

*Telefónica*

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# Telco Edge Cloud Goals and Enablers

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# The Telco Edge Cloud Concept

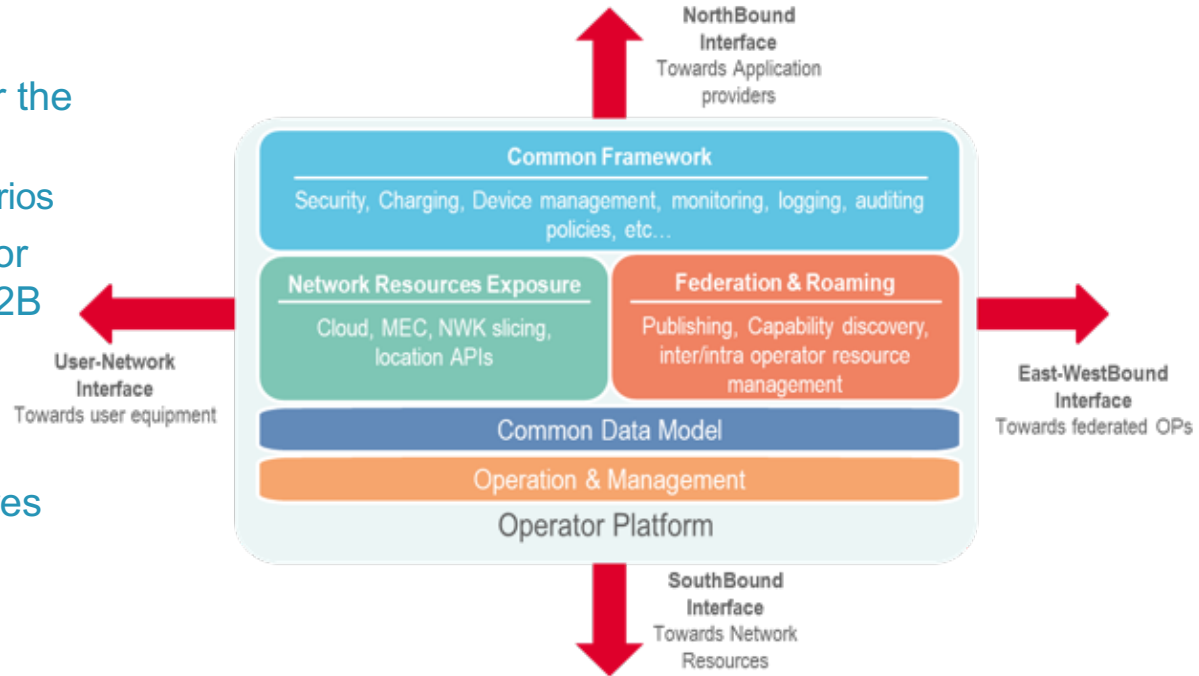
- A global distribution system that offers edge computing services for customers to develop, deploy and manage edge-based solutions over a global footprint, benefiting from the unique capabilities that Telecom operators offer
- Offering a digital one-stop shop for edge computing services, on a trusted and secure environment
- With a fair and transparent commercial model across the value chain
- Providing a single and simple interface (GUI, CLI, API), that facilitates the relationship with multiple service providers and multiple mobile operators, interconnected by open and standard federation mechanisms



