



# Telefónica Strategy for Systems and Network Evolution

**Morgan Stanley** Telecoms CTO Symposium

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Global CTIO

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# Leader in telecom infrastructures, platforms and services

**#1** in fibre in Europe and Latin America



**154.7** premises passed

UBB footprint, **80** million though own network (2021 H1)

**4G** **99%** Coverage in Europe (78% Lat Am, 2021 H1)

**5G** Deployed in UK, Germany, Brazil and Spain

## Fibre vehicles well on track

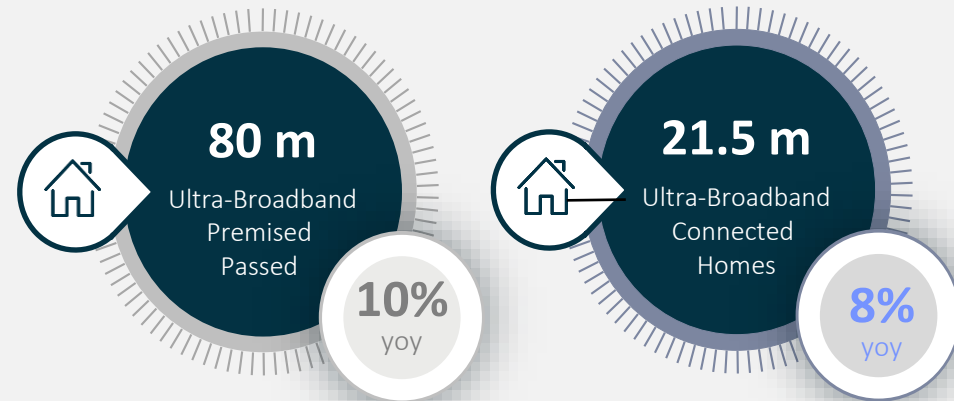
**FiberCo in Germany**  
50% Allianz / 50% TEF. (40% T. Infra / 10% T.DE)

**FiberCo in Brazil**  
50% CDPQ / 50% TEF. (25% T. Infra / 25% T.BR)

**FiberCo in Chile**  
60% KKR/ 40% T.CHL

**FiberCo in Colombia**  
60% KKR/ 40% T.COL

## Great effort deploying Ultra broadband networks...



**51m** FTTH Premise passed

**56%** of broadband customers with speed greater than **50 Mbps**<sup>1</sup>

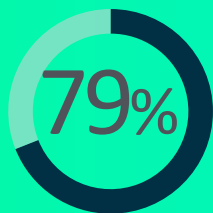
Spain has more fiber deployed than the sum of UK, Italy and Germany

### UBB own + wholesale connected homes

	<b>4.7m</b> (+6%)
	<b>5.5m</b> (+3%)
	<b>1.8m</b> (+5%)
	<b>5.3m</b> (+6%)
	<b>4.1m</b> (+21%)

Source: Telefónica. Results Q2 2021. UBB Premises Passed includes FTTx + Cable including vehicles. UBB Connected Homes includes FTTx + Cable (1) FBB Commercial speeds does not include UK

The most digital telco



Of processes digitalised (2021 H1)

**#1** in network virtualisation "Única" deployed in 10 countries

**#1** shutting down legacy 1,000 CO decommissioned

# ... evolving Fiber technology towards 50G-PON by means of a multiservice approach...

## 50G-PON

- **Multi-technology OLTs** with GPON optics.
- **XGS-PON is the next step** over **same passive network** (up to 10 symmetrical Gbps).
- **50G-PON in mid-term** (up 50 symmetrical Gbps).

## FTTH coverage

- **Increasing FTTH coverage** with better optics enabling the delivery to further customers using the same central office.
- **Third party deployments**

## Base Station backhaul

**Connecting base stations backhaul with fiber** enabling to move functions to the Edge node, and thus lighten the base stations.

## Legacy Switch-off

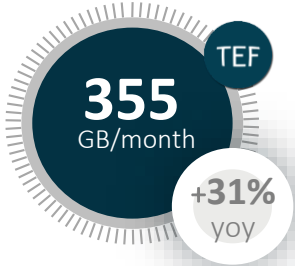
- **Copper evolution totally deprioritized** focus on fiber.
- **Facilitate copper and DSLAM switching-off**, consolidation and compaction
- **Telefónica Spain** will be the **first company to switch-off the copper in 2024** to fully transition to the fiber universe

... while **simplifying** and **performing the switch-off** of legacies

# Providing differential customer experience through excellent Wi-Fi quality and home equipment...

## Customer demand for data keeps on growing

Fixed Data traffic  
Per customer, Q2 2021



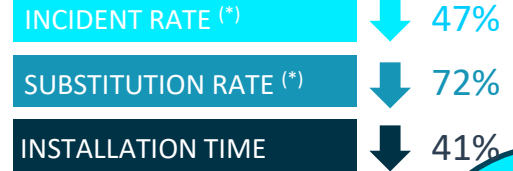
Total Fixed Data traffic

**7,546**  
Pbytes/month



## Home Gateway Unit

- Up to 1 Gpbs
- Total Wi-Fi coverage at home, including roaming and band-steering
- Smart Wi-Fi (apps to control connectivity at home, managed Wi-Fi, Parental control, security)



