MEF Seminars

Building Dynamic Third Network Services Powered by CE 2.0, LSO, SDN and NFV

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ECI THE ELASTIC NETWORK

Vodafone Network Virtualisation Architecture for LSO, SDN and NFV

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Virtualisation – Key Themes

SDN

- Introduction of **SDN** for Virtual, Packet and Optical networks. Leveraging existing assets and enabling **Dynamic Service Management** and optimisation

Network Virtualisation (NFV)

- **Virtualisation** of our network functions portfolio, **worldwide** (e.g., MME, HSS, S/PGW, SGSN, GGSN, MGW, BNG, Firewalls, Gi-LAN, CGNAT)

E2E Service Orchestration & Big-data Analytics

- **End-to-End automated** service delivery with full collaboration of all components (e.g., SDN Controllers, CMS, VNFM (new EMSs), evolved OSS/BSS)
- Deliver **superior customer experience** through big-data and analytics based pre-emptive service assurance and fault management

Virtualisation – Key Principles

Operations-Driven

- Full collaboration with **Operations Teams**
- New **Single E2E Target Architecture Worldwide**
- **End-to-End support** is a fundamental part of Architecture

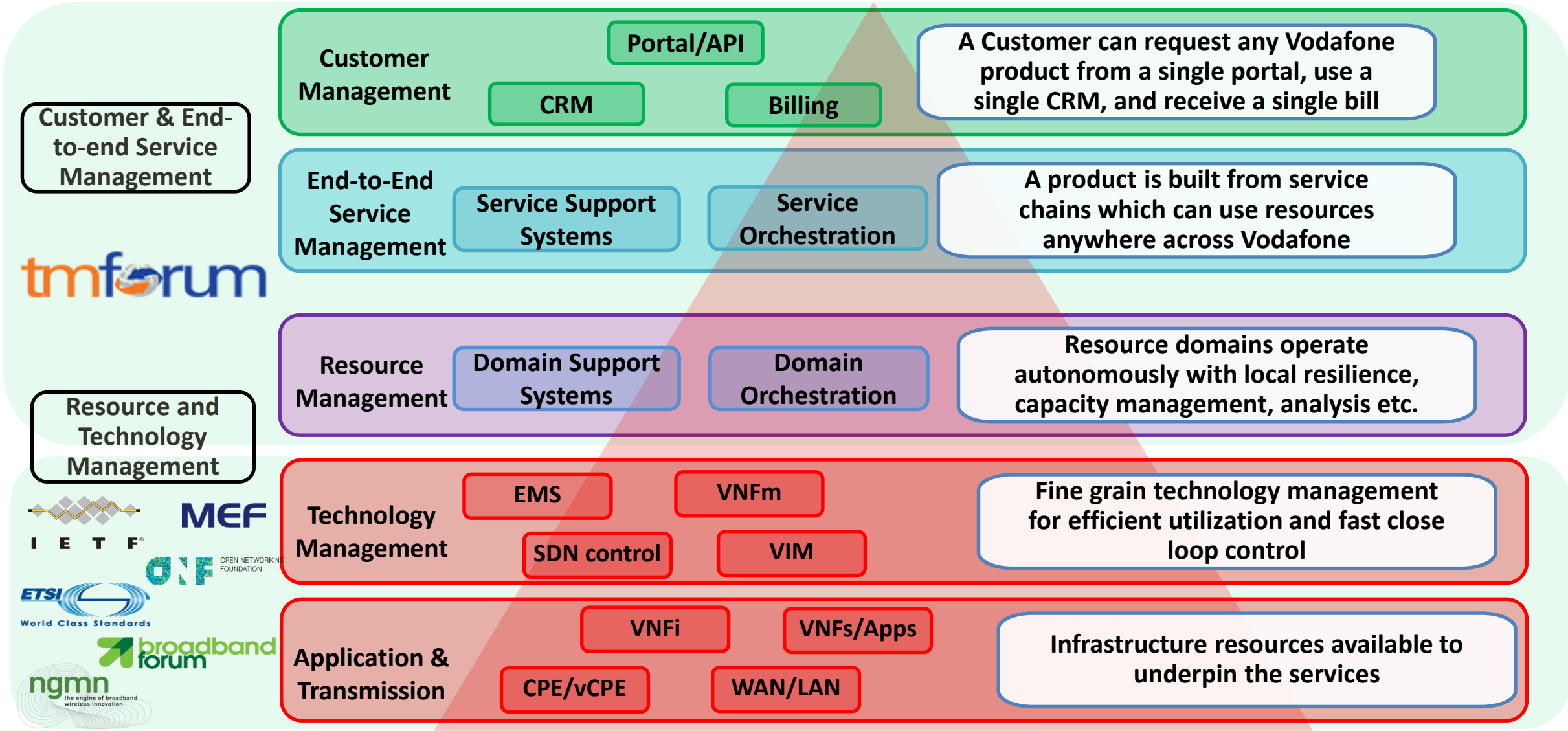
Openness

- **Open Interfaces**. Defined and published by Industry Body or Open Source project
- Partners are **jointly** implementing interfaces on their selected products
- Vodafone will **contribute** open interfaces **back** to communities

