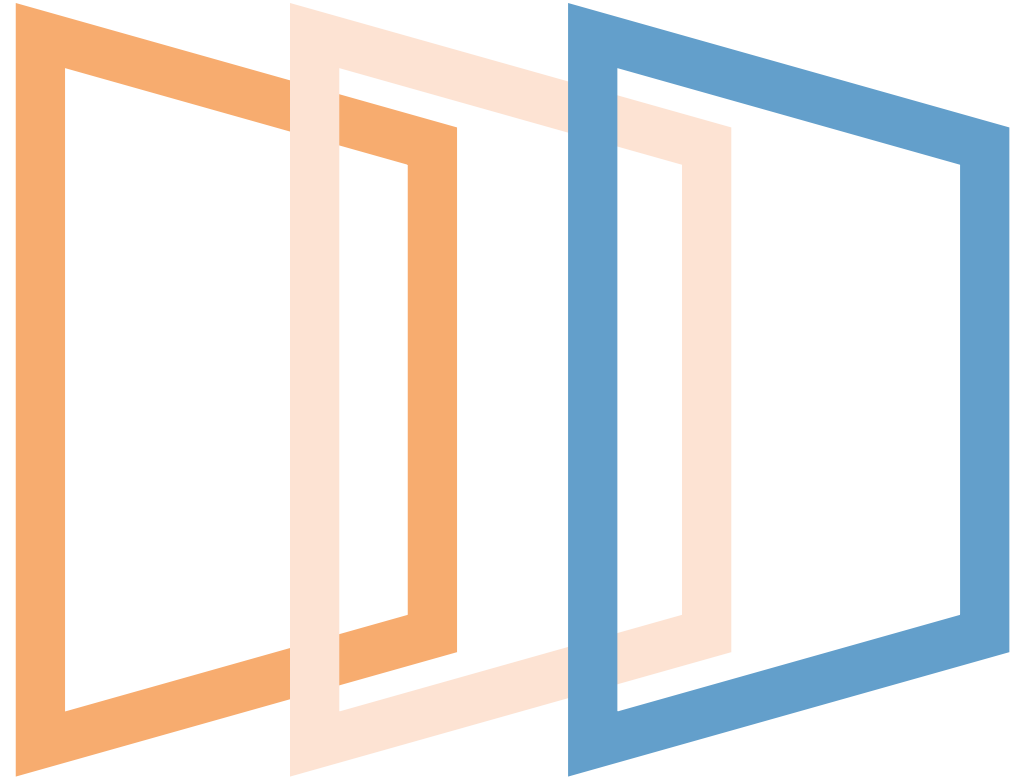


DEPLOYING OSM IN PRODUCTION

OSM Ecosystem Day

March 12th 2020

minsa1t



Topics to cover

1. Indra / Minsait
2. Indra and Open Source MANO
3. OSM Distro
4. OSM Infrastructure
5. OSM Operations
6. Integration into the Telco Systems

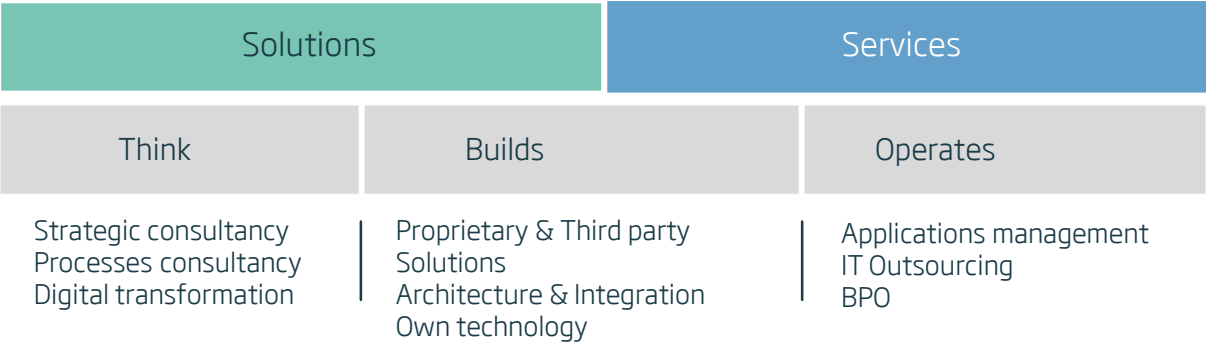
Indra / Minsait

About Indra and Minsait ...

Indra is one of the leading global consulting and technology companies and the technology partner for its clients' key businesses around the world.

Minsait is the Indra brand commercialising services and solutions in the information technology industry. It has developed an offer of proprietary solutions and advanced services with high technological added value, making it possible for its clients to solve their more critical matters and improve their processes, efficiency, profitability and differentiation.

We work in the entire value chain



€3,104m
turnover in 2018

+43,000
professionals

+140
Countries

+4,000
T&M professionals



Energy & Industry

19%



Financial Services

22%



Transport & Traffic

17%



Defence & Security

19%



Telco & Media

8%



Public sector. and
Health

15%

We work in 15 countries in, 4 continents and for more than 30 operators (including 4 of the top 10)

Main clients



Our figures in Telco & Media



Applications management and maintenance

In the BSS and OSS domains through multidisciplinary and global teams

- +800 BSS / OSS applications: Business Intelligence, Corporate Systems, Network Creation and Provisioning Systems, Supervision, Network Services, ...



Data management

With our Telco BigData solution (BigBox)

- 45M customers
- 7 countries
- 1.3 PB data managed



Infrastructure management

Through our Sites-asset management solution

- 15,000 antennas
- 6,000 municipalities



Advertising management

Through our content management solution

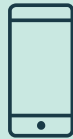
- +14% ads watched
- +44% purchasing willingness



Business Management

With the B2B/B2C Connecta solution (eInvoice)

- 17 m customers with 6,000 m+ bills stored
- 920K documents / hour



Portability management

With our Portability Management solution

- 95 m portabilities processed
- 8 countries and 10 operators



Network Management

With DRACO, our fibre monitoring solution

- 45,000 KM of monitored fibre
- 125 RTUs (Remote Tester Units)



Support systems

With our comprehensive ERP solutions service

- 80% DBs reduction and 40% customized development
- 50% simplification of the financial model