(\*) June 2021 data ESP



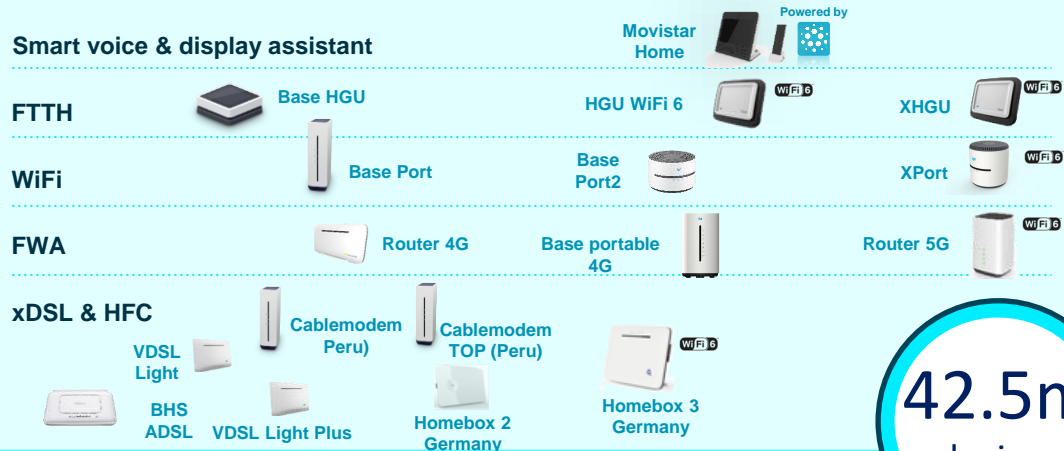
**>9.7m**  
HGU\*



**89%**  
Equipment at FTTH homes

\*installed in TEF footprint June 2021 data

## Marco Polo family: same home connectivity services regardless the access



Produced through this model (2014-2021)

**42.5m**  
devices



# ... and moving forward to Wi-Fi 6, using our home devices ecosystem as an open service platform at home and providing FWA solutions

## Next Generation Home Gateway Unit – Wi-Fi 6

First 10G Home router integrating WiFi 6



xHGU

5G Router with WiFi6 Connectivity



HGU 5G+

Wi-Fi 6 Access point and Wi-Fi repeater

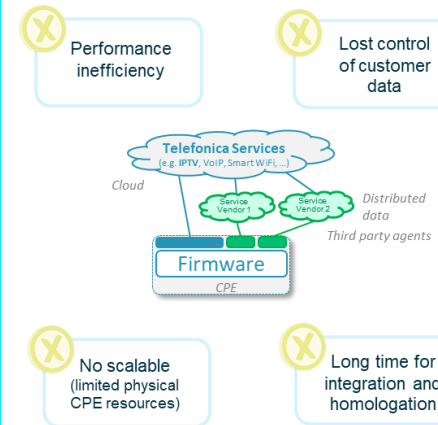


xPort

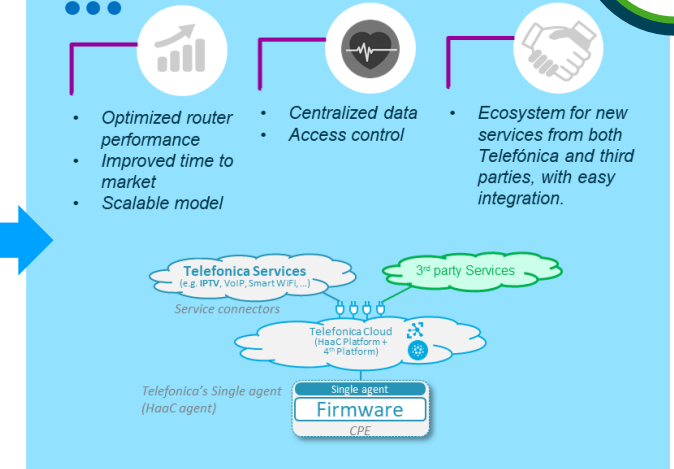
- Wi-Fi 6 Dual Band 5GHz 8x8 & 2.4GHz 4x4 up to 9.7 Gbps

## Home devices ecosystem as an Open Service platform

### Current approach



### Haac Agent approach

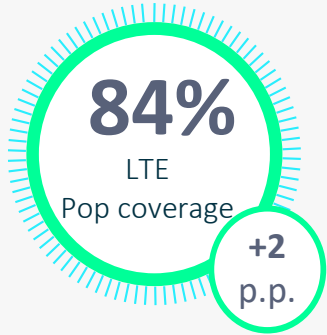


### Single Agent Architecture and Haac (Home as a Computer) platform as an element in the cloud:

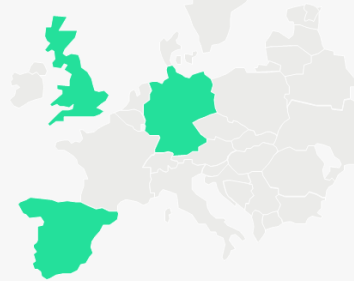
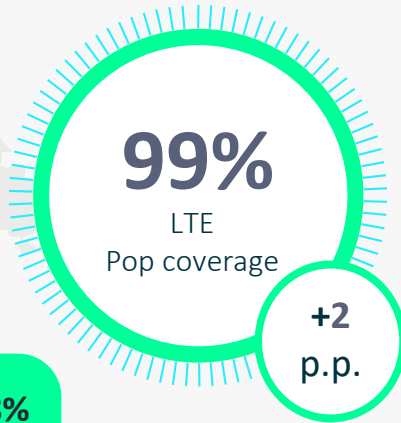
- Shorter time to develop and deploy **NEW services (differentiation)**
- Chance to open to **3rd party developers** and create and **open development ecosystem**
- Customer might choose the “apps” at home