Multivendor

- Multivendor **cooperation** is essential
- Demonstrated by consortium environment in **Vodafone Labs**
- **Collaboration** on implementing open interfaces

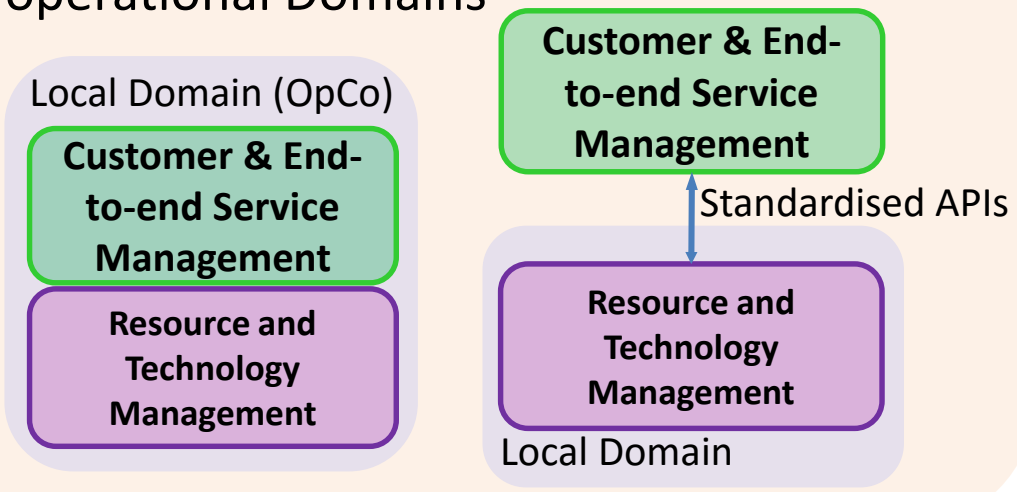
Service Delivery Stack

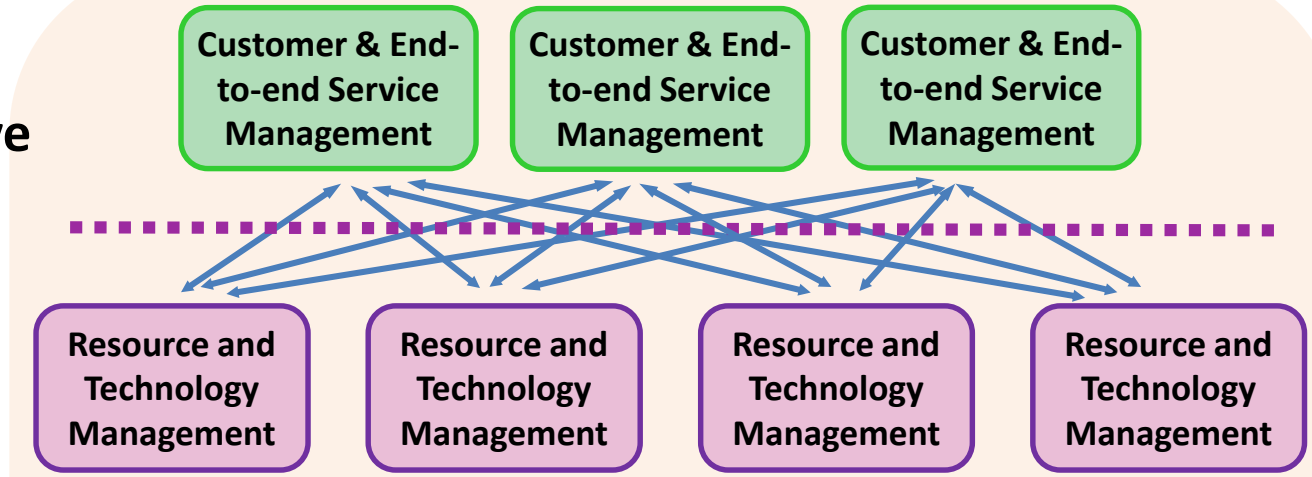


Globalising Services

- **Today interconnected autonomous local market networks (OpCos).**
  - Technically aligned for consistency and reliability
  - Independent service delivery and operations stacks
- **End-to-End orchestration will further improve this**