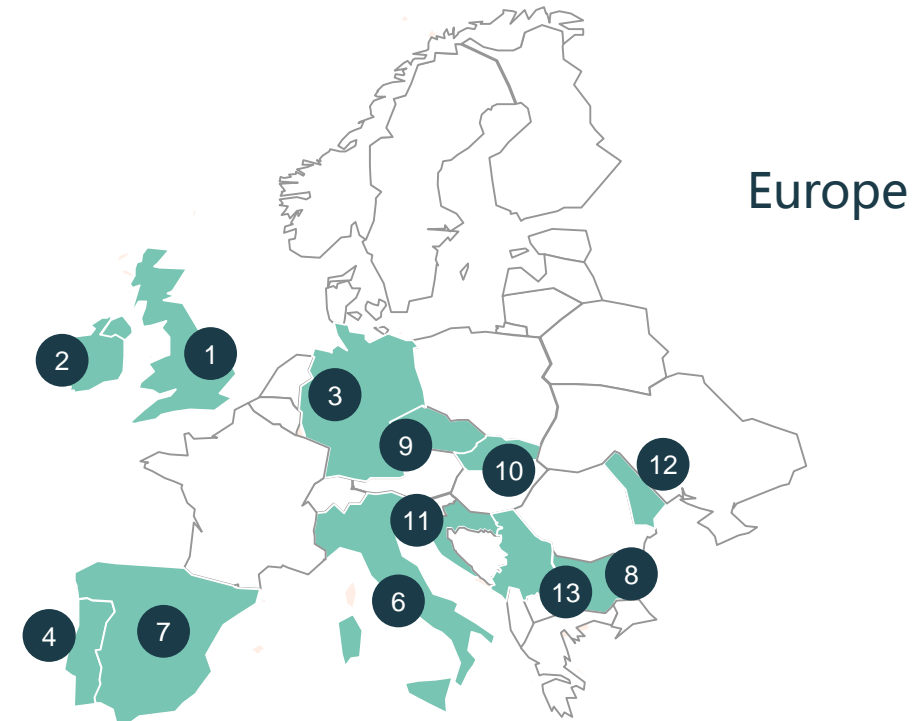
Back office automation






With our RPA solutions

- +26,000 tickets reduction/day
- +190,000 FTEs reduction/month

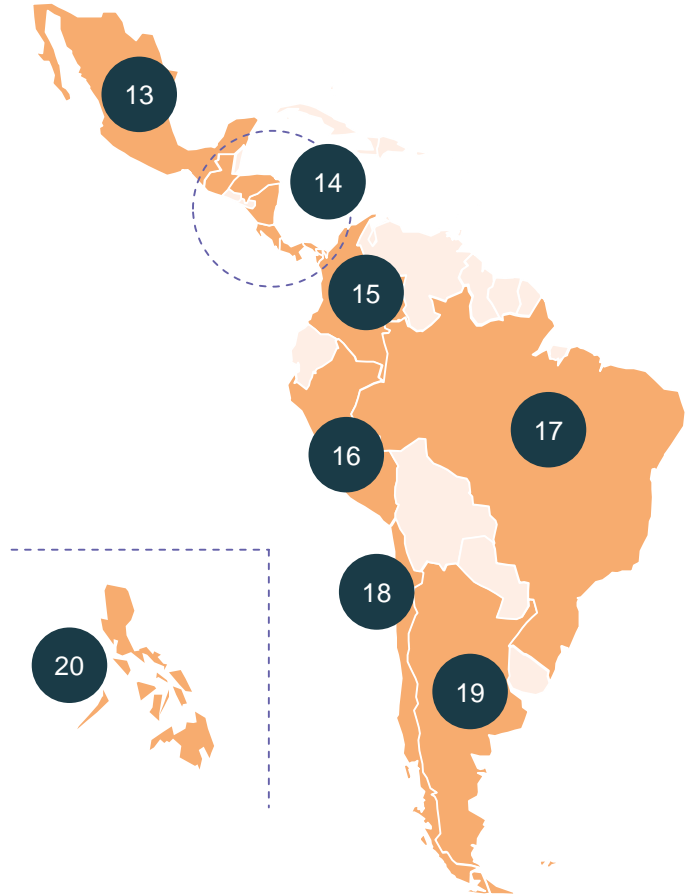
Presence in 20+ countries, with operations and services in many of the world's leading telecommunications operators

1	UK	O2 (Mobile)	
2	Ireland	TEPS	
3	Germany	O2 (Mobile and Fixed)	
4	Portugal	Portugal Telecom (Mobile and Fixed) NOS Anacom (Regulator)	
5	Morocco	Orange Maroc INWI	
6	Italy	Telecom Italia (Mobile and Fixed) Wind 3 (Mobile and Fixed) Vodafone (Mobile and Fixed) Open Fiber	
7	Spain	Telefónica (Mobile and Fixed) Orange – Jazztel Vodafone-Ono Telecable Iberbanda R – Euskaltel Yoigo Cellnex Telxius Torres España Másmóvil	
8	Bulgaria	PPF Group	



9	Czech Rep.	T-Mobile	
10	Slovakia	T-Mobile	
11	Croatia	T-Mobile	
12	Moldova	Orange	
13	Serbia	PPF Group	

Presence in 20+ countries, with operations and services in many of the world's leading telecommunications operators



13	Mexico	Movistar (Mobile) AT&T Telcel Altán Cablevisión	    
14	CA	Movistar ICE Cable & Wireless	  
15	Colombia	Movistar (Mobile and Fixed) UNE – TIGO Azteca Com. Claro	    
16	Peru	Movistar (Mobile and Fixed) Claro Azteca Com. Entel	   

Latam & Philippines

17	Brazil	Movistar (Telesp, Vivo & GVT) TIM (Mobile and Fixed) Claro (Mobile) Oi	   
18	Chile	Movistar (Mobile and Fixed) WoM VTR Entel	   
19	Argentina	Movistar (Mobile and Fixed) Telecom (Mobile) Personal (Mobile) Telxius Cable Argentina	   
20	Philippines	Globe Smart	 

We have a broad ecosystem of alliances and relevant partners for the industry

Full-Stack Main Partners:

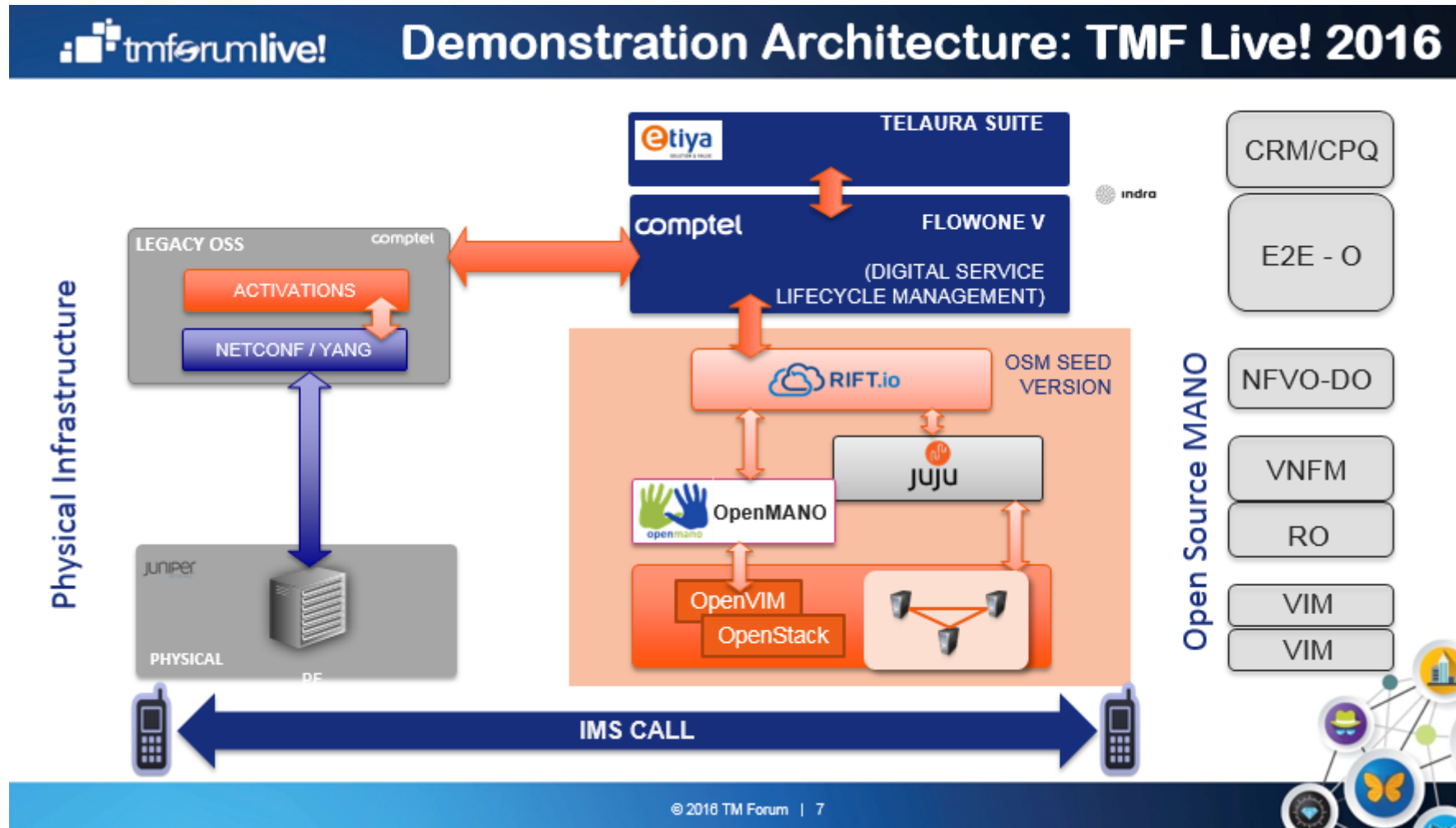


Other relevant partners:

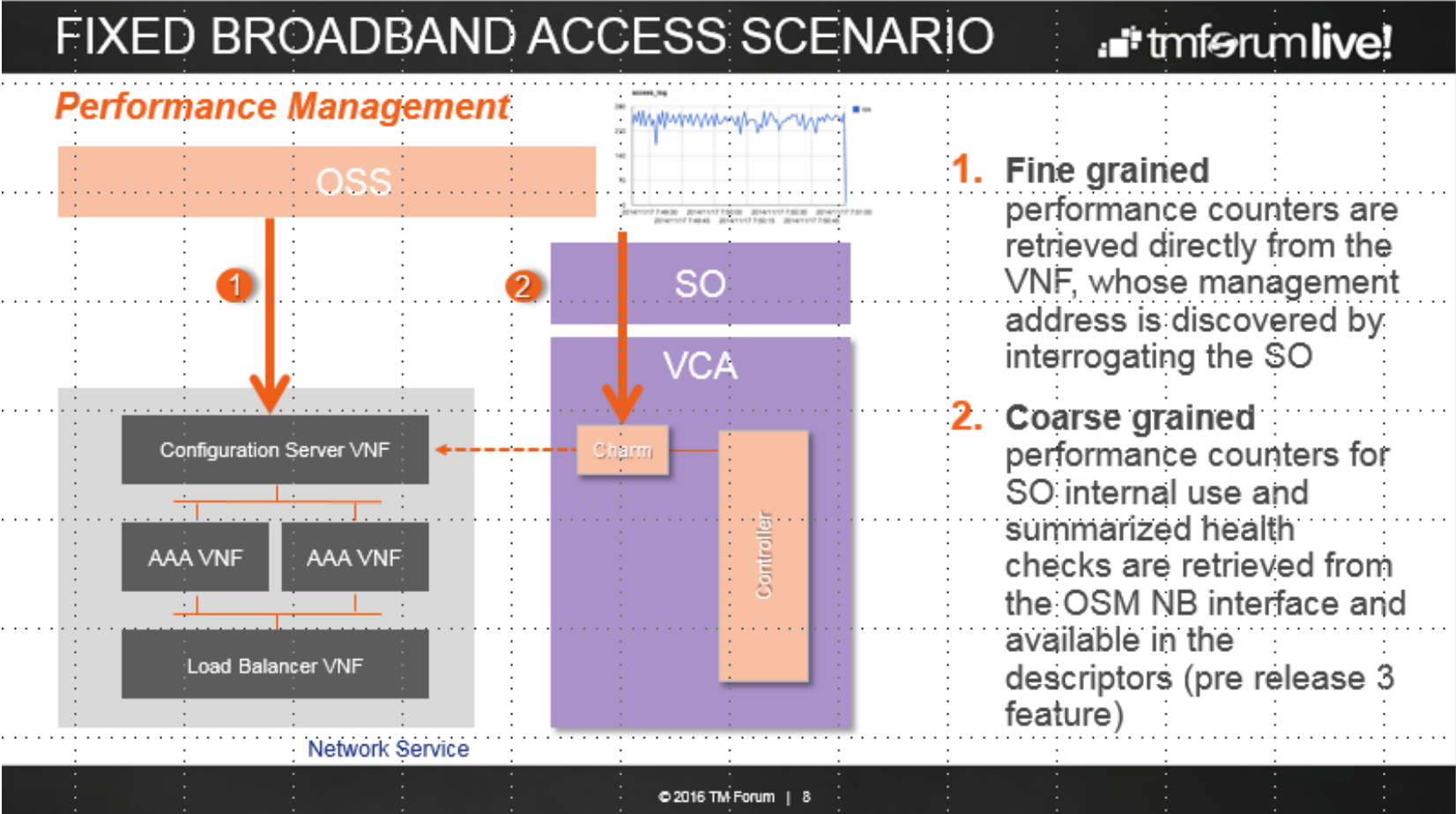


Indra and Open Source MANO

Participant in OSM since inception in 2016



TMForum 2017 integration effort: Performance management with Telefónica, Verizon, Riverbed, Sigscale



[Day 2] NFV Management with Open APIs in Open Source MANO

Contributions to the community: Monitoring stack for the Kubernetes deployment

```
./install_osm.sh -c k8s --k8s_monitor
```

