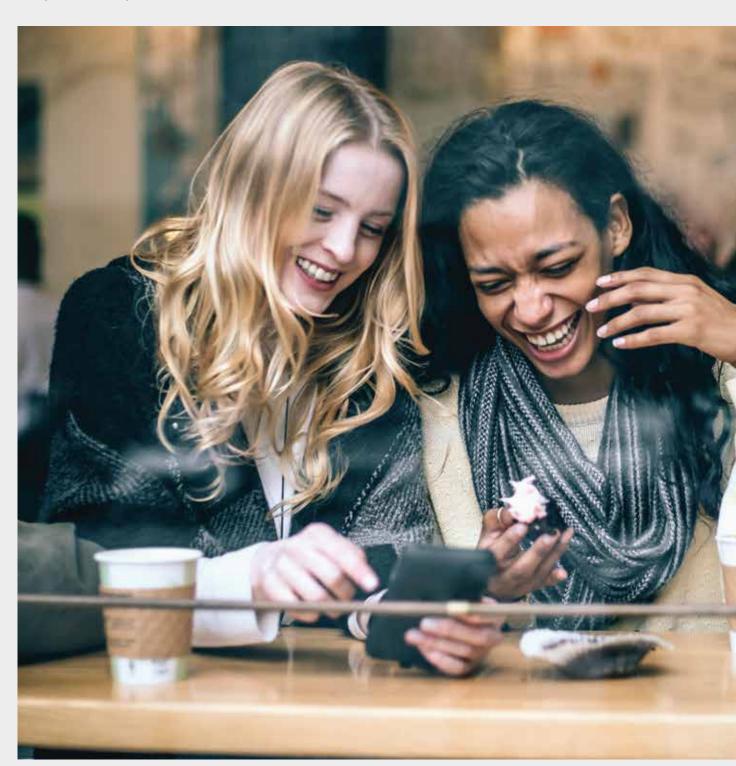# Active and Live Network Inventory

n today's ever-changing world of telecommunications, Communication Service Providers (CSPs) are required to operate with great flexibility to scale up, scale down, or evolve services at high speed. Additionally, there is tremendous pressure on CSPs to reduce CAPEX and OPEX through reduced equipment costs, thus making Network Virtualization inevitable. Every communication service provider will have to go down this path. With 5G around the corner, many have already started with this initiative.

However, what is being ignored is the impact of this on their existing OSS. This paper will take a peek into the impact on Network Inventory - how can Network inventory be active and live? Network Inventory cannot be monolithic and offline if service providers want to take advantage of Network Virtualization. By active and live, it means that these are living, changing every moment to reflect the dynamic nature of virtualized networks.

Real time, active and live inventory for 5G OSS and to co-exist with legacy OSS

Why do we need active & live inventory?

With NFV and SDN getting realized, the way Communication Service Providers operate will change. The fulfilment and assurance process will change. The fulfilment process will have to leverage the dynamic capability of the network and provide services in an efficient manner. The ordering process will have to change as the network is dynamic. The conventional 'Reserve Inventory' and 'Activate Network' approach will have to change. Inventory will be real-time and should reflect the changes in network immediately unlike the conventional 'discover and reconcile' method. Network will be able to scale up and down, thereby optimizing resources. Self-healing and closed-loop assurance is becoming a reality. To facilitate all of this, we will need an active and live inventory in the ecosystem.

What are the challenges?

Future Networks are not going to be completely Virtualized. We will have to live with a Hybrid Network for a long time. Active Inventory will need to be **hybrid in nature** and should be capable of managing VNFs and PNFs seamlessly.

Inventory will be updated at a given point of time by various OSS processes. While the resource is getting updated by the fulfilment process, assurance process or capacity management process will change it immediately based on the dynamic characteristics of network. Active Inventory should be able to **cope with dynamic characteristics.**

As discussed, inventory will become more critical in all the OSS processes. The number of active transactions in the inventory system is going to increase multifold, in order to keep it active and live. Hence, inventory is required to be **highly scalable and available.**

OSS processes will change. Operations will be able to enable services on-demand. **Adaptability of process** by service providers and leveraging the benefits will become key factors for success.

Key characteristics of active & live inventory

Federation

Transitioning to a fully virtualized world will take ages. Communication service providers will operate in a hybrid world for a long time. Hence, the active inventory should also be equipped with necessary abstraction or federation to manage hybrid networks. This will be required to consolidate today's legacy, silo inventories and create a new layer of active and near-real time inventory.

Just-in-time stitching

With the advent of 5G, network slices will be created based on-demand. Just-in-time creation and deployment of virtual network will be common. Active inventory should be capable of creating transient networking components like network slices in the inventory by stitching together existing components for a communication path.
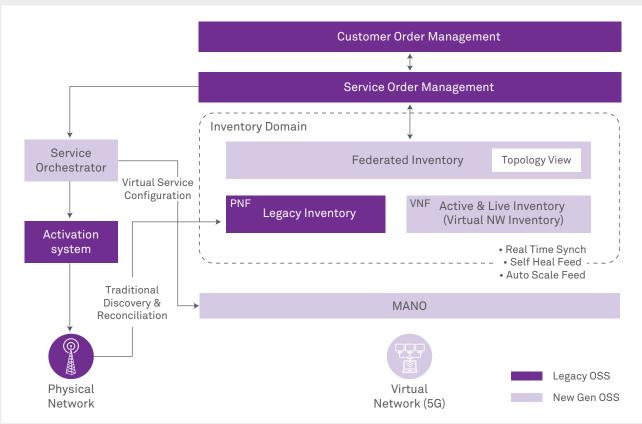
Efficient data access and management

Owing to the dynamic nature of VNFs, the amount of CRUD (Create, Read, Update & Delete) operations on inventory data will increase multifold compared to conventional inventory management systems. Hence, data access to inventory shall be done through in-memory cache. The database should be Topology DB / Graph DB based which will enable dynamism and flexibility.

Standard interfaces

TOSCA (Topology and Orchestration Specification for Cloud Applications) is a proven industry modelling language. The TOSCA includes concepts such as nodes and relationships, whereby a node is an infrastructure such as a network, subnet, or a server software component. The use of this model in building Active Inventory will enable the ability to interface with MANO and other systems in the future.

A comprehensive view of how Active and Live Inventory will host VNFs and co-exist in a future OSS architecture for hybrid networks is depicted in the diagram below.

Customer Order Management

Service Order Management

Inventory Domain

Service Orchestrator

Virtual Service Configuration

Federated Inventory — Topology View

PNF — Legacy Inventory

VNF — Active & Live Inventory (Virtual NW Inventory)

Activation system

Traditional Discovery & Reconciliation

• Real Time Synch
• Self Heal Feed
• Auto Scale Feed

MANO

Physical Network

Virtual Network (5G)

Legacy OSS
New Gen OSS

About the authors

Ajay Patter Veetil
Managing Consultant,
Communication BU,
Wipro Limited.

Ajay is solution lead representing the OSS team
as part of the Communications BU. He has 20+
years of experience working with various service
providers across the globe.

Dipankar Saha
Lead Solution Architect,
Communication BU,
Wipro Limited.

Dipankar is an industry veteran and
accomplished technology leader in the
Telecom vertical with more than 22 years of
working experience creating products for
network equipment providers and solutions
for communication services providers across
the globe.

● **Wipro Limited**
Doddakannelli, Sarjapur Road,
Bangalore-560 035,
India

Tel: +91 (80) 2844 0011
Fax: +91 (80) 2844 0256
wipro.com

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