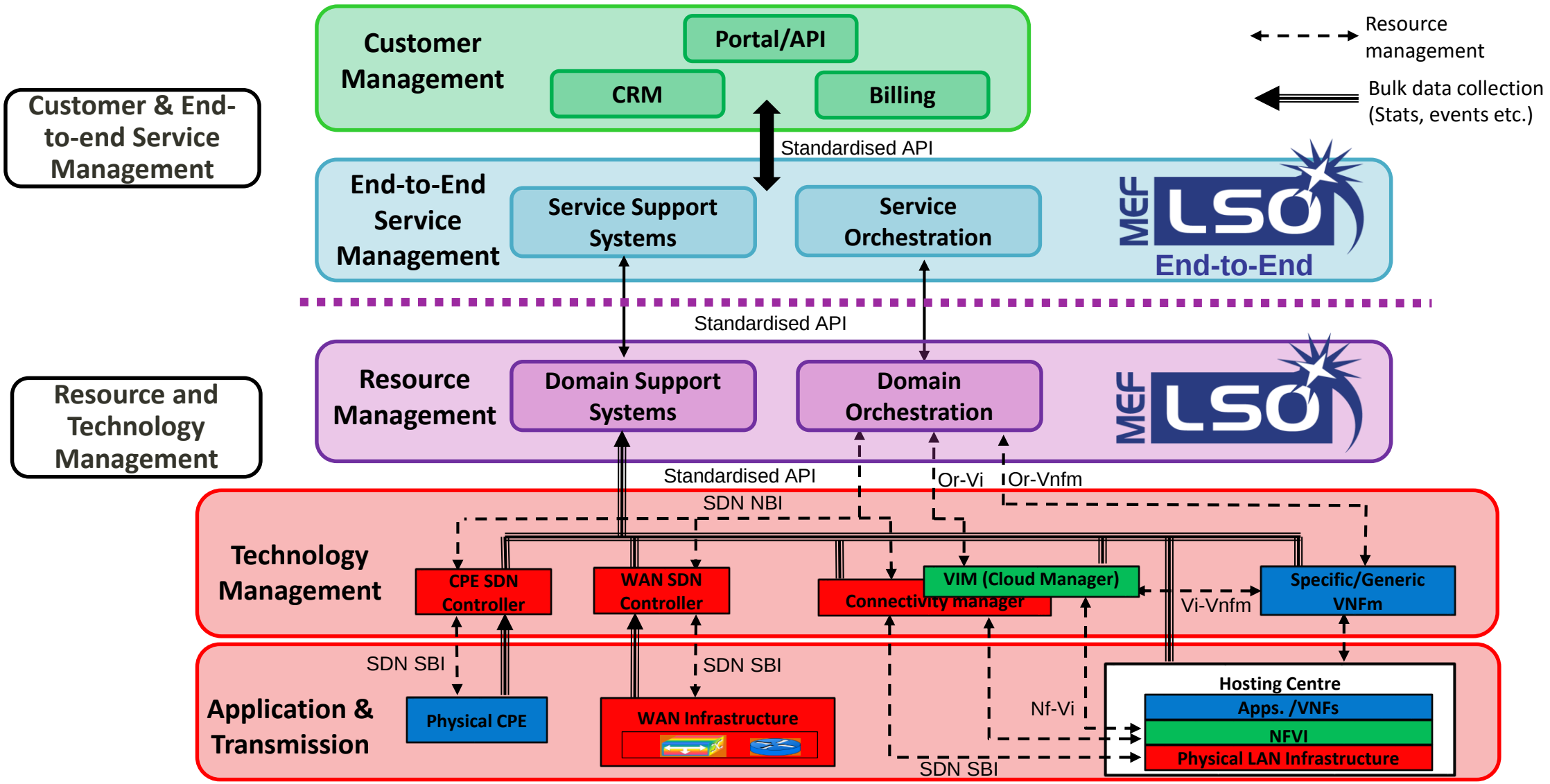
- 1. Use standardised APIs to split the customer oriented systems from the local operational Domains





- 2. Service management instances interact directly with relevant Domains to deliver end-to-end service.
  - Service management layer manages the lifecycle of end-to-end services, coordinating local domains as necessary
  - Domains manage local resources, automated delivery and fulfilment procedures, allocating resources, resource restoration and capacity planning

Architectural Overview



Orchestration Framework

E2E Service Orchestration

- **Automated** management of End-to-End Customer Services
- A **single** global orchestration framework for all areas (e.g., Network, Applications, IT)
- Delivers **superior customer experience** via analytics based pre-emptive Service Assurance and fault management
- **What-if** simulation according to marketing traffic forecast

End-to-End Service Orchestrator (SO)

The **SO** understands the full chain of network functions and connectivity for an end-to-end service.