Access dashboard: <http://<osm-host>:3000>



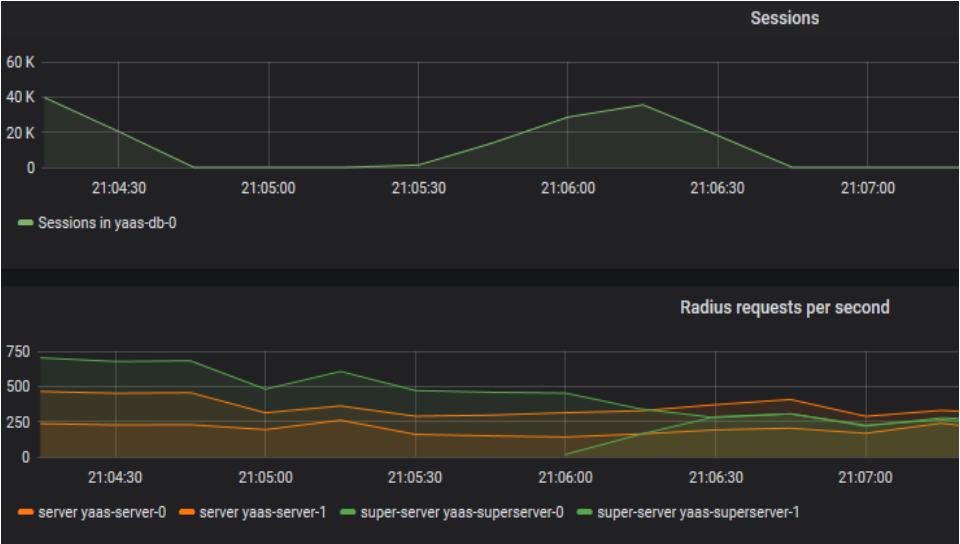
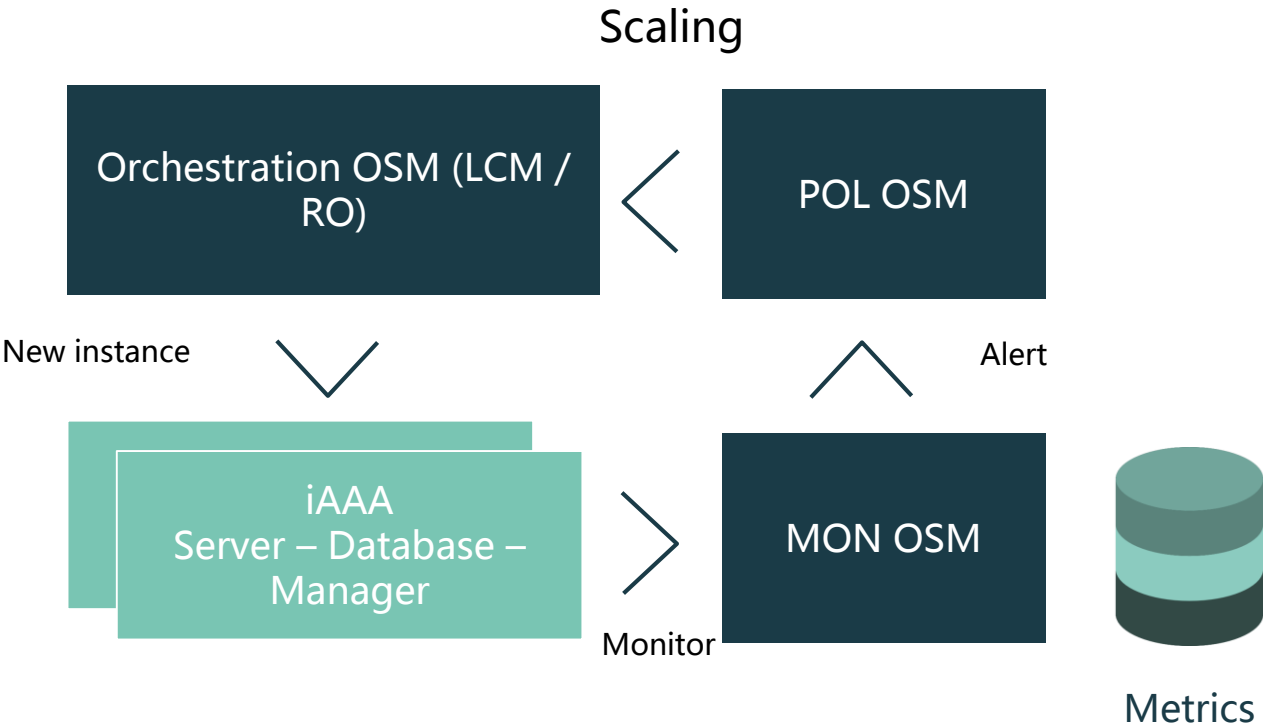
← Kubernetes health

← OSM component status

← OSM component resource consumption

iAAA as a reference VNF

Auto-scaling of Radius/PCRF server. To be used for UNICA-Next proofs of Concept

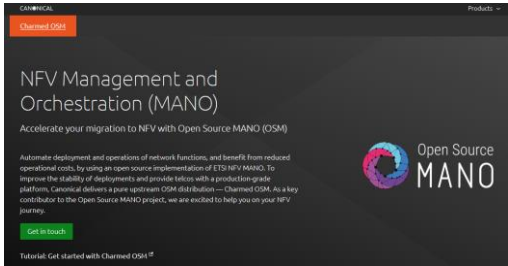


The distros

The commercial distros

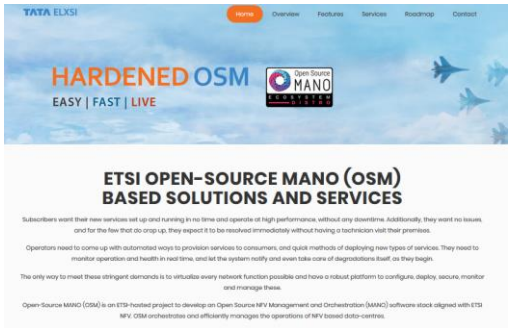
We work with the three commercial Open Source MANO distros (in alphabetical order)

Canonical
Charmed OSM



<https://charmed-osm.com/>

TATA
TE - OSM



<https://www.tataelxsi.com/TE-OSM/index.html>

Whitestack
WhiteNFV



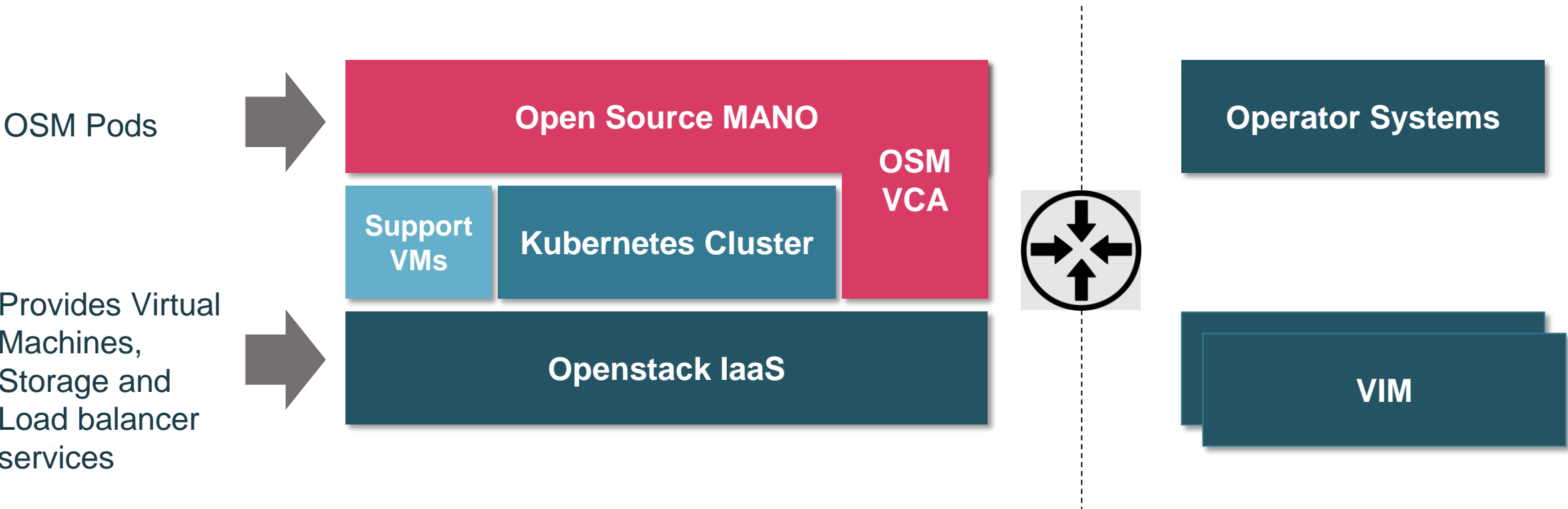
<https://www.whitestack.com/products/whitenfv/>