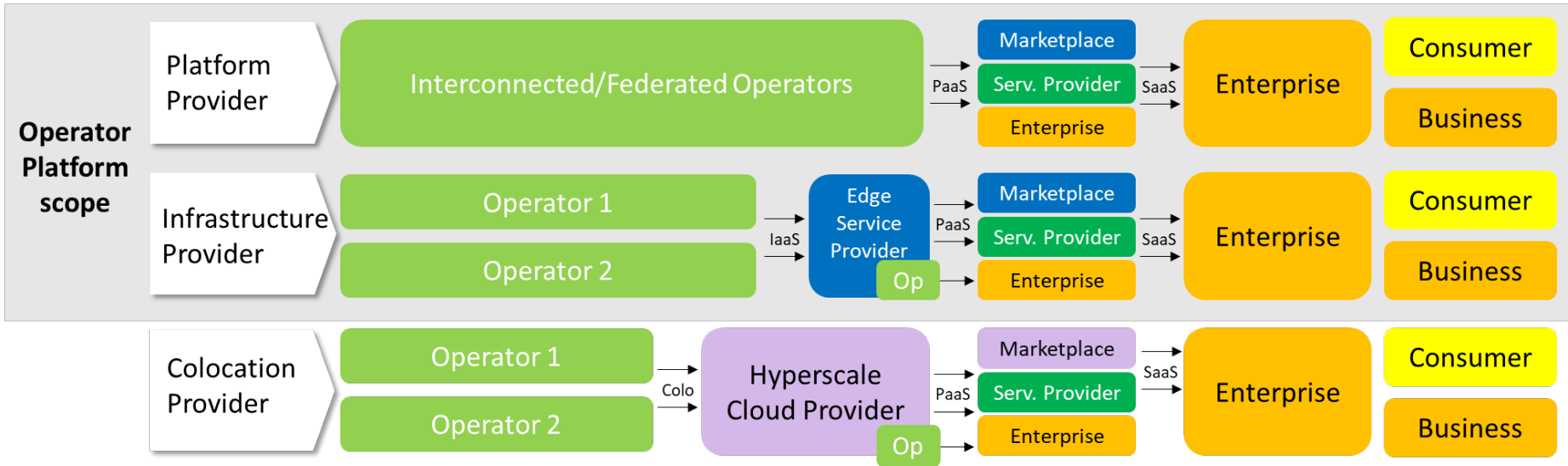
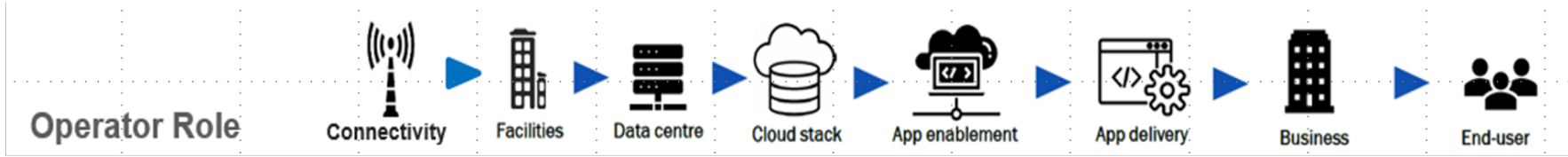
- Supported by a group of **25 operators** from Europe, Middle East, Asia-Pacific and the Americas
  - Coordinated by GSMA
- Built on edge technology based on a combination of **Open Source, Cloud and Telco standards**

# The Operator Platform

- The supporting environment for the TEC concept
  - And applicable to other scenarios
- A common exposure platform for network capabilities to reach B2B and B2B2X markets
- With federation capabilities for expanding coverage beyond individual operator infrastructures