# Completing coverage and capacity deployments of 4G networks as we activate 5G

## Telefónica Mobile Networks

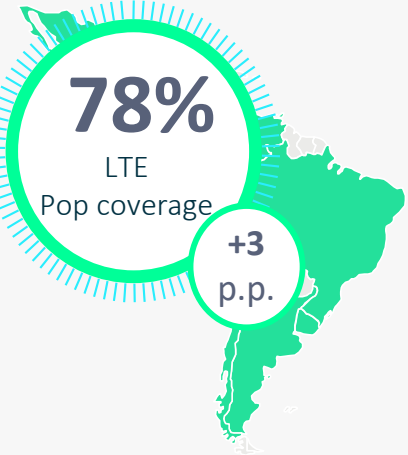


## Europe



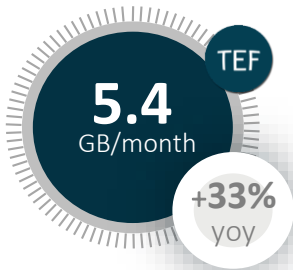
Spain	98%
UK	99%
Germany	99.8%
Brazil	92%

## LatAm



## Customer demand for data keeps on growing

Mobile Data traffic  
Per customer, Q2 2021



Total Mobile Data traffic

**980**  
Pbytes/month



~245m HD show episodes

LTE will stay with us for at least 15 more years. Currently the most developed, mature and tested mobile ecosystem

Focus on strategic 5G rollouts (700 MHz, 3.5 GHz)

Spectrum evolution plan towards 5G: Plan to move spectrum to the most efficient 5G technology. Clean plan for downsizing and switching off 2G/3G.

Working in Open RAN. Pushing for automation in RAN processes such as planning and optimization to move to best-in-class networks. RAN automation is key for the New Operating Model

Continue increasing the number of sites with fiber-backhaul with sufficient capacity for 5G

Evaluate RAN sharing options for a more efficient deployment

Evolve to radio and baseband units 5G-ready supporting Single RAN

# 5G deployment at the right pace according to business needs

Commercial launch of DSS (Dynamic Spectrum Sharing) (4G-5G) as a mechanism to have 5G in FDD Bands by using **dynamically the existing LTE spectrum to improve time to Market significantly vs 3.5GHz deployment**

Focus on strategic 5G rollouts (700 MHz, 3.5 GHz)

## 4.9G use cases





Deployment of 5G capacity over 4G network

First experiences, pilots and use cases experiences

-  5G tech cities
-  O2 Arena Experience
-  FWA mmWave trials
-  Pilots

## 5G Launches

5G NSA commercialization in our main operations

- 
  - ✓ Commercial launch in Sep 20 (5G DSS)
  - ✓ >80% cov Jun 21
- 
  - ✓ First 5G Private Network (Daimler Apr 19)
  - ✓ Operates in 80 cities (Jun 21)
  - ✓ >30% cov 2021YE, >50% 2022YE
- 
  - ✓ Commercial launch in Oct 19
  - ✓ >180 5G towns & cities on live in Jun 21
- 
  - ✓ Commercial launch 8 cities Sep 20 (5G DSS).
  - ✓ Spectrum auction by Q4 2021.
  - ✓ 5G SA in auction conditions.

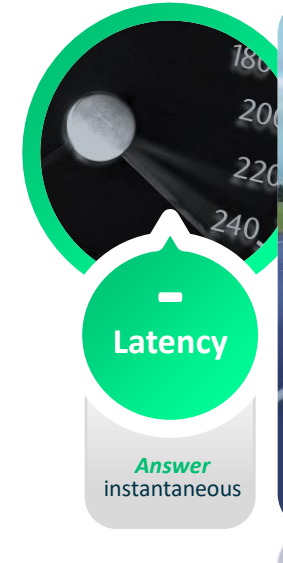
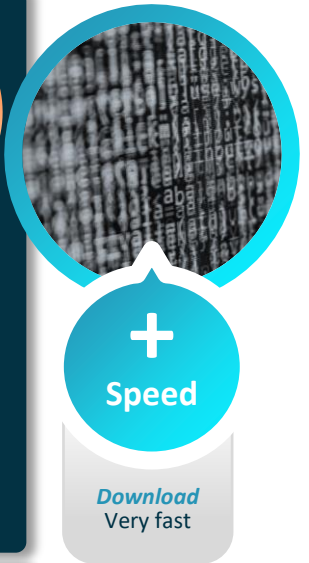
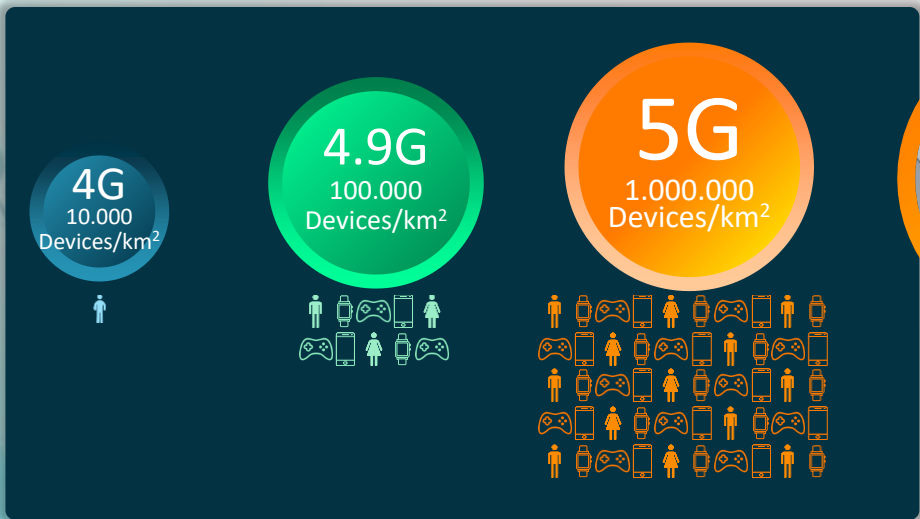
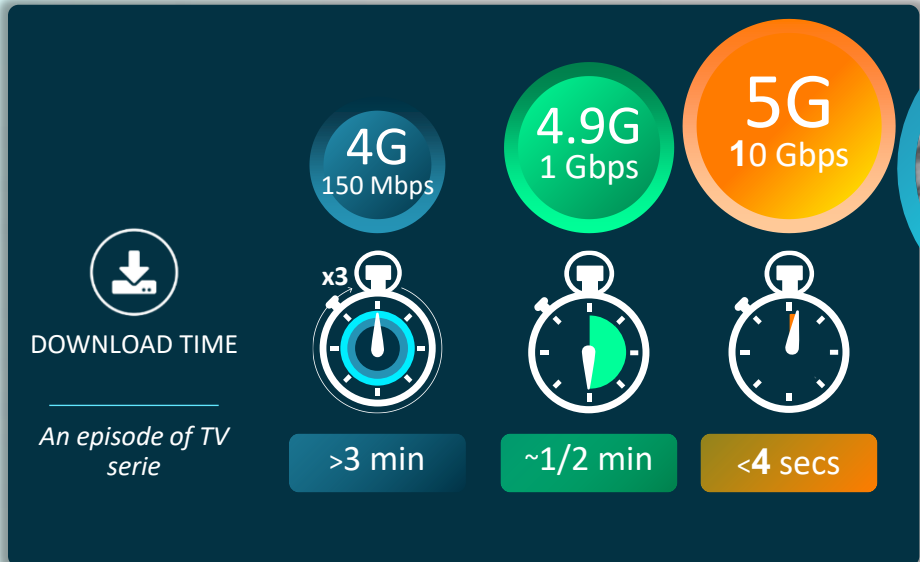
## 5G massive deployment