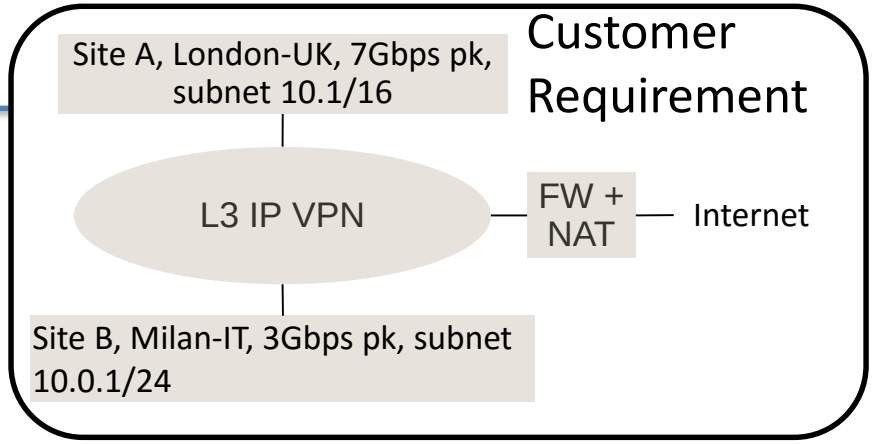
SO decomposes requests into specific requests for **DO**. **SO/SS** creates an assurance view providing SLA reports and notifications during the entire service life cycle

Domain Orchestrator (DO)

DO monitors resources utilization at Application (by EMS/VNFm), Infrastructure (by VIM) and connectivity level (SDN).

DO decomposes SO requests into specific requests for SDN controllers, Cloud Managers, Application configuration etc.

Service Use Case Example

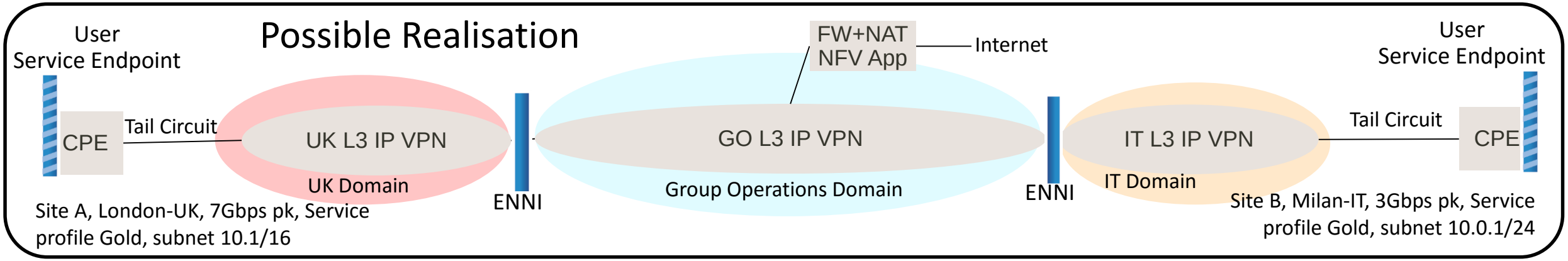


Customer wants to purchase connectivity between two of their sites and also connection to the internet.

