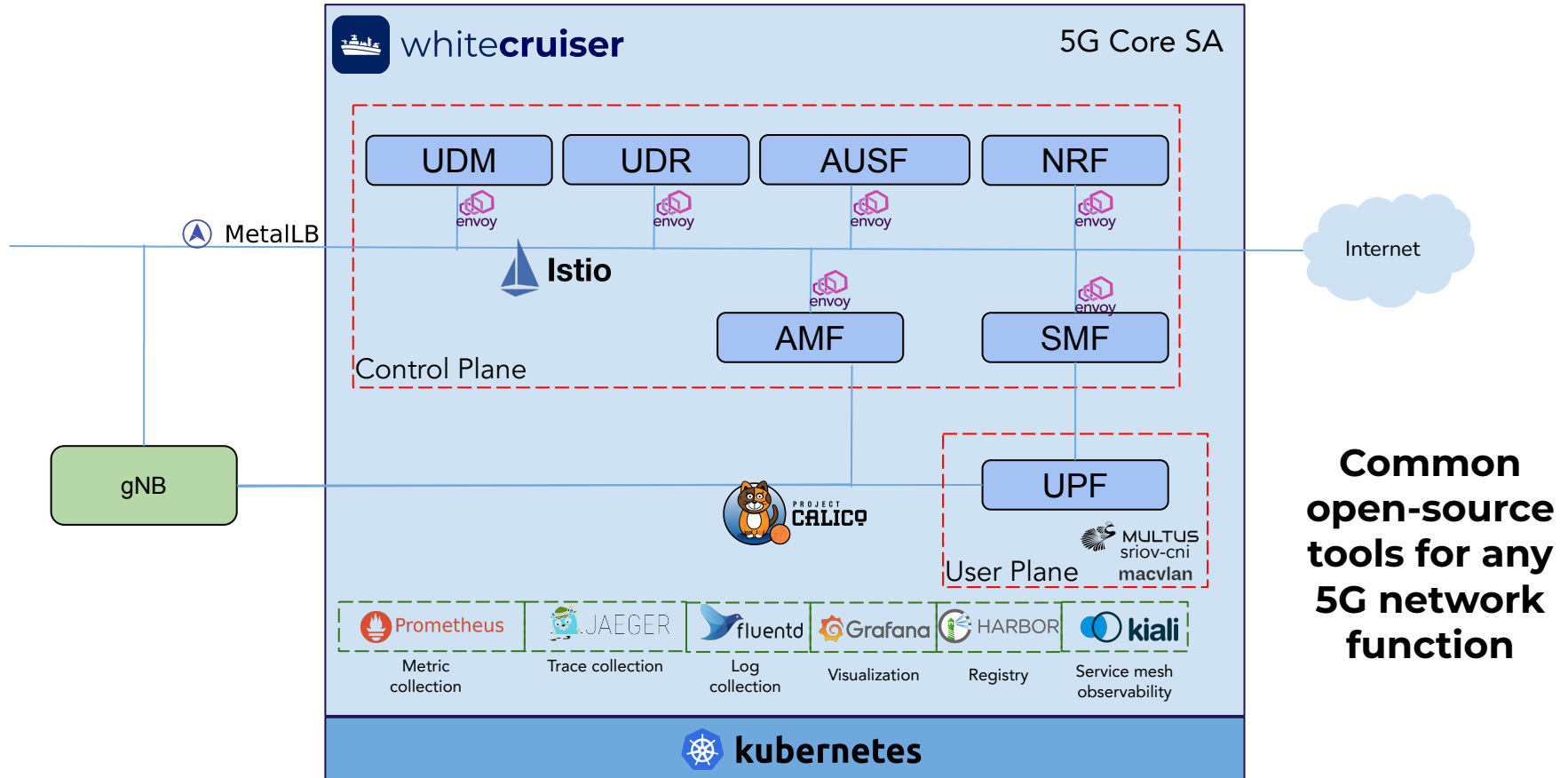


# The 5G footprint

## Service mesh



# The 5G footprint

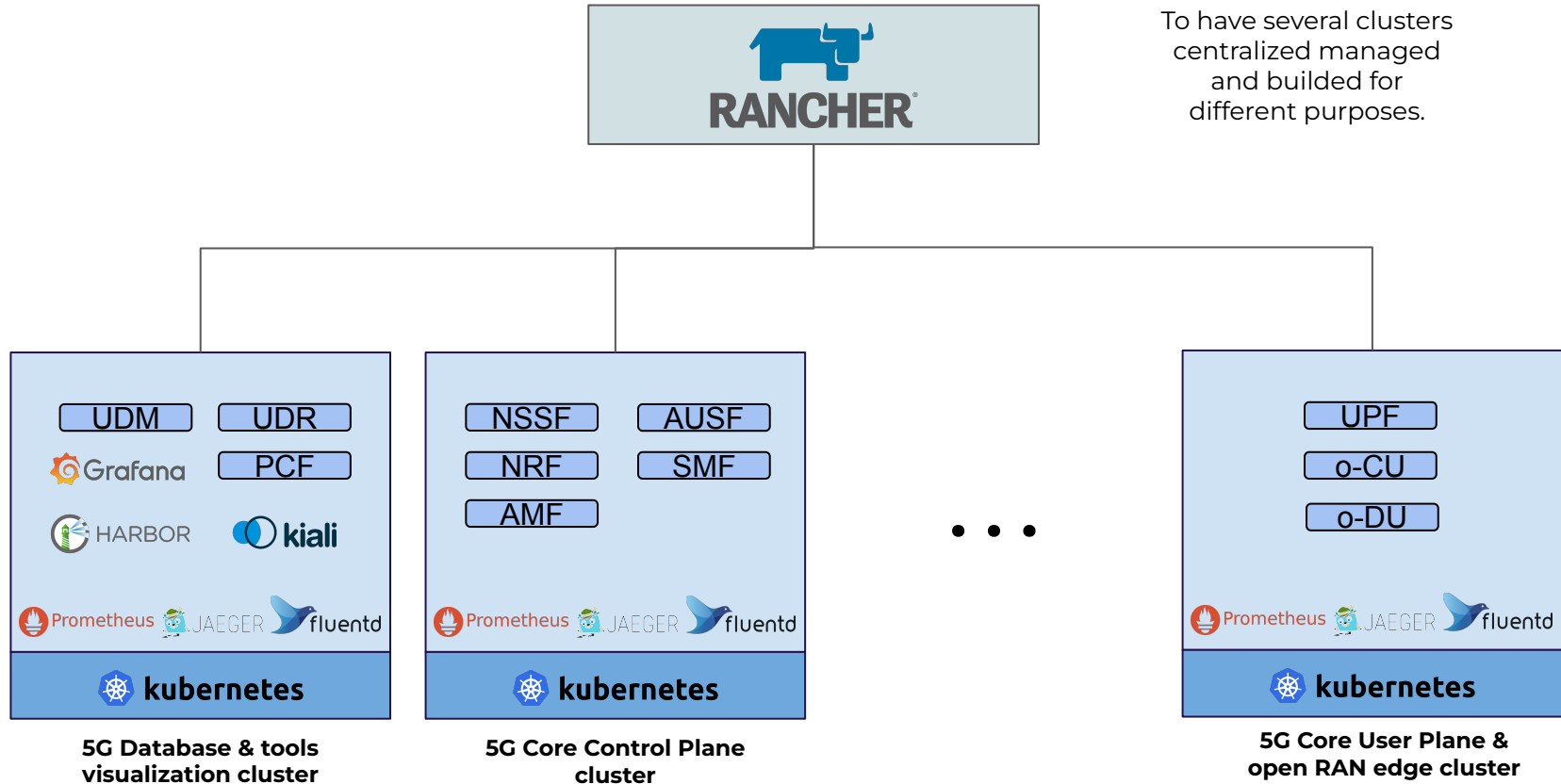


# The 5G footprint



## Multi-cluster

To have several clusters centralized managed and build for different purposes.



**Multiple 5G CNFs** can be deployed centrally and managed over a **shared** infrastructure.

It is possible to **leverage open source tools** to build a ecosystem with shared **monitoring and management**.

You **don't need** to buy different **vendor-specific platform management solutions**.

# Thanks



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