Deployments based on markets and technology

Evolution to SA architecture



# 5G, in its final version (SA), will provide differential attributes for the provision of new services





# 5G is an attractive technology to promote new enterprise businesses that demand specific use cases in Industrial IoT

## 5G Private Networks

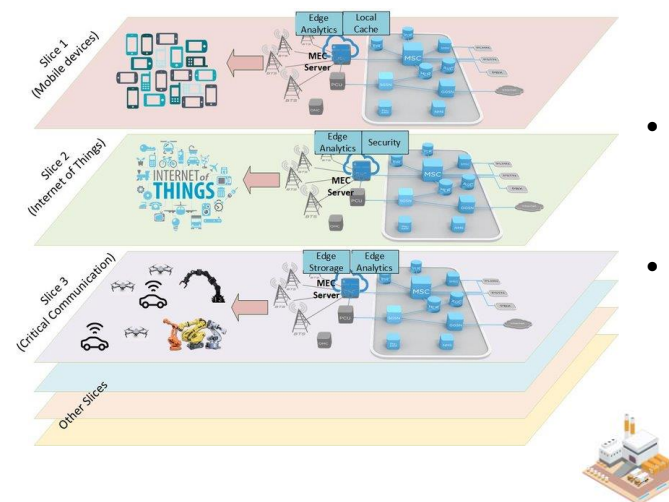
- Private networks are **dedicated mobile networks for one B2B customer**, already being deployed with 4G technology, but the new functionalities (mainly latency) in 5G will allow more use cases. Private network massification expected with 5G.
- **A private network is the same technology as public 5G network but the implementation will be modular and simpler.** The flexibility is key:
  - Many implementation possibilities
  - Usage of part of the public network in the private implementation



**"Factory 56"**. Mercedes-Benz Cars increases flexibility and efficiency in operations

## Network Slicing

- **Network Slicing is a new feature in 5G SA that brings the ability to create virtual sub-networks** with dedicated resources and different configurations.



- **Network slicing** will enhance private network and user experience handling.
- Will drive **further automation** towards **zero touch**.
- **Enable software-based tailoring** of the network to **specific vertical needs**.

## Network as a Service

- Preparing for Network exposure with **Network as a Service (NaaS)**.
- **Automation and APification** of our network will allow **full exposure of our network capabilities** to foster development and **interconnection of third parties** opening the door to **new monetization capabilities**.

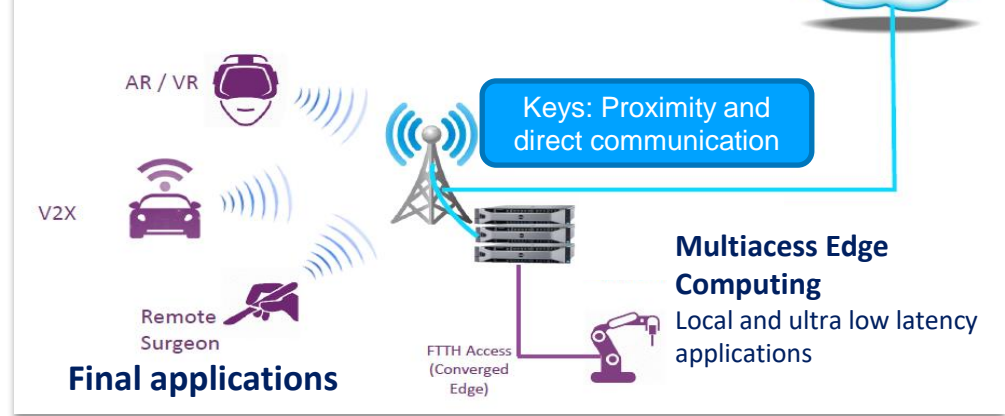
# 5G and Edge computing as enablers for new services requiring low latency and locality