OSM infrastructure

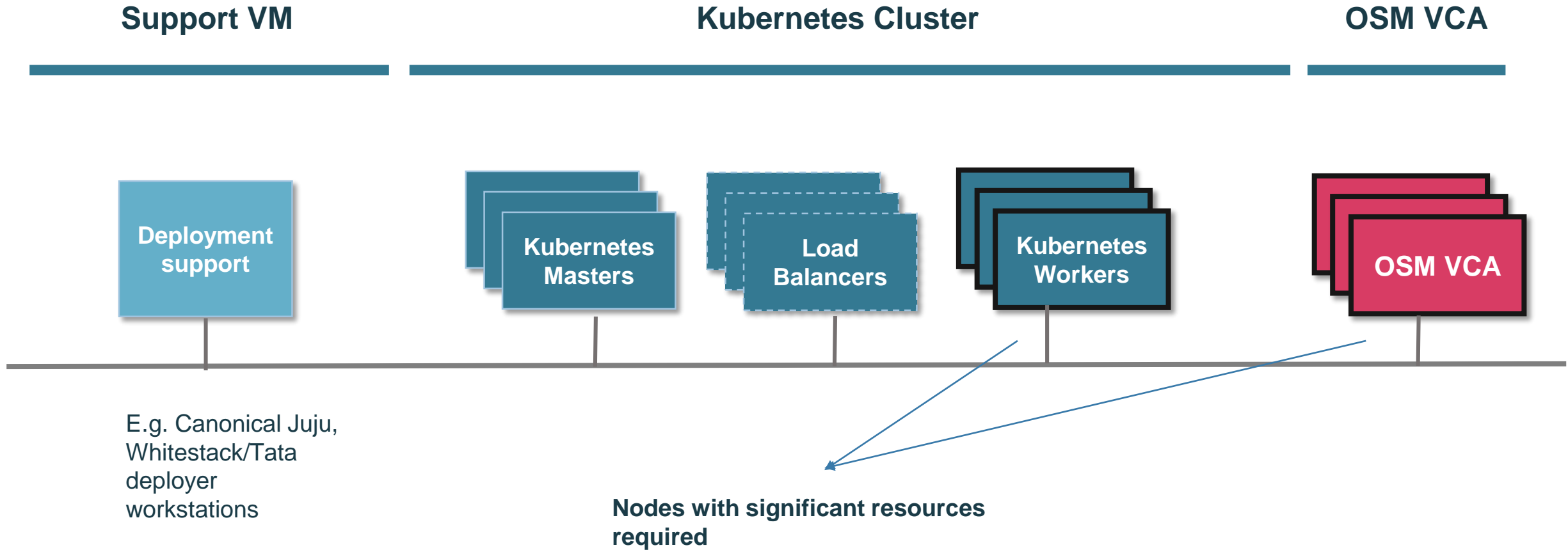
High level architecture

Although OSM may be deployed on bare metal servers, in the most typical scenario it is installed on top of a pre-existing IaaS (e.g Openstack, VMWare VIO)

The full stack is as follows



The required infrastructure



Sizing

Details **may vary** as a function of the VIM size, distro, operator requirements, etc.

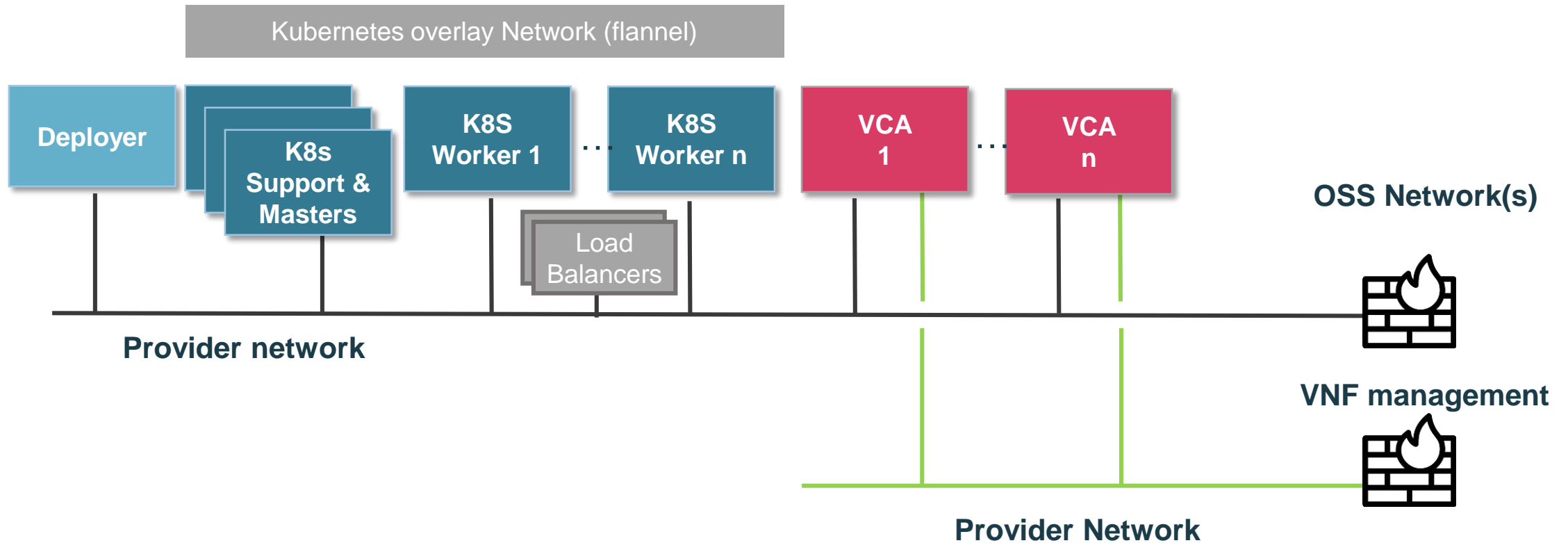
Numbers below intended as a reference for orders of magnitude

Host / Virtual Machine	Number of nodes	Starting resources required	How does it scale
Deployment support	1 to 3	1 Core, 4GB RAM, <100GB disk	-
Kubernetes masters	3 to 6	2 Core, 8GB RAM, <100GB disk	-
Kubernetes workers	3	8 Core, 32GB RAM 9 Volumes 100GB 14 Volumes 16GB	With the number of Day-2 operations and monitoring params expected
VCA	3	16 Core, 64GB RAM 100GB Disc	With number of proxy charms (100/Node)