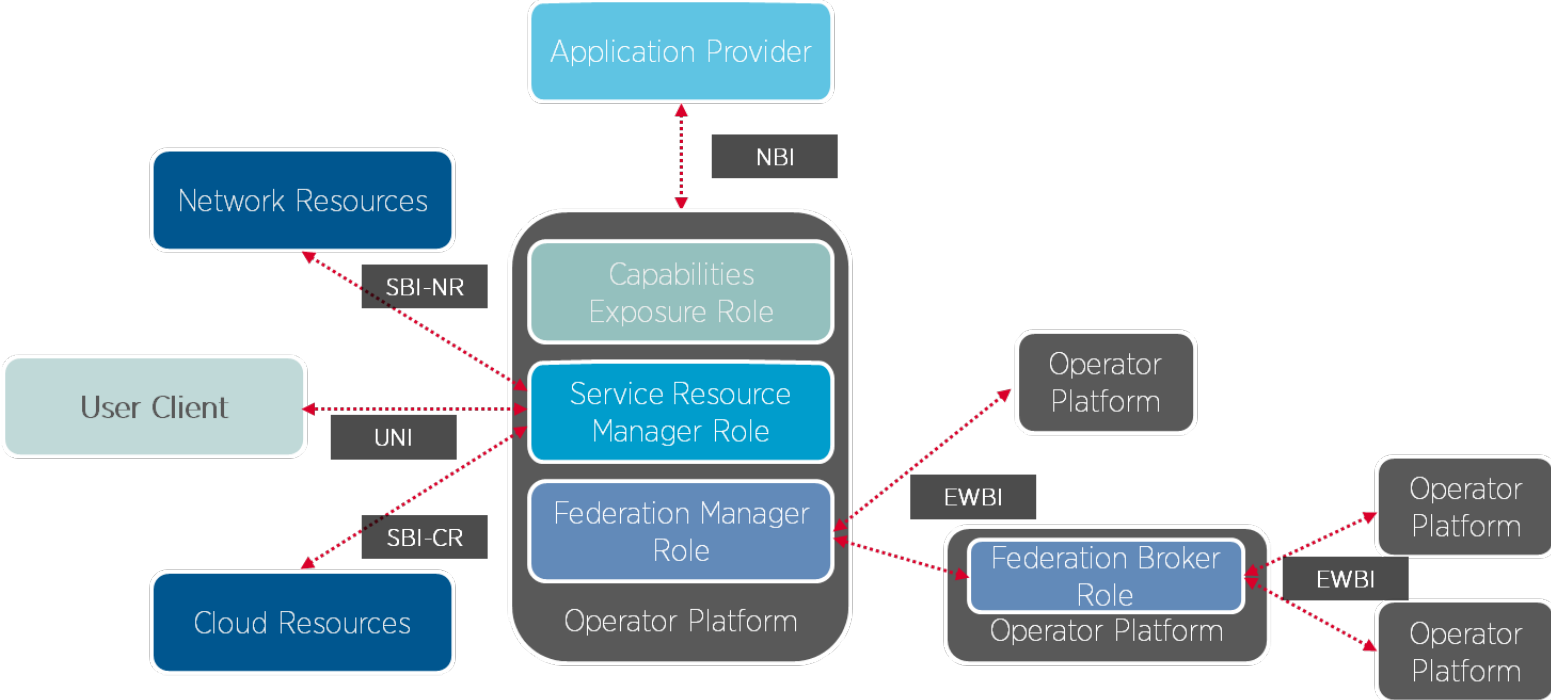


# The Value Chain

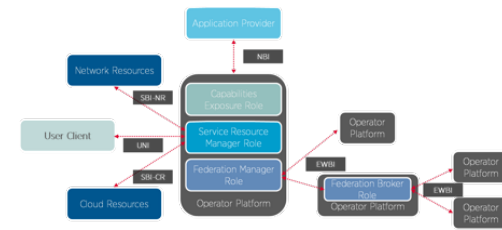




# The Framework



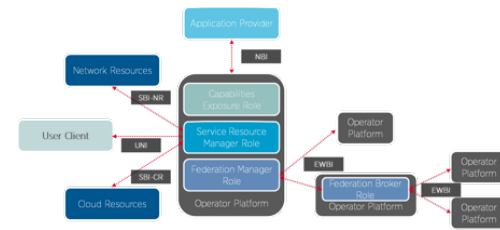
# Actors and Roles



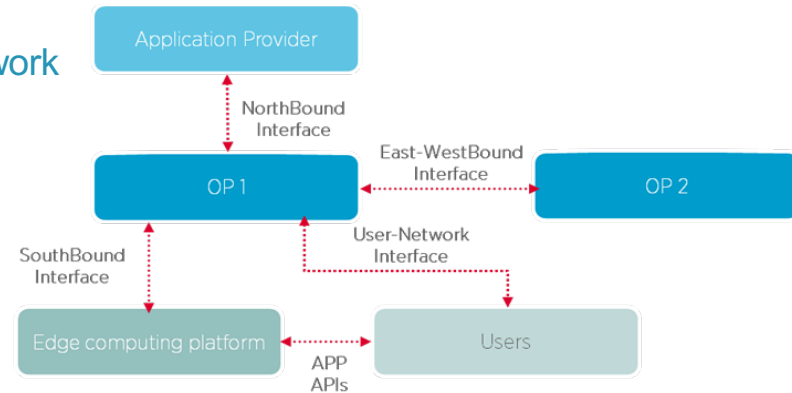
- **Operator Platform:** Single Point for exposure, management and federation of different services
- **Application Provider:** Owner of the applications deployed on the OP
- **Cloud Resources:** IT infrastructure where applications will be deployed on
- **Network Resources:** Network-based capabilities, exposed and used by e2e edge services: location, identity, QoS...
- **User client:** UE element that connects and interacts with the operator platform

- **Exposure Role:** Relationship with the application providers, enabling the exposure of the OP services
- **Service/Resource Manager Role(s):** Management of resources that will provide the service
