



Oxapampa, Peru



Atalaya, Peru
(10.7318° S, 73.7586° W)



Magma

Bring more people online by enabling operators with open, flexible, and extensible network solutions.



Towards an Orchestrated 5G Open Core for Telco NFV



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Table of Contents

Magma Principles 3-11

Fabric vs Edge

Software lifecycle

Magma Solution Overview 12-15

Usecases

Tenets of FWA

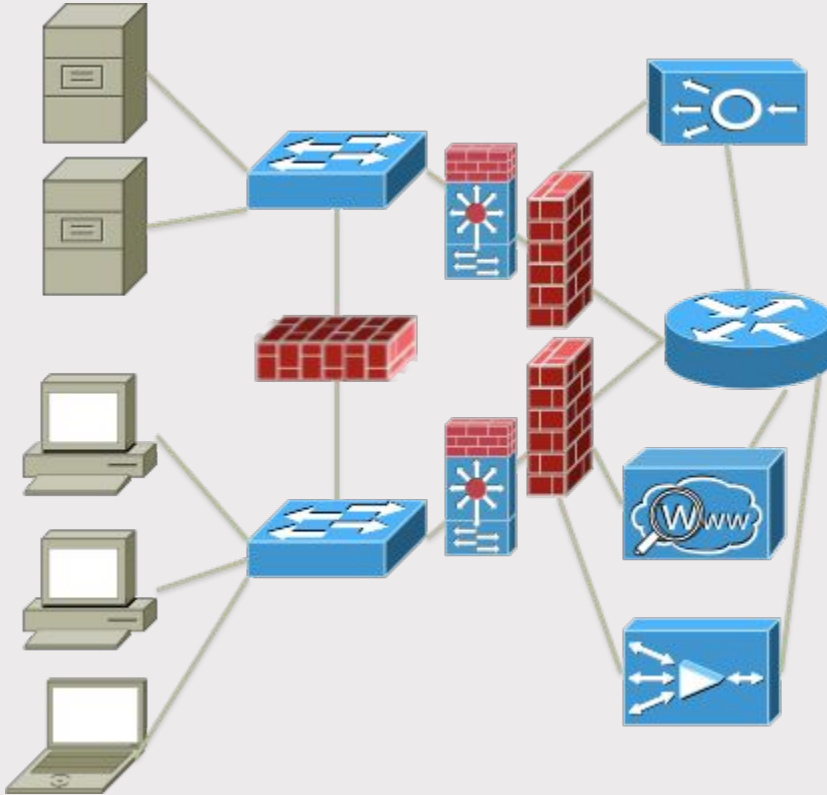
High level features

Bringing “Open Packet Cores”
to Telco NFV 16-25

1: Edge vs Fabric

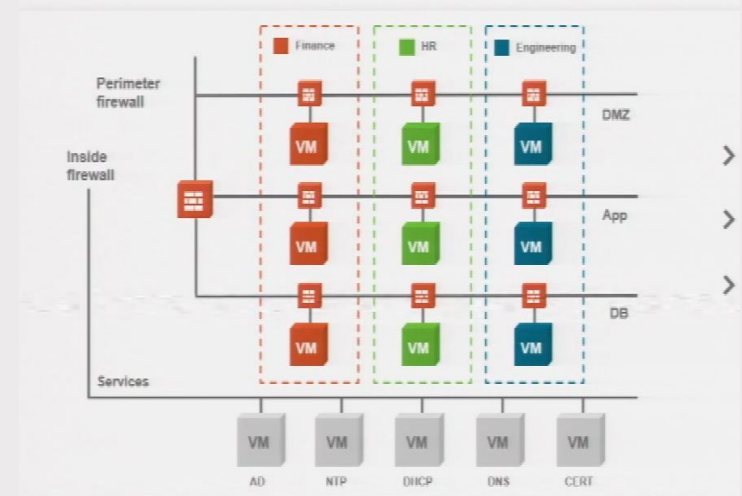
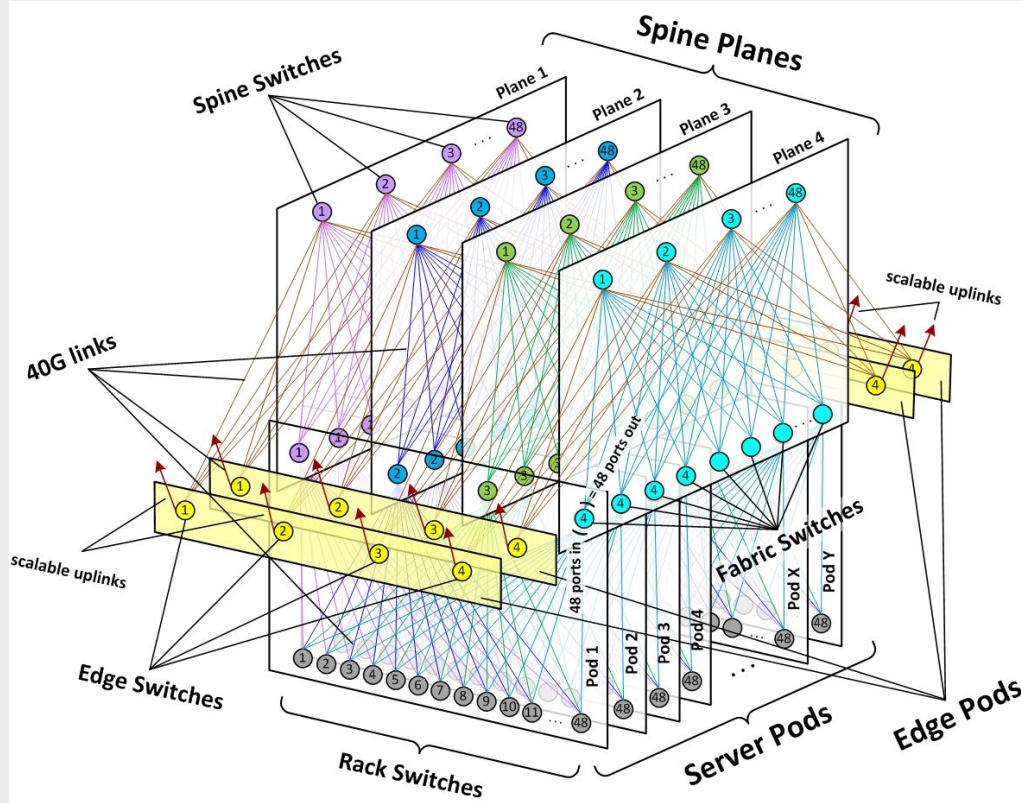
Network Modularization

Traditional Datacenter: Hierarchical Networks



- Lots of in-network processing appliances: IDS, Firewall, Proxies, Load balancers
- Chokepoint devices
 - Force a topology
 - Expensive: Fast pipes + rich policies

Modern datacenters: Fabric and policy rich edge



Modularize the network: Fabric responsible for moving packets faster. Distributed edge responsible for rich policy enforcement