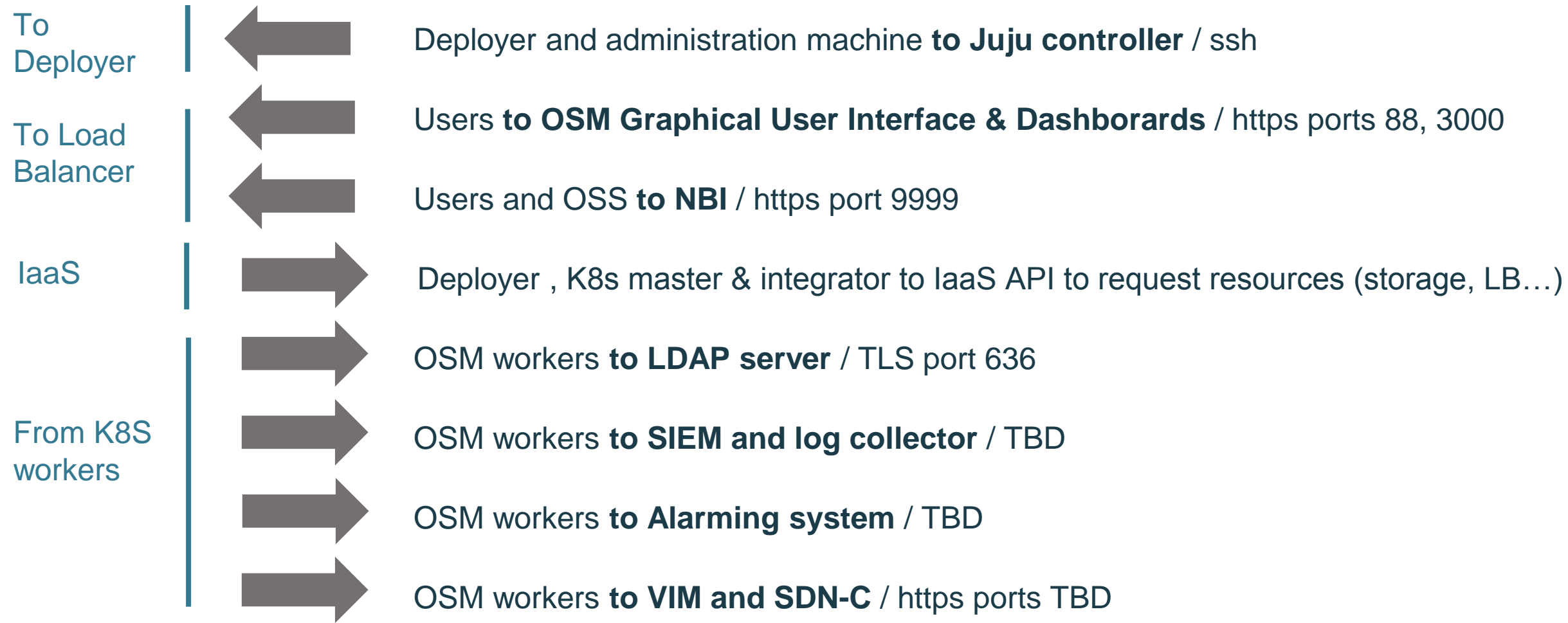
Networking

Outgoing traffic OSM → Operator systems will have origin IP address one of the Worker Nodes