- **Federation Manager/Broker Role:** Management of the federation among different OP
  - Support cross-domain integration and application roaming

# Interfaces

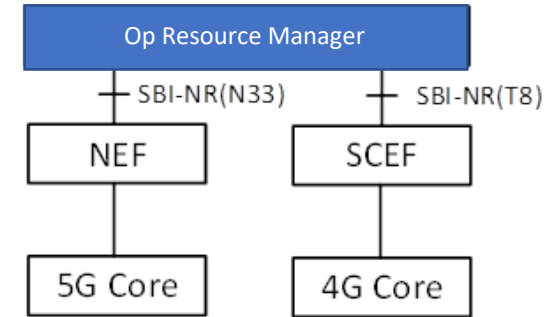
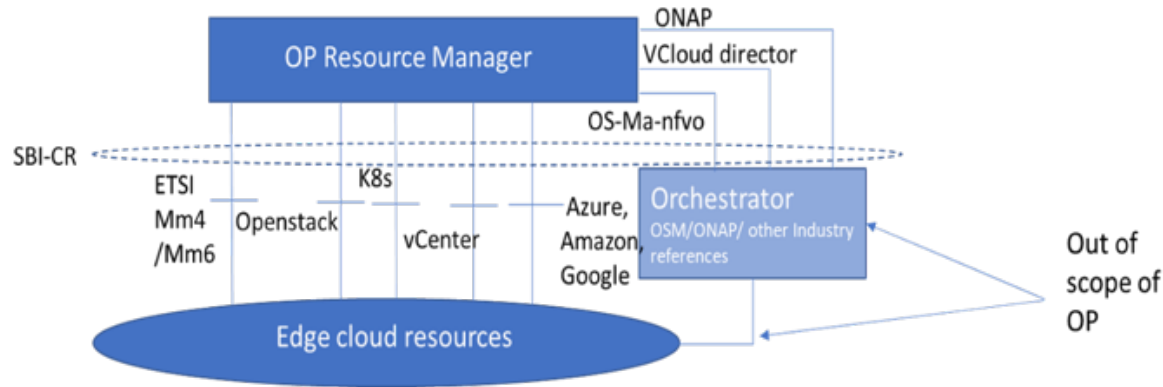


- **NBI:** Application onboarding and capability exposure
- **SBI-CR:** Interaction with the edge cloud resources, instantiating or orchestrating applications
- **SBI-NR:** Orchestrate, configure and request network services
- **UNI:** Interface with user clients: Registration and application service delivery
- **EWBI:** Interaction with other Ops, enabling federation use cases
  - Deploy applications on other infrastructures
  - Edge roaming service: service availability on visited network
  - Edge sharing
  - Support for a one-stop shop paradigm