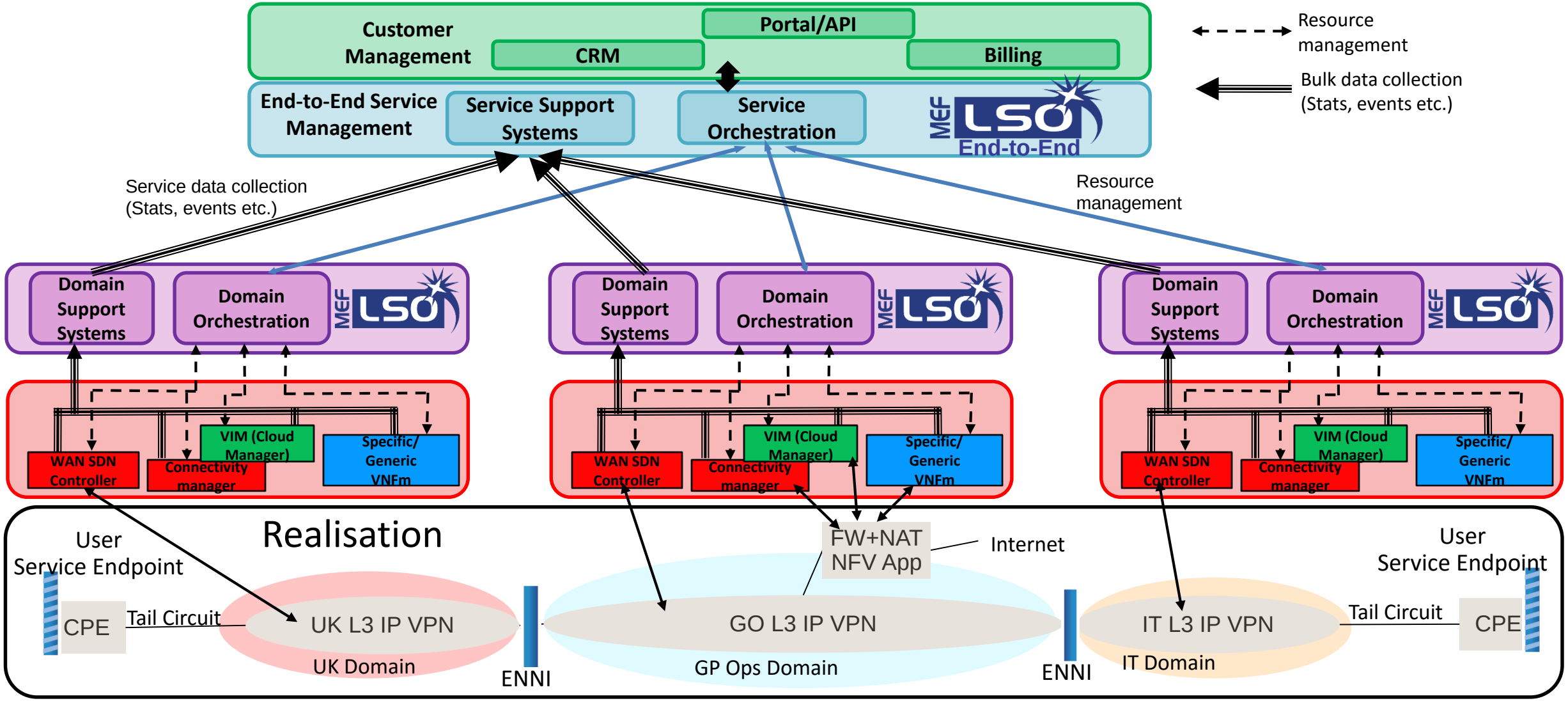
The E2E service comprises several distinct parts. In this example:-

- **The private L3 VPN comprised of 3 separate VF network domains:- Italy, UK and Group Operations**
- **Two CPE located on separate sites, each requiring a dedicated Access Link/Tail Circuit**
- **The virtualised Firewall & NAT application (which requires a VM/container on a physical server)**
  - and connected to the L3 VPN instance and also the internet

The FW+NAT could be hosted in any suitable location as the customer did not specify any requirements here (assume a Group Operations hosting site since these all have direct internet access)



Management Systems Roles



Service Use Case Example

Workflow Steps (simplified)

- **Customers use dedicated portal to describe what they want (friendly GUI and/or API depending on needs)**
- **Customer Management systems pass end-to-end customer service request to Service Orchestrator.**
  - Uses TMF compliant APIs to fully describe the entire customer service request.
- **Service Orchestrator uses published domain capabilities to decompose into specific requests for each domain.**
  - Uses TMF compliant APIs to describe the services required from each relevant domain, many customer services will continue to be delivered by a single domain.
- **The Service Orchestrator needs to coordinate inter-domain connectivity service 'stitching'.**
- **Domain Orchestrator uses local knowledge to decompose into specific request for each control entity (e.g. cloud manager, SDN controller, VNFM/VNF etc.)**
  - APIs dependent on control capabilities e.g. MANO, YANG, TOSCA, …
  - Domain service availability is delegated to the domain (fault handling, performance management etc.).
  - Service performance and status streamed back to the originating Service Orchestration instance (enabling it to provide a service view to customer portal)
- **Cloud API compliant to ETSI NFV, MANO etc.**
- **SDN controller NBI API based on standardised YANG service models ('Intents').**
- **SDN SBI also uses YANG but using standardised device control models.**

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Thank You

Questions?

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