Incoming traffic Operator Systems → OSM will be directed through load balancer

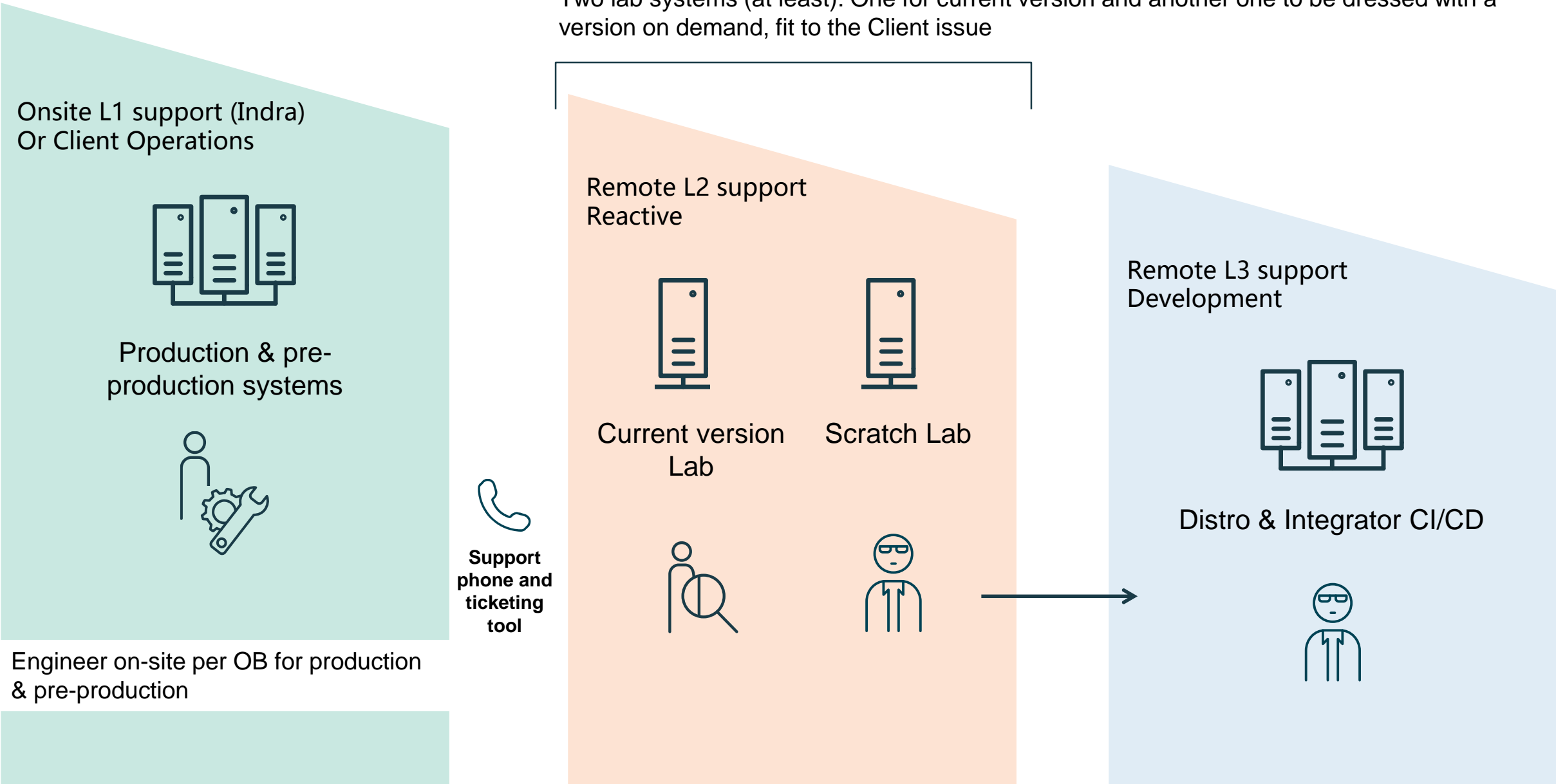


Communication flows / Security policies

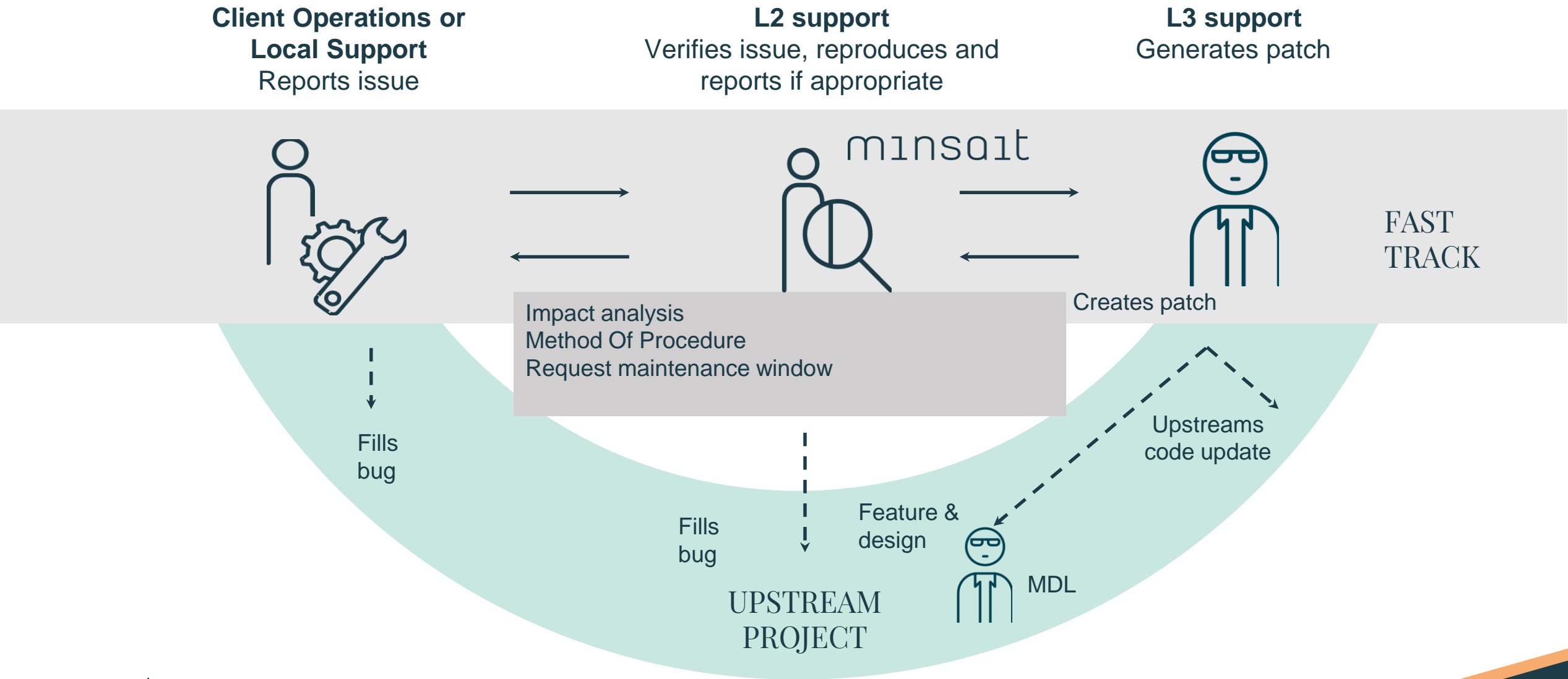


OSM Operations

Level 1 / 2 / 3 Support



Bug fixing. Sync with upstream



Operation and maintenance processes



Backup

Both Kubernetes cluster and OSM. Adapt to whatever is available in the Telco infrastructure



Software updates

Bugs and security patches with backwards compatibility as part of L2 support. Major version changes require dedicated activities.



Adding additional resources

As the size of the managed resource pool grows, the OSM infrastructure may need to grow by adding more nodes or scaling vertically the existing ones.



Housekeeping

Configuration changes (e.g. LDAP, logs..), checking of database performance, host health, etc.

VNF integration into OSM with Telco mindset



VNF onboarding. Definition of descriptors.

May be done in Indra lab, previous to any activities in the end client lab.



VNF management. Definition of charms



Testing

Functional, performance and management.

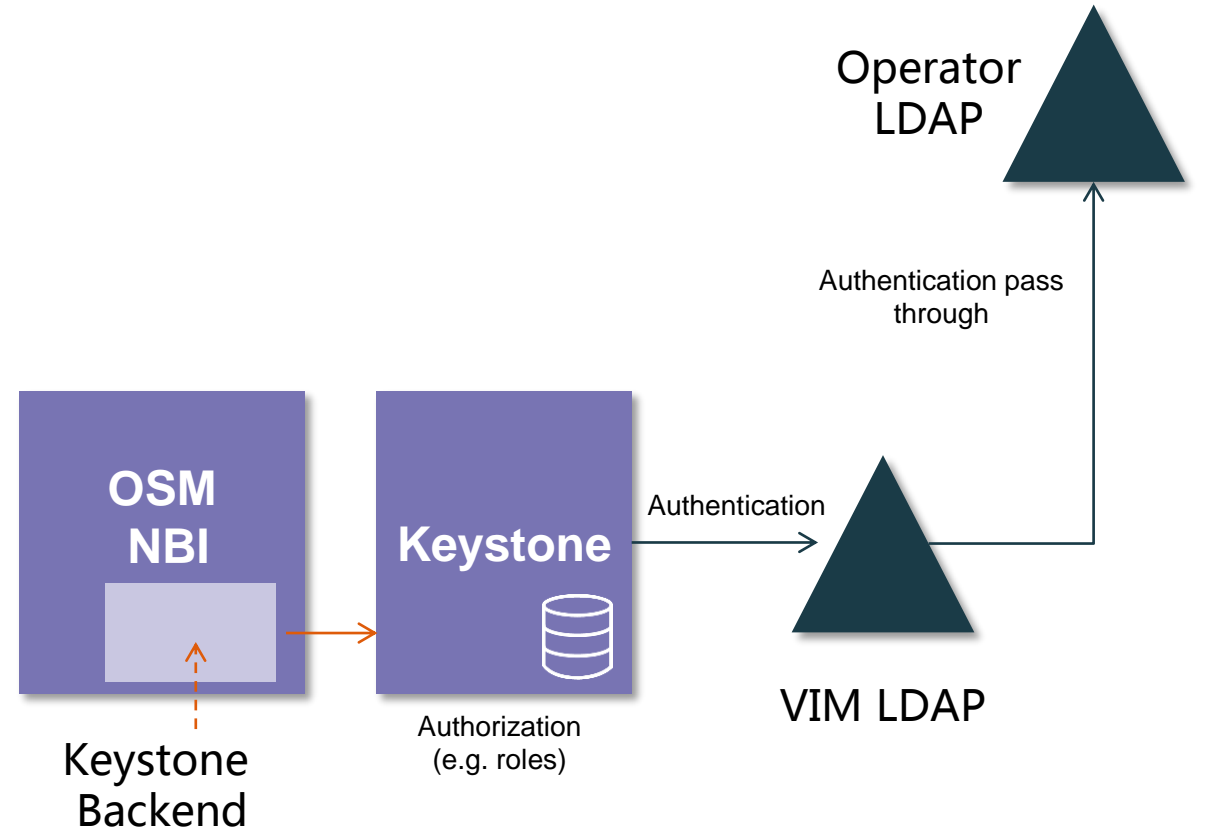
Experience with vEPC (e.g. Mavenir), SD-WAN (Versa), Fixed Access (virtual Cisco ASR 9K, Nokia), etc.