Core network



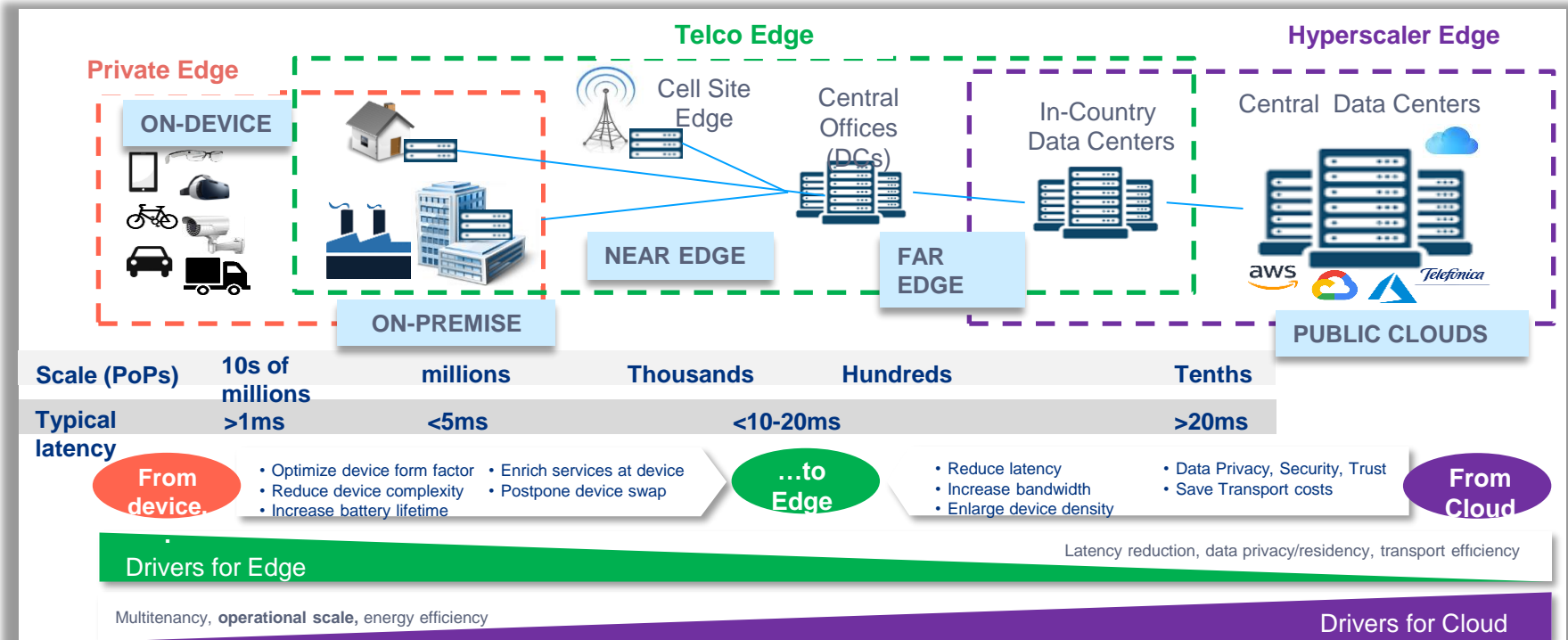
## Edge computing

- There are **services that require 1 ms of latency** and cloud platform (as we know it today) can not provide support to them.
- **Edge computing, which brings the cloud closer to the customer.** There are applications "on-premise" that can be hosted in the edge cloud.



## Telco edge cloud

- Considered a complement to hyperscaler edge that allows providing **differential MNO features**, and further distributed topology following network core sites to deploy app loads.
- **GSMA operator platform definition** concluded as reference to guide telco edge implementations.
- **Integration between 5G core and the telco edge platform** to enable such features and provide a **key differentiation to traditional cloud.**

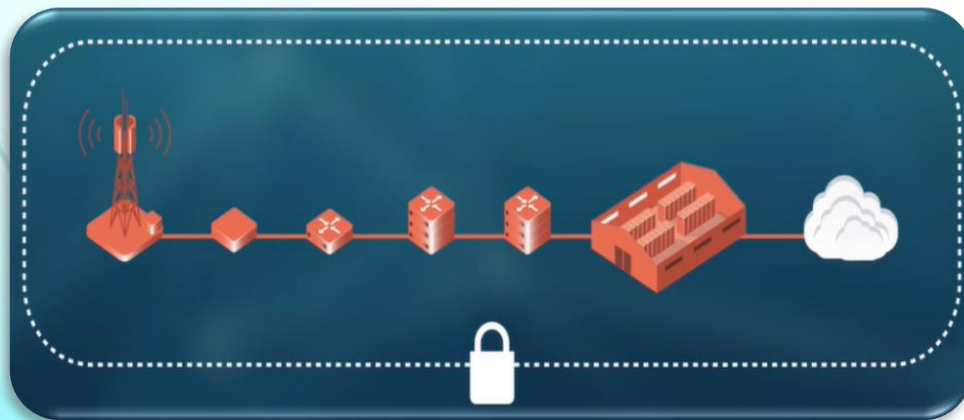
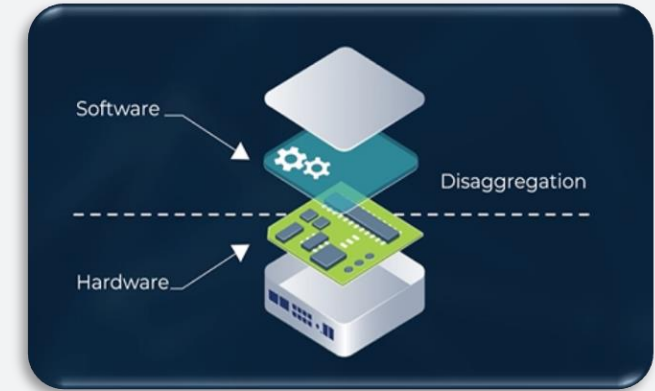