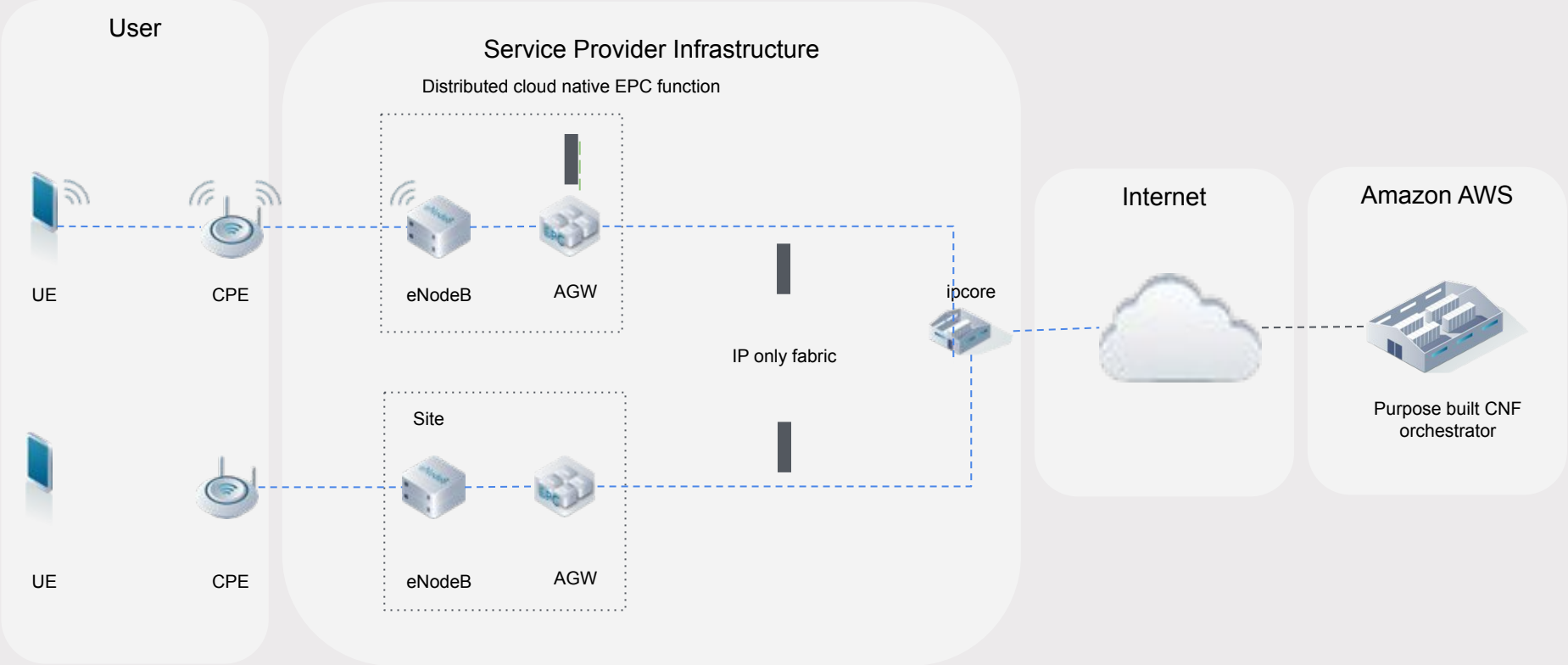
Magma takeaway 1: Modularize the cellular network

Why Magma? Why Facebook?



- Distribute policy enforcement point
 - Let the ideal topology decide the policy enforcement point
- Move policy enforcement to software
 - Leverage rapid iteration and programmability of software
- Keep core network simple
 - Allows for easy scale up/down
 - Cost-efficient: core network only needs to move packets fast
- Focus on operationalizing the network
 - Leverage purpose built systems for FCAPS and pluggability into NFV Orchestrators
 - Keep device nodes introspectable

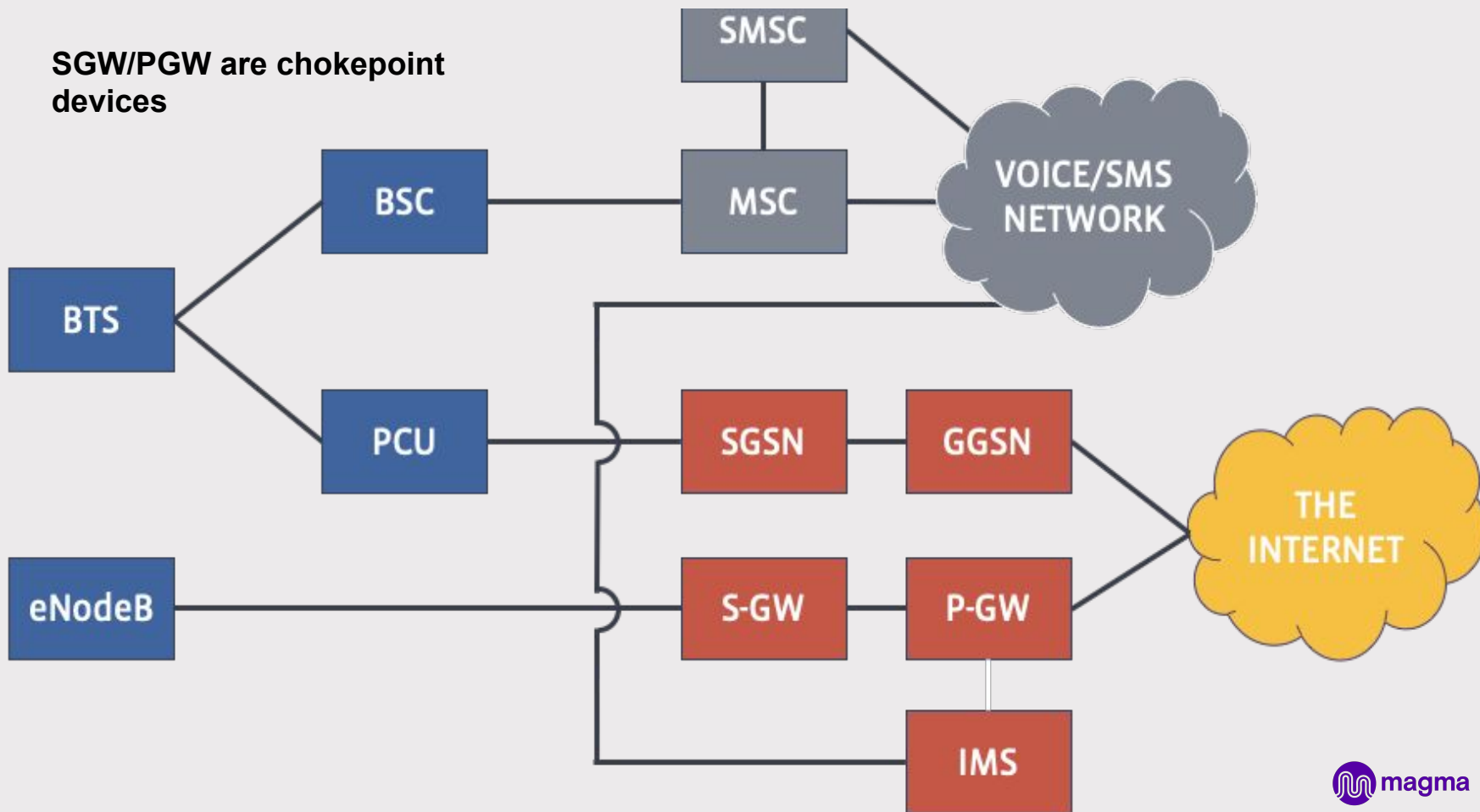
Magma Fixed Wireless - Modularizing the network