Integration into Operator Systems

LDAP integration

User-Password stored in operator LDAP

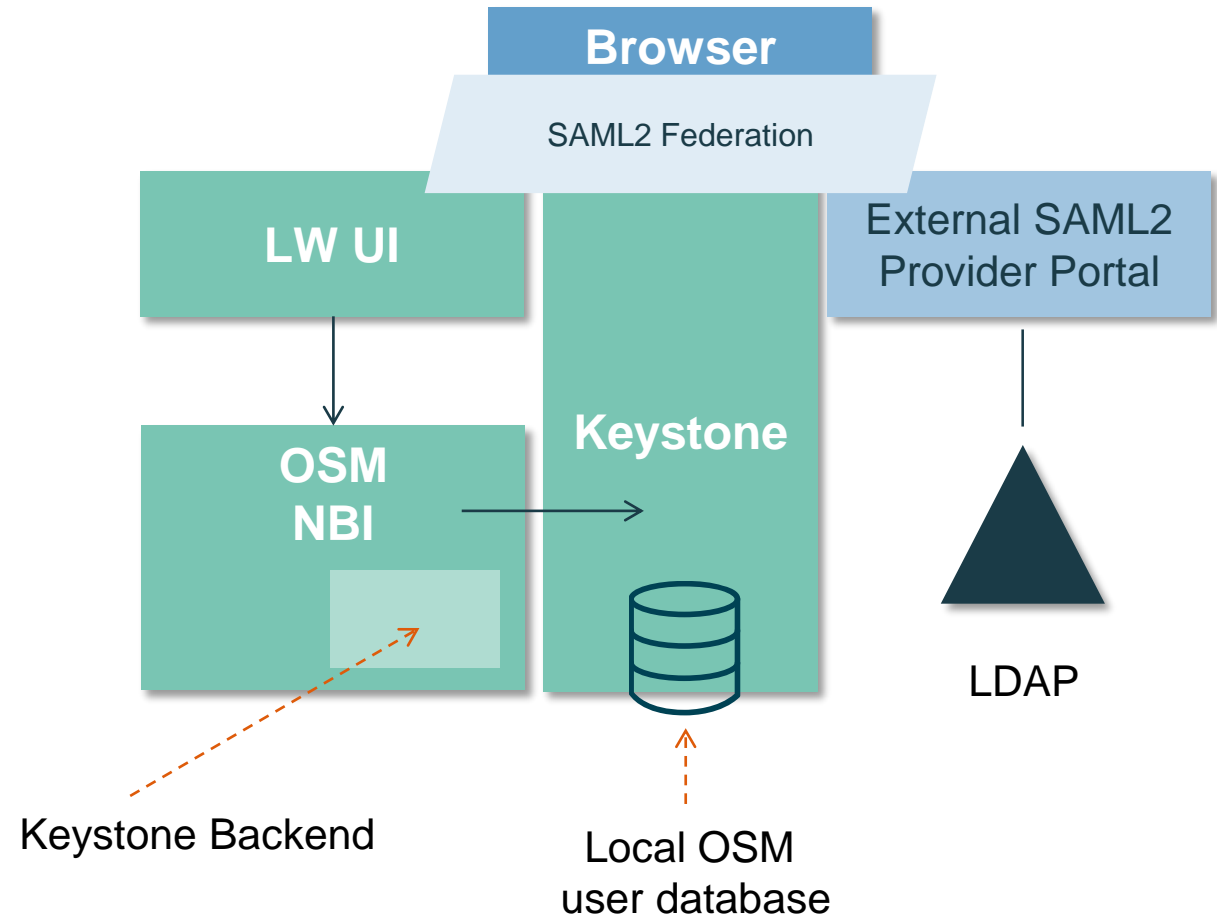
- Operators usually employ an LDAP server for storage of credentials
- This is only for user identity. Roles (authorization) are normally managed in the specific platform. The user has to reside also in OSM.
- The approach consists on leveraging the existing OSM keystone backend, configured to use an external LDAP for identity storage



Single Sign On

Only needed if the user must be able to avoid logging-in again if already used another portal

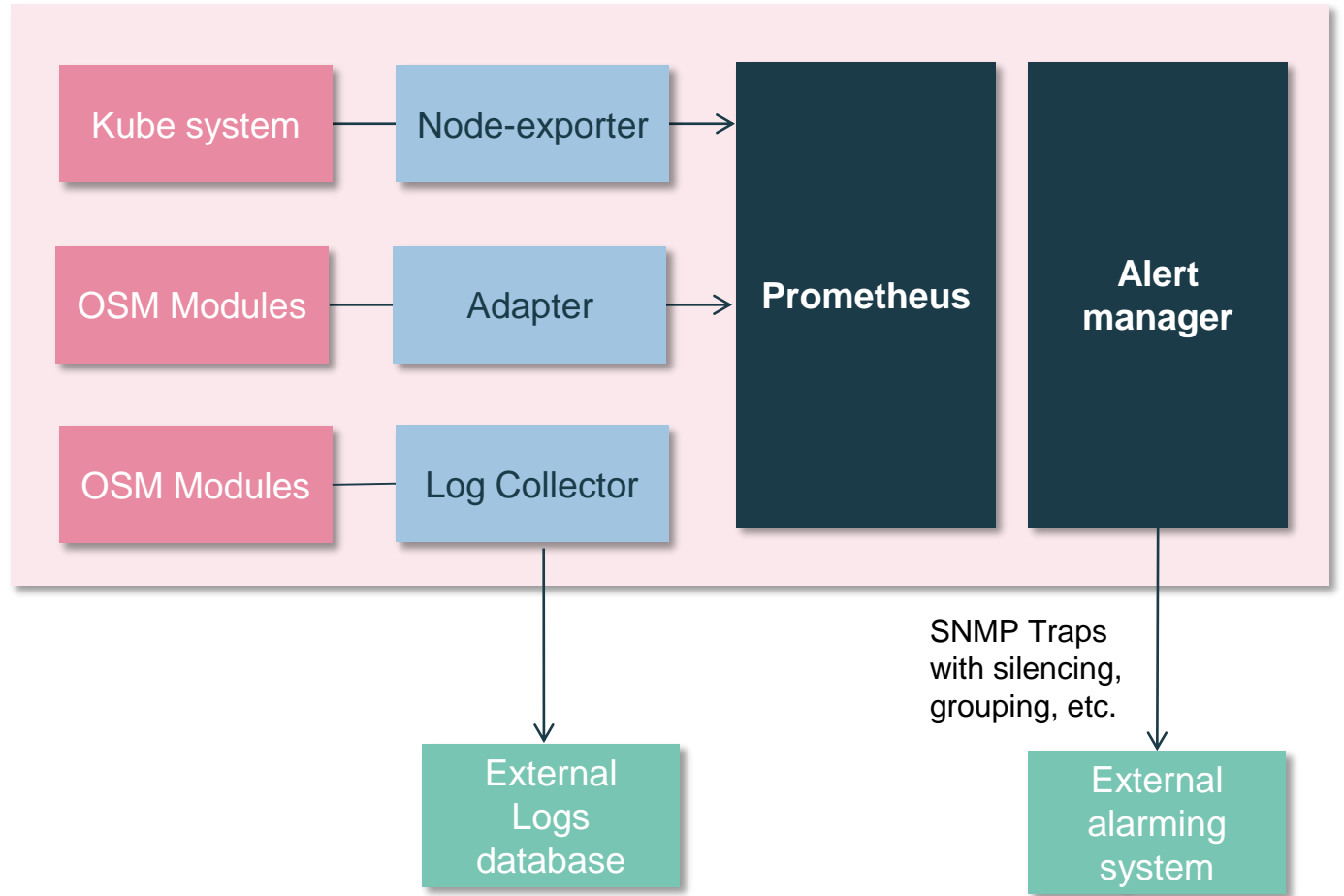
- The proposed architecture consists on leveraging the SAML2 federation capabilities in Keystone/Shibboleth. Openstack Horizon uses this approach.
- The client will authenticate in UNICA portal, which generates a SAML2 assertion that is trusted by Keystone/Shibboleth (federated in UNICA OpenAM)
- Keystone redirects back the client with a token that can be used in OSM NBI



Fault and Performance management of OSM modules

Monitoring of OSM infrastructure

- **Metrics:** OSM dashboards & export to client systems via Prometheus federation
- **Alarms:** Exported to client systems via Prometheus Alert manager (e.g. SNMP) after grouping, inhibition, throttling & silencing configuration
- **Log collection:** Agents in OSM and storage internal or external in client provided database



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Mark Making the way forward

An Indra company