# We are evolving our networks and systems towards virtualized and open architectures to ensure the strength of industry ecosystems...

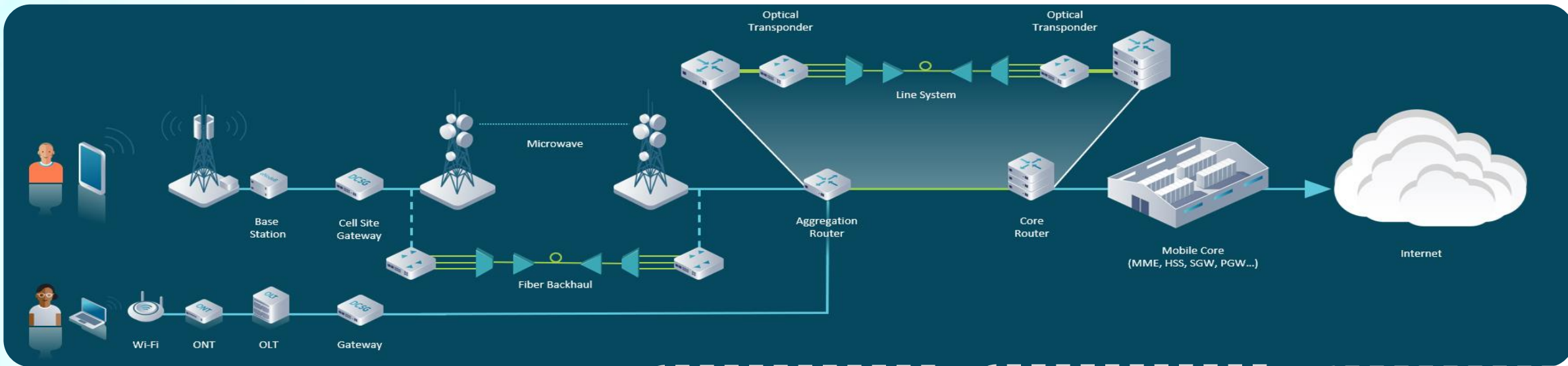
Open

## OPEN FOUNDATIONS

- Define open architectures that guarantee the robustness of ecosystems **avoiding vendor lock-in**.
- Gain robustness, flexibility and efficiency in **the supply chain** by increasing the number of actors in different segments of the network and systems.
- **Ensure the interoperability** of technology.
- Have tools that are a **lever for differentiation** and accelerate innovation through open interfaces.
- **Improve network economics** by reducing TCO (Total cost of ownership).



... and this is being carried out in all the segments of our network and in our systems...



### Home

Driven by Single Agent & HaaS platform

- Home gateways
- Baseport / XPORT
- CPE 5G / Base 4G
- Set top boxes
- Movistar Home

### Access Network

- Open Broadband (OLT)
- Open RAN



### Transport Network

- IP and Optical disaggregation (OpenFUSION)
- SDN (iFUSION)

### Core Network

- Telco Cloud Strategy
- Network Virtualization
- Core multivendor



### Systems

- Cloud native and hybrid cloud
- Hyperscalers partnership
- Telefónica Open Digital Architecture



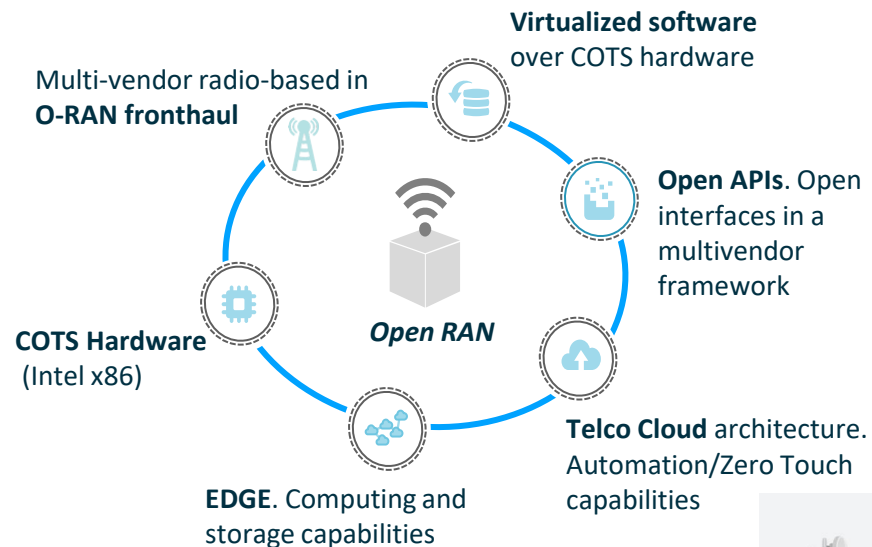
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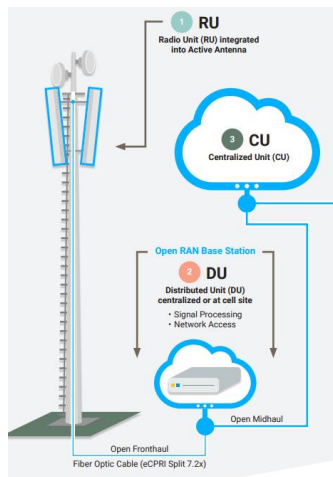
... guaranteeing robustness, flexibility and efficiency, enabling differentiation