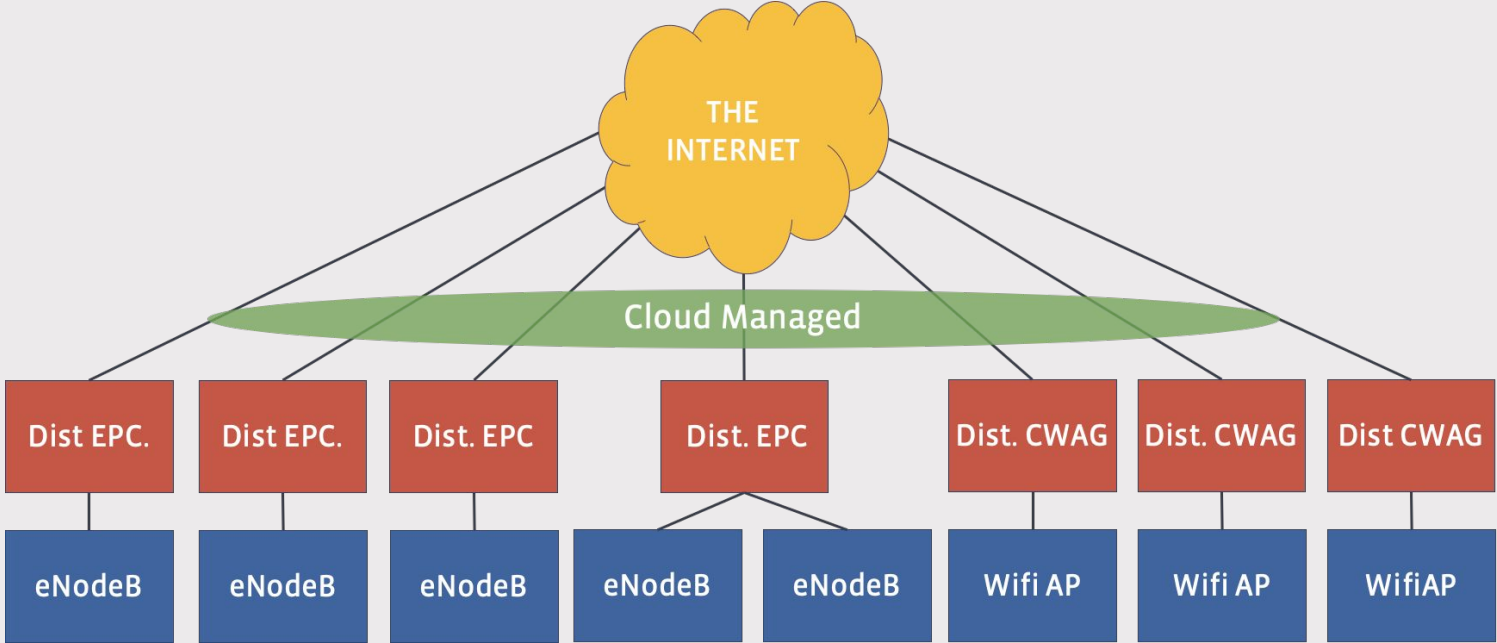
2: Agility

Design for upgrades

Software delivery: Too big to fail



Software delivery: Fault domain

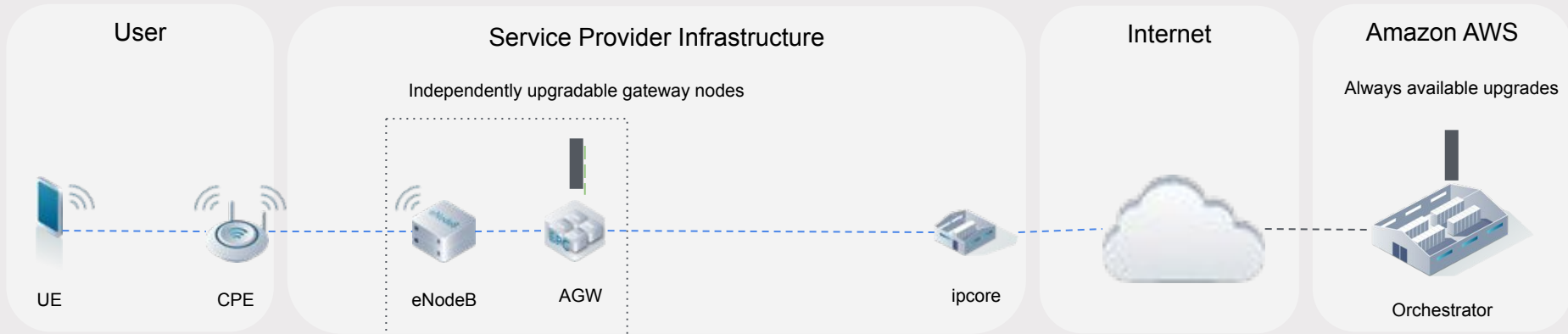


Magma takeaway 4: Software upgrades

Why Magma? Why Facebook?

Design for localized fault domains

- Small upgrade domains
 - Each node is independently upgradable - Hitless upgrades
 - Gradual rollout is baked into the platform
- Control plane independent from dataplane operations
 - Existing traffic not affected by Orc8r outage

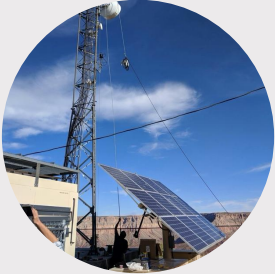
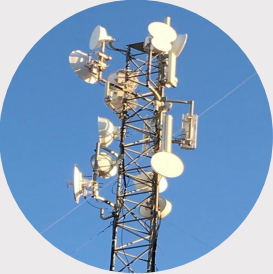


Solution Overview

Magma Use Cases

2020 Focus Areas

Roadmap



1

FIXED WIRELESS ACCESS

- Offer broadband subscriptions by leveraging existing investments in LTE
- Apply network policies at local break-out points

2

CARRIER WI-FI

- Alleviate congestion by offloading cellular traffic to nearby Wi-Fi
- Integrate with existing core
- Easily distribute Wi-Fi profiles on user devices