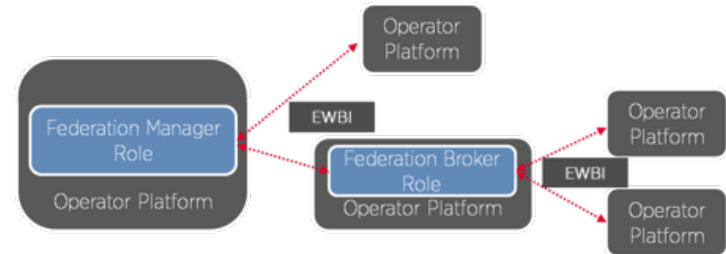
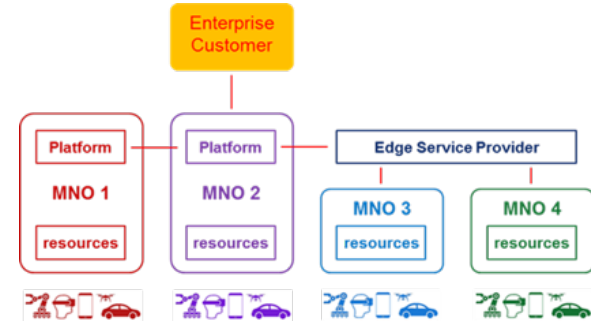
# Resource Integration

- A broad strategy to access edge cloud resources through the SBIs
  - Integrate with current IaaS/PaaS model that operators have already on its premises
  - Open to multiple technologies and integration strategies (direct resources or orchestrator)
  - Open to integration with hyperscaler resources
- Network resource access through capability exposure
  - Facilitate NPN integration

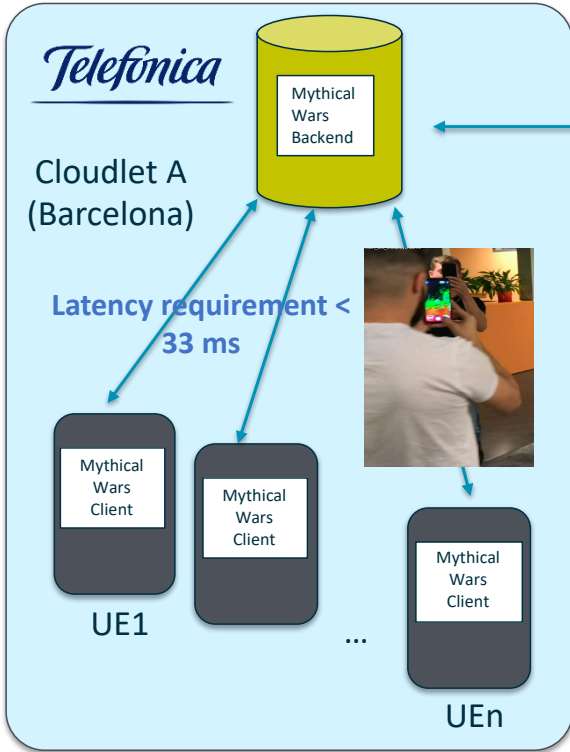


# Federation

- OP supports a multi-operator environment
  - Expanding the scope of developers and users
  - Further from the particular operator(s) they have a direct link to
  - One-stop shop for developers and operators
- The Federation Manager is in charge of OP interaction
  - Support for application and user roaming
  - Mediating resource sharing
- The Federation Broker is intended to simplify multi-operator interaction
  - Hub-and-scope for discovery, trust...