# Open RAN and Open Broadband: enabling the evolution of our access while managing our vendor map by creating robust ecosystems

## Open RAN: concept and benefits

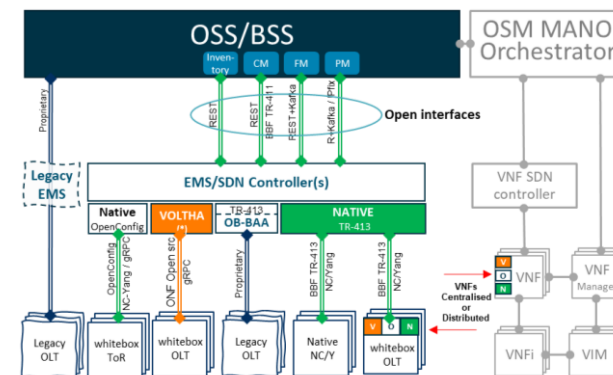


- **Enrichment of the RAN ecosystem**
- **Full control** over the final design and costs of the solution
- **Avoid vendor lock-in** through open interfaces
- **Virtualized and flexible RAN architectures** allowing new uses cases
- **Boost innovation**



## Open Broadband: concept and benefits

- **HW and SW disaggregation**
- **Multi-vendor environment**
- **Open standard interfaces** (not proprietary)
- Use of **general-purpose processors and servers**



- **Enhance our vendor map**
- Introduction of **new services and applications** to bring new incomes or improve customer experience and network performance
- Access programmability to **improve operating model, automate network functions and simplify system integration**, leading to reduced TTM and OPE

# We count with our IT Architecture principles



## Enable Telco Cloud

- Use of **softwarization, cloudification** and containers
- **Hybrid cloud** (public and private)
- **Multicloud** architecture. Allow mobility between clouds
- **Avoid vendor lock-in**



## Open source and use of standards

- Integration among components should be through standardized and secured open APIs
- Easy integration with third parties
- Use of opensource solutions



## Decoupling channels from back-end

- Separation of concerns and de-coupling between blocks
- Use of discoverable microservices (repository)



## Data/model driven operations

- Data as a core of a common architecture to give support to operative processes.
- Use of Artificial Intelligence and Machine Learning in the relationship with our customers and to manage our own networks and systems.

## ENGAGE TRANSFORMATION



## THROUGH OUR PRINCIPLES



## Network softwarization support

- Brings virtualized functionality closer to the customers
- Ready for 5G, OpenRAN and EDGE applications
- Auto-diagnosis and self healing in real time
- Distributed topology of computing sites



## Online Convergent Charging

- Online Charging is Digital Experience
- Convergence is Strategic
- B2B / B2B2X is Revenue Opportunities
- 5G SA Charging is new CCS Architecture



## Use of DevOps

- Collaborative – Business centric approach with DevOps and CI/CD capabilities
- Use of agile governance principles that allow rapid changes to be managed in a complex environment.