3

PRIVATE LTE

- Offer cellular connectivity in difficult to reach areas
- Rapidly validate shared spectrum technology
- Reduce integration costs for neutral host networks

4

NETWORK EXPANSION

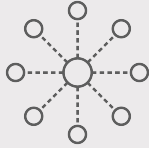
- Expand network to rural and remote areas while protecting the existing core
- Enable rapid adoption of new RAN

5

MOBILE BROADBAND

- Offer LTE / 5G based cellular connectivity
- Apply network policies at local break-out points
- Integrate with 3rd party systems (e.g., OSS) via APIs

FWA Solution - Key Tenets



Distributed EPC



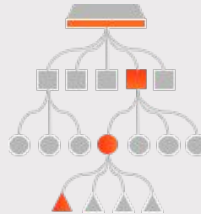
Cloud Managed - Orchestrator can be on a public/private cloud



Access **network agnostic**
Cellular (4G/**5G**) or Wi-Fi



Local Breakout of
subscriber traffic



Disaggregation & Scale as
you **grow**



3GPP Compliant Core
Integration for Auth, Policy
and Charging

Magma FWA - Feature Details

FWA w/Federation		
Availability	Q3 2020	Q4 2020
Spectrum support		
LTE	yes	yes
CBRS	yes	yes
User experience - data		
Service through CPE	yes	yes
Whatsapp Voice	no	no
User experience - voice		
Whatsapp Voice	no	no
VoLTE	no	no
CSFB	no	no
Magma infrastructure		
Orc8r in AWS	yes	yes
Orc8r on-prem	no	no
FedGW	yes	yes
Mobile core integrations		
HSS	yes	yes
OCS/PCRF	no	yes
Mobility support		
Mobility	no	no
Inbound roaming 1	no	no
Outbound roaming 2	no	no

Federated FWA	Infrastructure	
	Orchestrator	In Amazon AWS
	Access Gateway	Bare metal
	Federated Gateway	Virtual Machine
	Internet backhaul	Fiber, microwave

Federated FWA	APIs	
	User provisioning	Via API to Orc8r
	Datapack provisioning	Via API to Orc8r
	CDRs	Not supported

Federated FWA	Mobile core integrations	Q3-2020	Q4-2020
	HSS	Supported (S6a)	Supported (S6a)
	PCRF	Not supported - built-in in Orc8r	Supported (Gx)
	OCS	Not supported	Not supported
	LI	Not supported	Not supported
	IPDR	Not supported	Not supported

Federated FWA	Management	Vendor specific solution	Orchestrator (via REST API)
	Configuration	supported (as provided by vendor)	supported w/ specified models
	Alerts	supported (as provided by vendor)	supported
	Metrics, KPIs	supported (as provided by vendor)	supported

Federated FWA	User experience - Data	
	Service through CPE	Supported
	Service from UE	Not supported
	Data pack type	Prepaid, volume/duration limited
	Charging	Not supported
	Policy	Disconnect, throttle

Federated FWA	User experience - Voice	
	Whatsapp Voice	Not supported
	VoLTE	Not supported
	CSFB	Not supported

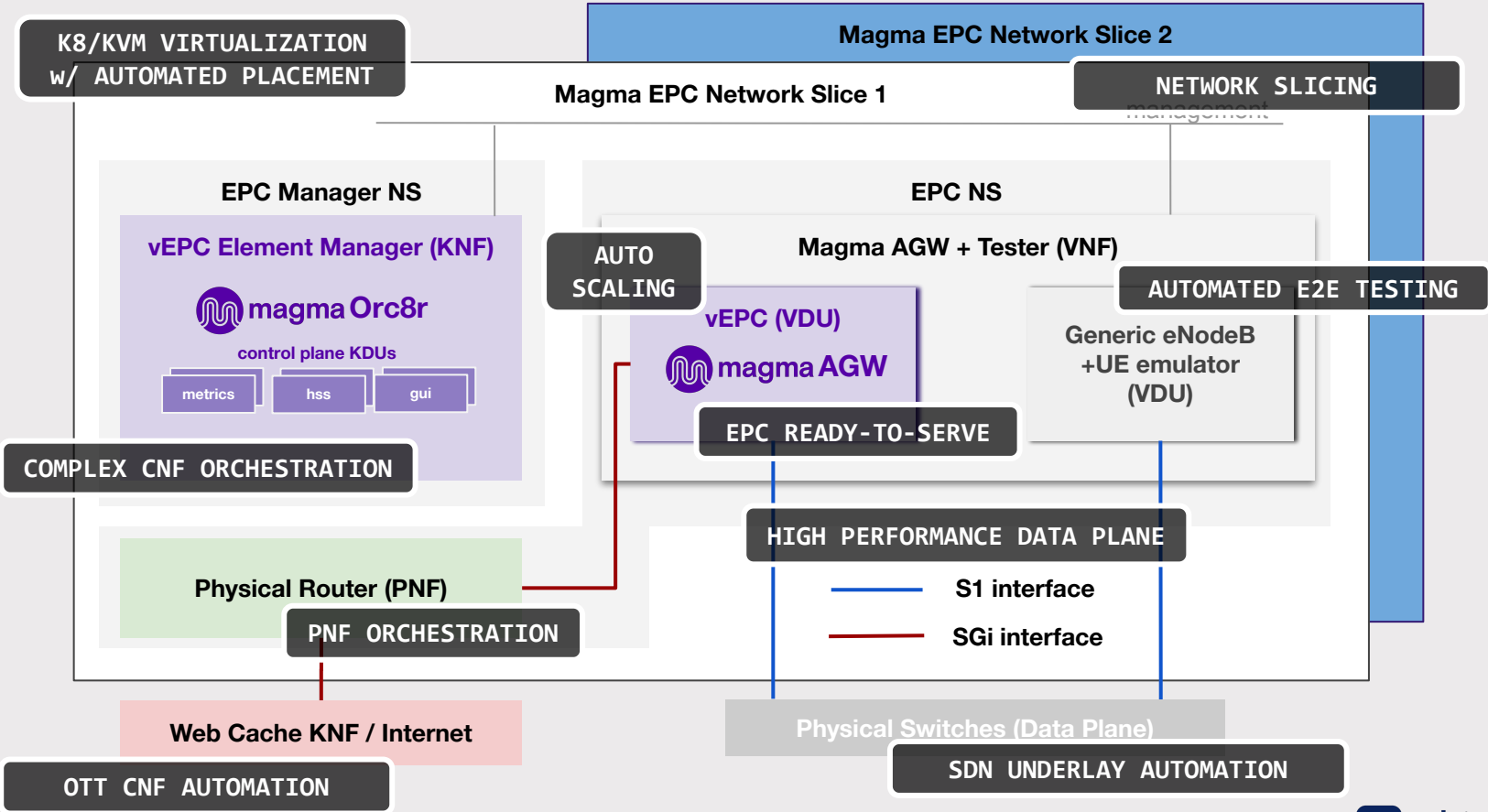
Federated FWA	User interfaces	
	Captive portal	Not supported
	Retailer POS	Not supported
	Customer support	Via Orc8r