# Multi-Operator Mobile VR gaming DTAG-Telefonica



E2e latency requirement from UE/Country A to UE/Country B < 100 ms

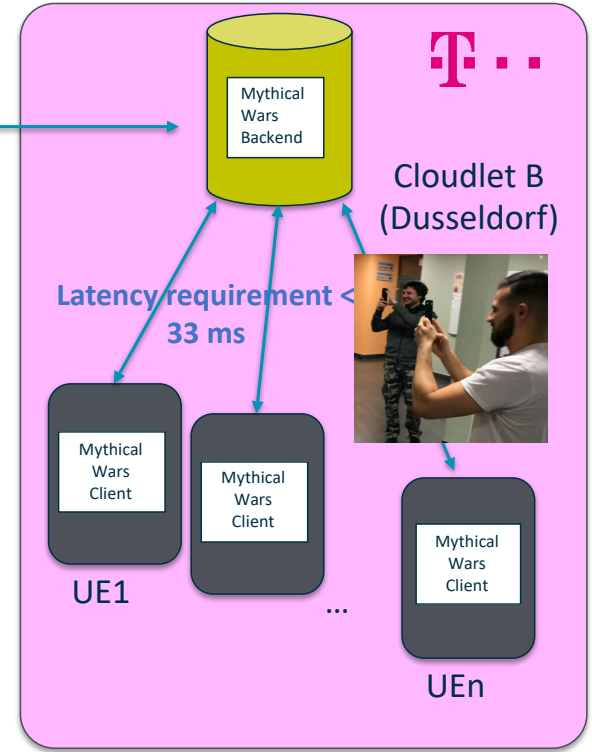
- 2 countries: Spain and Germany
- 2 Operators: Telefonica and Deutsche Telekom
- 1 gaming experience across the 2 countries



<MoblEdge>



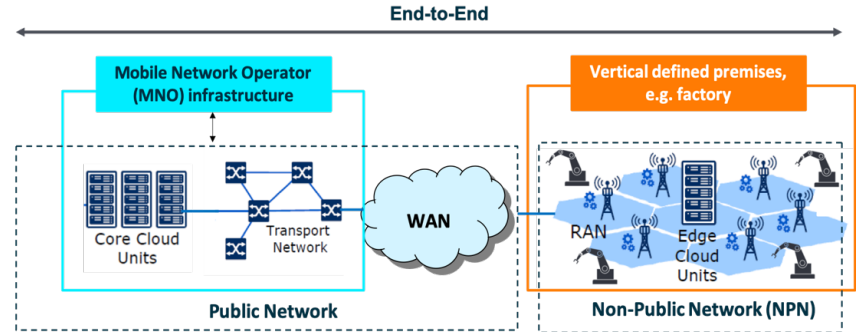
<https://youtu.be/05IO7-W-VHk>





# Where PNs and NPNs Meet

- Edge apps may well involve the combination of public networks and NPNs
- Exposure levels -> levels of control users can take over the provided capabilities (encapsulated as a slice)



Customer is able to consume operations related to...	Level1	Level2	Level3	Level4
<b>E2E network slice</b> <u>application layer</u> config & management	✓	✓	✓	✓
<b>Network slice subnet (and NF)</b> <u>application layer</u> config & management -> 3GPPscope for RAN and CN, IETF scope for TN.	✗	✓	✓	✓
<b>Network slice subnet (and NF)</b> <u>virtualized resource layer</u> config & management -> ETSI NFV network service (and VNF) orchestration	✗	✗	✓	✓
<b>Resource</b> control and management at the <u>virtual infrastructure layer</u> -> NFVI with optional EPA capabilities and infrastructural SDN control	✗	✗	✗	✓

# The Unified Edge Theory

- The edge environment has to work as a single cloud provider
  - Consistent APIs for developers: *Build once, run anywhere*
  - Support for different deployment styles
  - Multi-dimensional openness
- The Ultimate Goal: In-Network Computing
  - A service continuum based on
    - Programmable network devices
    - Languages and abstractions to implement network functions
    - Data-plane abstractions and new network protocols to efficiently federate decentralized computing
    - Decentralized security and discovery mechanisms
  - End-to-end orchestration of all kind of resources and functionalities