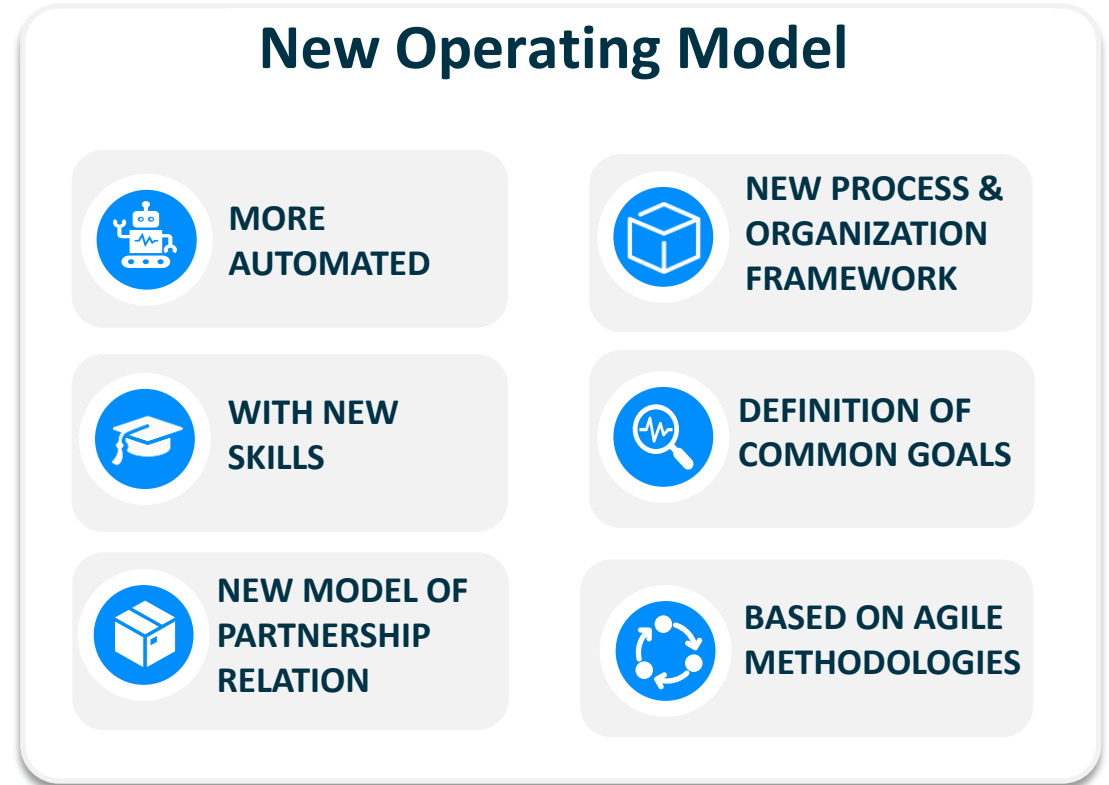
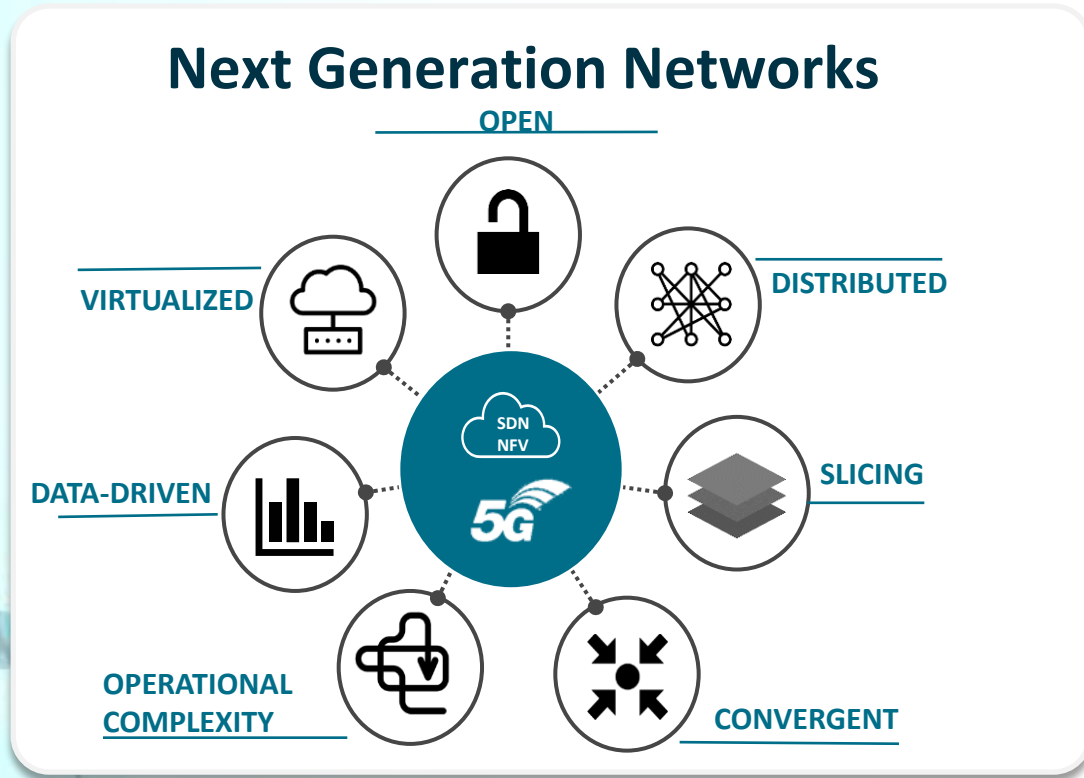
## Security and transparency

- Company information and data must stay safe, available, unedited and being used by the right people
- Access to customer information must be guaranteed by means of identity, privacy and confidentiality in a transparent way.

And strategic axes (Customer engagement, IT Basics, Core IT, Cloud & Infra (for Network and IT) and Security) that allow us to progress towards the cloudification and digitalization, and provide differential value to the market and customers

# While building a new operating model where AI would be a key component...

The new era of digital services over **Open and Virtualized Networks** needs a **change of paradigm** in the way we do things that will lead us into a **new operating model**



and defining the journey towards the *Autonomous network* until 2025

# To create value with 5G beyond improvement in browsing, speed and latency

Innovation Day 2018 | We are in

## Streaming TV 4K



## Augmented Reality



## Virtual Reality



## Video 360



## Fixed Wireless Access (FWA)



## Home automation and intelligent buildings



## Gaming 8K – real time





# Working with active sectors in 5G

## Vehicular Comms (V2X)



5G private networks



## Industry 4.0, airports and Logistics



Edge services



## Tv and Media



Remote Maintenance based on AR, VR



## Tourism and entertainment



Custom connectivity



And approaching horizontal multi-sector 5G applications

# Serving Society as a whole while supporting sustainability

## Education



## Health



Smart cities  
Smart buildings  
Smart Infra



Coping with a large  
increase in traffic  
demand



5G is 90% more  
energy efficient  
managing traffic vs 4G



# Becoming leaders in cutting-edge digital services

Innovation Day 2018 | We are in



Connectivity



Cloud



Cybersecurity

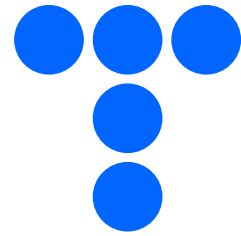


IoT



Big Data

Unlocking the power of integrating technology



**Telefónica**