	Technical support	Via Orc8r
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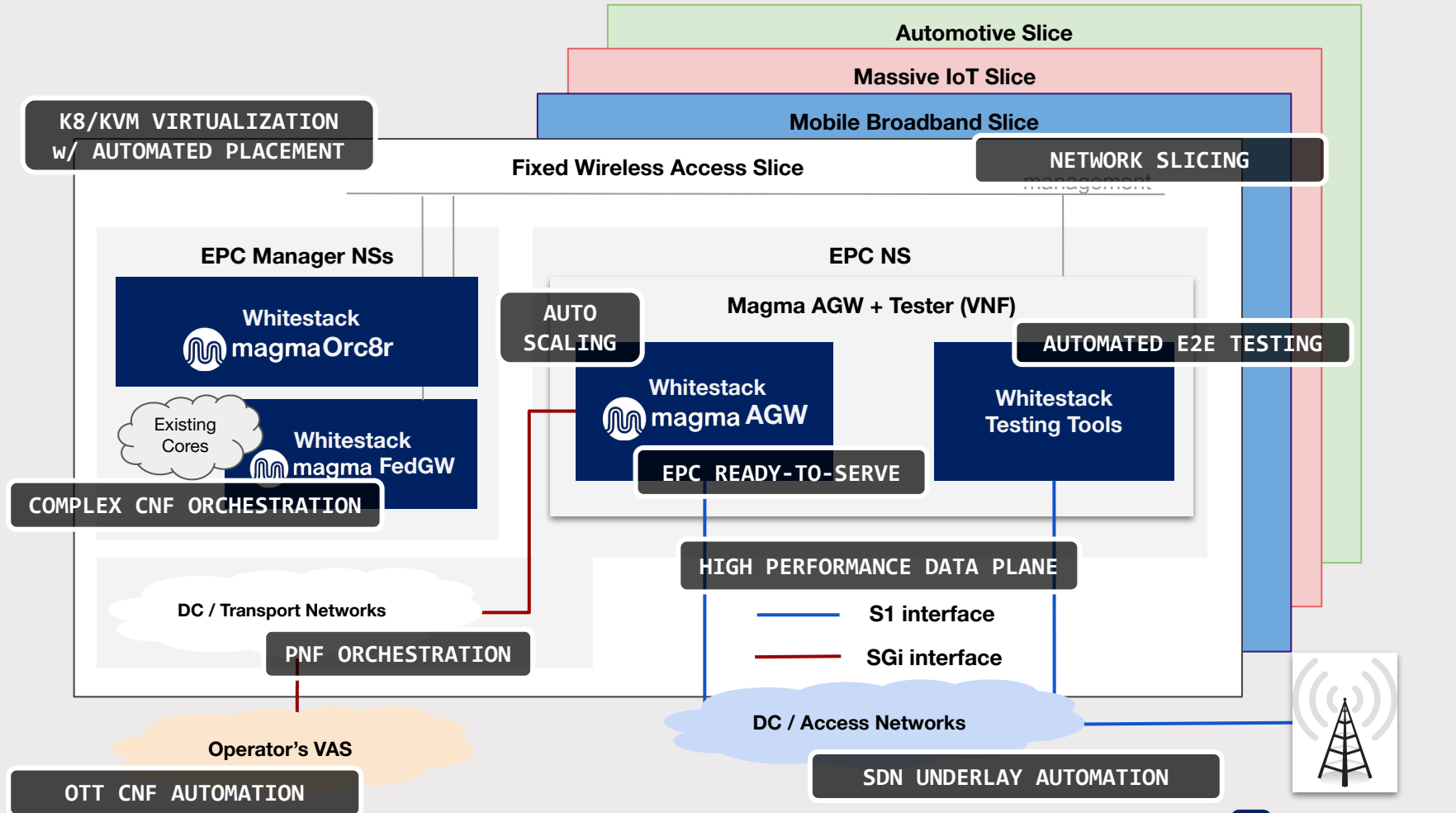
Bringing "Open Packet Cores"

to Telco NFV

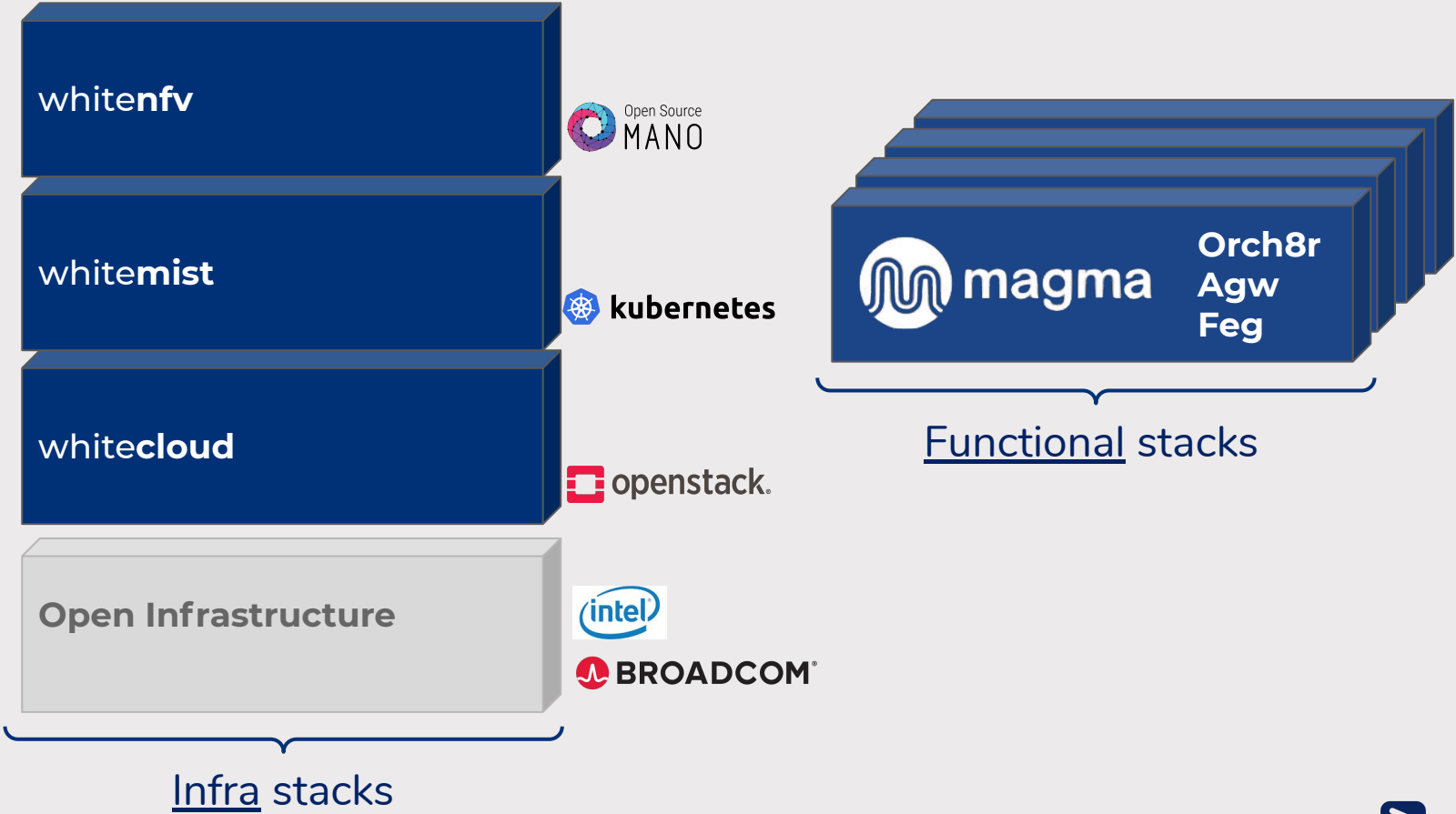
What we launched this week from OSM, **in minutes...**



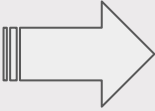
...is a huge value for the Telco Industry.



The whitestacks



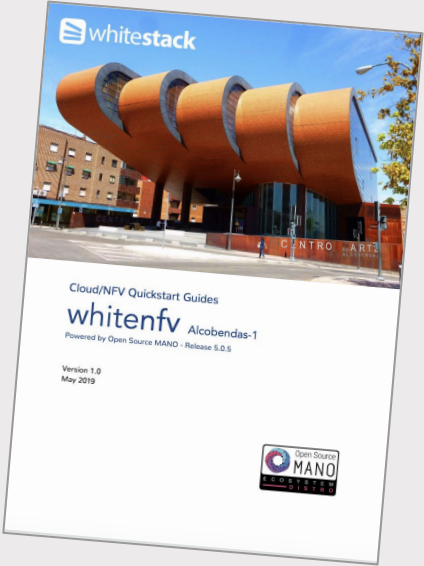
whitenfv



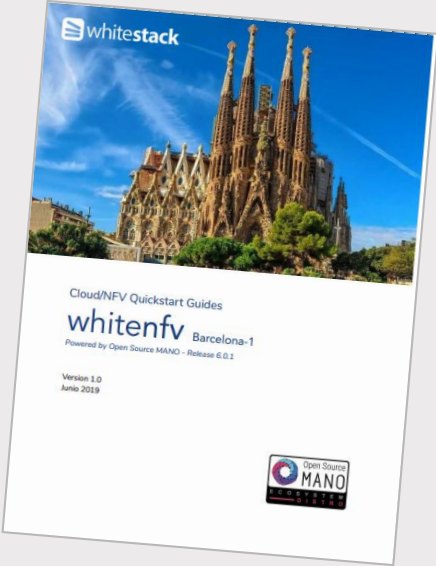
Jan/2018



whitenfv
alcobendas



whitenfv
barcelona



whitenfv
castelldefels



A large, blue, low-poly sculpture of a bear is mounted on the glass facade of a modern building. The bear is depicted in a climbing pose, with its front paws gripping the glass and its body angled upwards. The building's glass reflects the surrounding urban environment, including other buildings and trees. The sculpture is made of many flat, triangular facets, giving it a geometric, crystalline appearance. The background shows a clear sky and some greenery at the base of the building.

whitenfv *Denver*

OSM #5, Colorado, US
April 2018

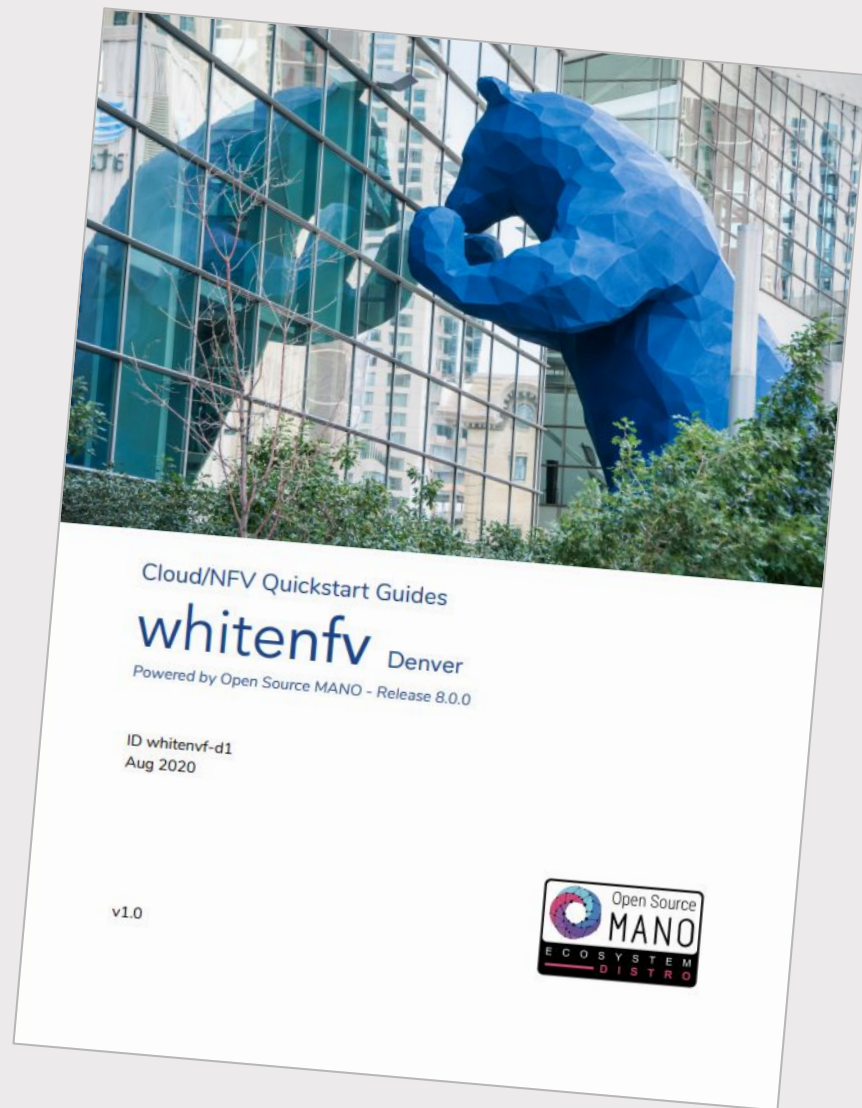
whitenfv

Denver

Main Features:

- VNF Repositories
 - Scalable VNF Monitoring (with Prometheus)
 - SDN Support for Juniper and Arista
 - Improved SDN monitoring
 - Support for Layer 3 networking
 - Kubernetes proxy Charms
 - VCA High Availability
-
- Deployment by using **Helm Charts!**

Available by Aug/2020



Easier to operate with every release with **helm charts**

Simple installation (once infrastructure elements are already deployed)

```
ubuntu@deployer:~$ helm repo add whitestack https://fabianbravo.github.io/whitestack/
"whitestack" has been added to your repositories

ubuntu@deployer:~$ helm search repo
NAME                CHART VERSION      APP VERSION DESCRIPTION
whitestack/whitenfv 0.1.1              1.16.0      A Helm chart for Kubernetes

ubuntu@deployer:~$ helm install whitenfv whitestack/whitenfv --create-namespace --namespace whitenfv --values
values.yaml
NAME: whitenfv
LAST DEPLOYED: Thu Jun  4 04:11:48 2020
NAMESPACE: whitenfv
STATUS: deployed
REVISION: 1

ubuntu@deployer:~$ helm list --namespace whitenfv
NAME      NAMESPACE   REVISION   UPDATED                               STATUS   CHART              APP VERSION
Whitenfv  whitenfv    1          2020-06-04 04:11:48.169545343 +0000 UTC deployed  whitenfv-0.1.1    1.16.0

ubuntu@deployer:~$
```

Easier to operate with every release with **helm charts**

```
ubuntu@deployer:~$ kubectl get pods --namespace whitenfv
```

NAME	READY	STATUS	RESTARTS	AGE
create-kafka-topics-w6dz4	0/1	Completed	0	75s
keystone-56d57d9ff8-gcx9c	1/1	Running	0	2m6s
keystone-56d57d9ff8-j4vrx	1/1	Running	0	2m6s
keystone-56d57d9ff8-jwndw	1/1	Running	0	2m6s
lcm-584f47c7d7-49jhf	1/1	Running	1	2m6s
lcm-584f47c7d7-gr8vk	1/1	Running	1	2m6s
lcm-584f47c7d7-wfkvn	1/1	Running	1	2m6s
mon-cf77c6ddf-462sr	1/1	Running	1	2m6s
mon-cf77c6ddf-7gzs4	1/1	Running	1	2m6s
mon-cf77c6ddf-t5bxd	1/1	Running	1	2m6s
nbi-c4df45755-4bsf5	1/1	Running	0	2m6s
nbi-c4df45755-b6n55	1/1	Running	0	2m6s
nbi-c4df45755-tmgmg	1/1	Running	0	2m6s
pol-76799784b6-phsww	1/1	Running	2	2m4s
pol-76799784b6-psdw5	1/1	Running	3	2m4s
pol-76799784b6-xc4vh	1/1	Running	3	2m4s
ro-84b974b568-d2ptp	1/1	Running	3	2m4s
ro-84b974b568-ghqmg	1/1	Running	4	2m3s
ro-84b974b568-ksd75	1/1	Running	3	2m3s
ui-6c4c75d585-2lg29	1/1	Running	0	2m4s
ui-6c4c75d585-sdl75	1/1	Running	0	2m3s
ui-6c4c75d585-smvk2	1/1	Running	0	2m3s
ui-migrate-mprsb	0/1	Completed	0	80s
whitenfv-elasticsearch-data-0	1/1	Running	0	2m6s
whitenfv-elasticsearch-master-6c8648d5-d56fs	1/1	Running	0	2m6s
whitenfv-grafana-584c9bcffd-vl49b	1/1	Running	3	2m6s
whitenfv-kafka-0	1/1	Running	2	2m6s
whitenfv-kafka-1	1/1	Running	2	2m5s
whitenfv-kafka-2	1/1	Running	2	2m5s
whitenfv-kibana-ddc679cc8-c2h24	1/1	Running	0	2m6s
whitenfv-mariadb-master-0	1/1	Running	0	2m5s
whitenfv-mariadb-slave-0	1/1	Running	0	2m5s
whitenfv-mariadb-slave-1	1/1	Running	0	73s
whitenfv-mongodb-arbiter-0	1/1	Running	0	2m5s
whitenfv-mongodb-primary-0	1/1	Running	0	2m5s
whitenfv-mongodb-secondary-0	1/1	Running	0	2m5s
whitenfv-openebs-admission-server-855b4d6c6b-4fjg2	1/1	Running	0	2m6s
whitenfv-openebs-apiserver-7fd796f874-79nsb	1/1	Running	0	2m5s
whitenfv-openebs-localpv-provisioner-5656c8cd47-tt95l	1/1	Running	0	2m5s
whitenfv-openebs-ndm-2vxs4	1/1	Running	0	2m6s
whitenfv-openebs-ndm-m7k8f	1/1	Running	0	2m6s
whitenfv-openebs-ndm-operator-59c6c97bf5-hpmwm	1/1	Running	0	2m5s
whitenfv-openebs-ndm-q24n2	1/1	Running	0	2m6s
whitenfv-openebs-provisioner-7bddff6b7b-72rgs	1/1	Running	0	2m5s
whitenfv-openebs-snapshot-operator-74894c4fcd-tvrsb	2/2	Running	0	2m5s
whitenfv-prometheus-689f494dc-m2tlz	1/1	Running	0	2m4s
whitenfv-zookeeper-0	1/1	Running	0	2m5s
whitenfv-zookeeper-1	1/1	Running	0	2m5s
whitenfv-zookeeper-2	1/1	Running	0	2m5s

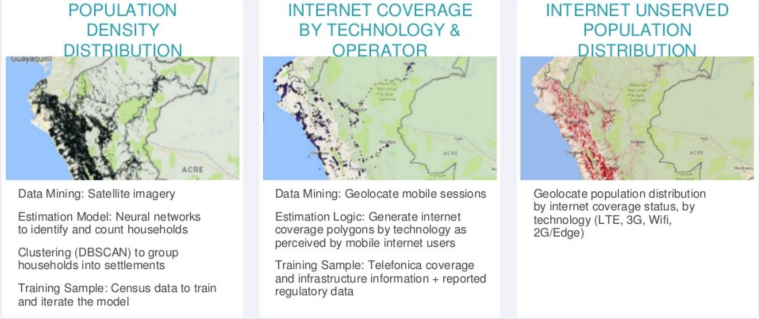
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```

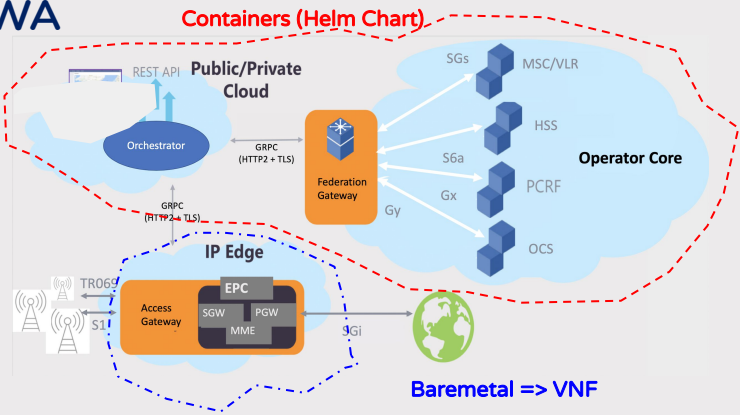
NAME	READY	STATUS	RESTARTS	AGE
create-kafka-topics-w6dz4	0/1	Completed	0	75s
keystone-56d57d9ff8-gcx9c	1/1	Running	0	2m6s
keystone-56d57d9ff8-j4vrx	1/1	Running	0	2m6s
keystone-56d57d9ff8-jwndw	1/1	Running	0	2m6s
lcm-584f47c7d7-49jhf	1/1	Running	1	2m6s
lcm-584f47c7d7-gr8vk	1/1	Running	1	2m6s
lcm-584f47c7d7-wfkvn	1/1	Running	1	2m6s
mon-cf77c6ddf-462sr	1/1	Running	1	2m6s
mon-cf77c6ddf-7gzs4	1/1	Running	1	2m6s
mon-cf77c6ddf-t5bxd	1/1	Running	1	2m6s
nbi-c4df45755-4bsf5	1/1	Running	0	2m6s
nbi-c4df45755-b6n55	1/1	Running	0	2m6s
nbi-c4df45755-tmgmg	1/1	Running	0	2m6s
pol-76799784b6-phsww	1/1	Running	2	2m4s
pol-76799784b6-psdw5	1/1	Running	3	2m4s
pol-76799784b6-xc4vh	1/1	Running	3	2m4s
ro-84b974b568-d2ptp	1/1	Running	3	2m4s
ro-84b974b568-ghqmg	1/1	Running	4	2m3s
ro-84b974b568-ksd75	1/1	Running	3	2m3s
ui-6c4c75d585-2lg29	1/1	Running	0	2m4s
ui-6c4c75d585-sdl75	1/1	Running	0	2m3s
ui-6c4c75d585-smvk2	1/1	Running	0	2m3s
ui-migrate-mprsb	0/1	Completed	0	80s
whitenfv-elasticsearch-data-0	1/1	Running	0	2m6s
whitenfv-elasticsearch-master-6c8648d5-d56fs	1/1	Running	0	2m6s
whitenfv-grafana-584c9bcffd-vl49b	1/1	Running	3	2m6s
whitenfv-kafka-0	1/1	Running	2	2m6s
whitenfv-kafka-1	1/1	Running	2	2m5s
whitenfv-kafka-2	1/1	Running	2	2m5s
whitenfv-kibana-ddc679cc8-c2h24	1/1	Running	0	2m6s
whitenfv-mariadb-master-0	1/1	Running	0	2m5s
whitenfv-mariadb-slave-0	1/1	Running	0	2m5s
whitenfv-mariadb-slave-1	1/1	Running	0	73s
whitenfv-mongodb-arbiter-0	1/1	Running	0	2m5s
whitenfv-mongodb-primary-0	1/1	Running	0	2m5s
whitenfv-mongodb-secondary-0	1/1	Running	0	2m5s
whitenfv-openebs-admission-server-855b4d6c6b-4fjg2	1/1	Running	0	2m6s
whitenfv-openebs-apiserver-7fd796f874-79nsb	1/1	Running	0	2m5s
whitenfv-openebs-localpv-provisioner-5656c8cd47-tt95l	1/1	Running	0	2m5s
whitenfv-openebs-ndm-2vxs4	1/1	Running	0	2m6s
whitenfv-openebs-ndm-m7k8f	1/1	Running	0	2m6s
whitenfv-openebs-ndm-operator-59c6c97bf5-hpmwm	1/1	Running	0	2m5s
whitenfv-openebs-ndm-q24n2	1/1	Running	0	2m6s
whitenfv-openebs-provisioner-7bddff6b7b-72rgs	1/1	Running	0	2m5s
whitenfv-openebs-snapshot-operator-74894c4fcd-tvrsb	2/2	Running	0	2m5s
whitenfv-prometheus-689f494dc-m2tlz	1/1	Running	0	2m4s
whitenfv-zookeeper-0	1/1	Running	0	2m5s
whitenfv-zookeeper-1	1/1	Running	0	2m5s
whitenfv-zookeeper-2	1/1	Running	0	2m5s

And growing orchestration use cases

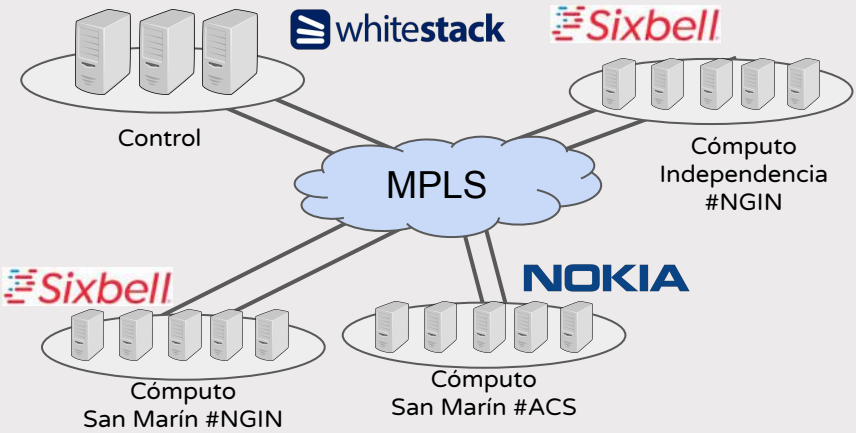
Internet para Todos



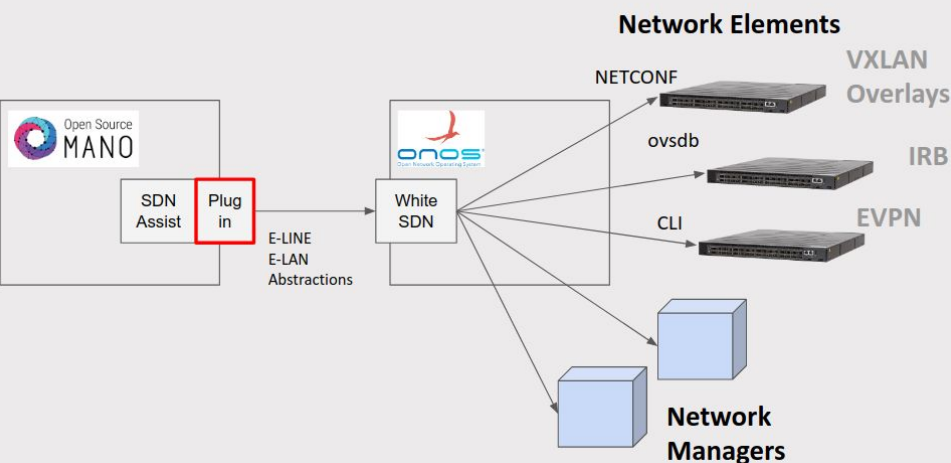
Magma FWA



Distributed Cloud / Multivendor VNFs



SDN Controller Integration



Thanks!

