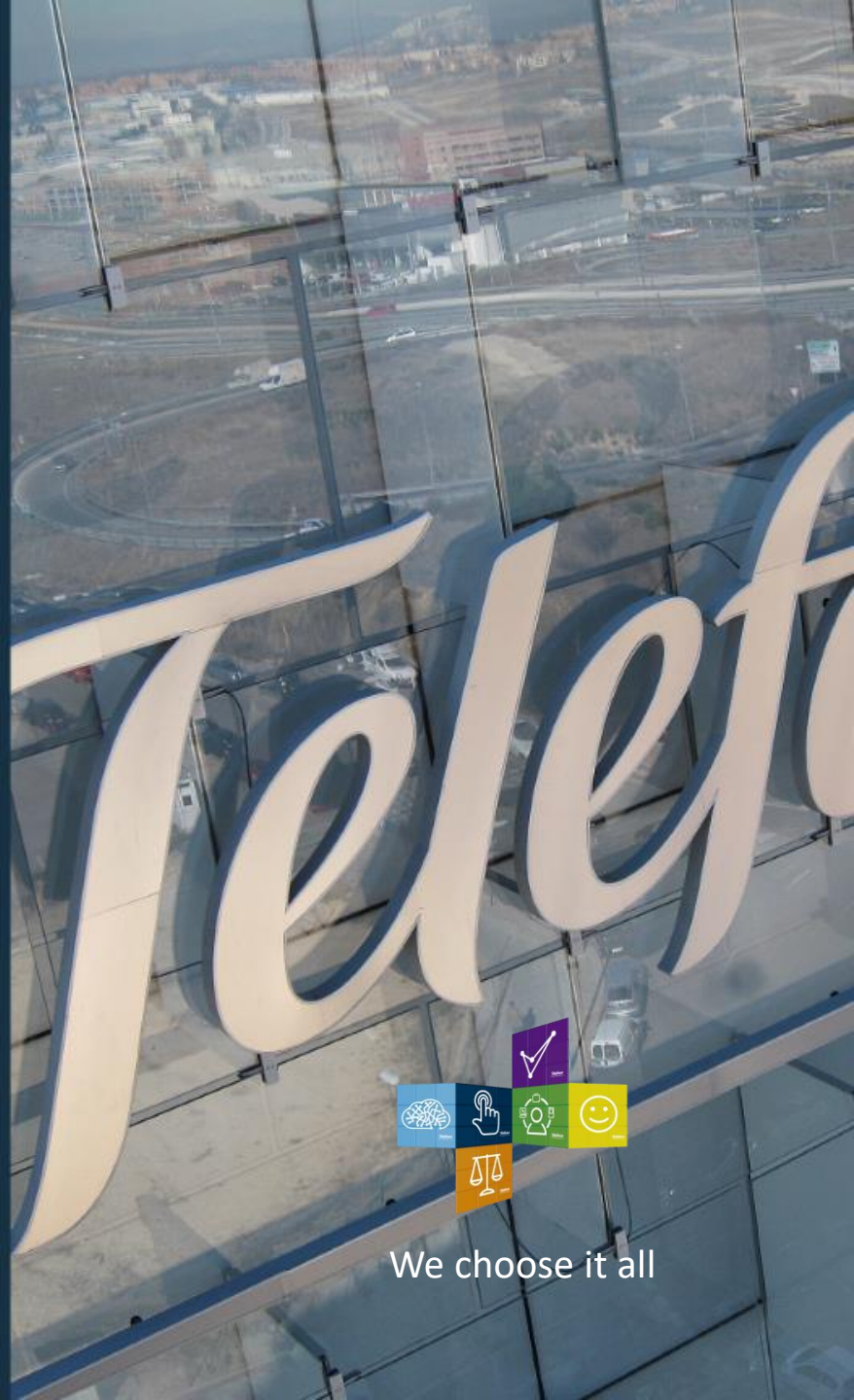
Telefónica

Network and Systems evolution

London, June 19th 2018



Network and Systems Evolution session

Pablo Eguirón
Global Director of Investor Relations

Telefónica

Key Objectives

Laura Abasolo

Chief Financial and Control Officer

Telefónica

Key Objectives

Network Transformation

- Growing **demand** and complex **technology**
- **Fiber and virtualisation**, pillars of Dynamic networks
- **Data driven networks** deliver **top user experience** and **internal efficiency**

Industrialisation advantage

- **Fiber deployment success story in Spain**, a key competitive advantage
  - Shorter time-to-market (-41% HGU installation time)
  - Lower cost per premise passed (-47%)
  - Operational excellence (-70% failures)
- **Industrialised Virtualisation**: Global UNICA program

Driving efficiencies

- CapEx peak behind us (17%/sales in 2016; 16% in 2017; 15% in 18E)
- **Smooth way to 5G**; leverage 4G replacement
- SDN delivers **operational efficiency**

Improved ROCE

- **Global scale** amplifies industrialisation gain
- New capabilities to **capture new business opportunities**
- **Optimized CapEx allocation** at network planning and operation

More sustainable business model

- Facilitate **scalability**, **data flow** between platforms
- **Big data** tools for optimization of cost/benefit
- **More capable, agile and efficient to accelerate growth**

Network and Systems Evolution

Enrique Blanco
Global Chief Technology and Information Officer (GCTIO)

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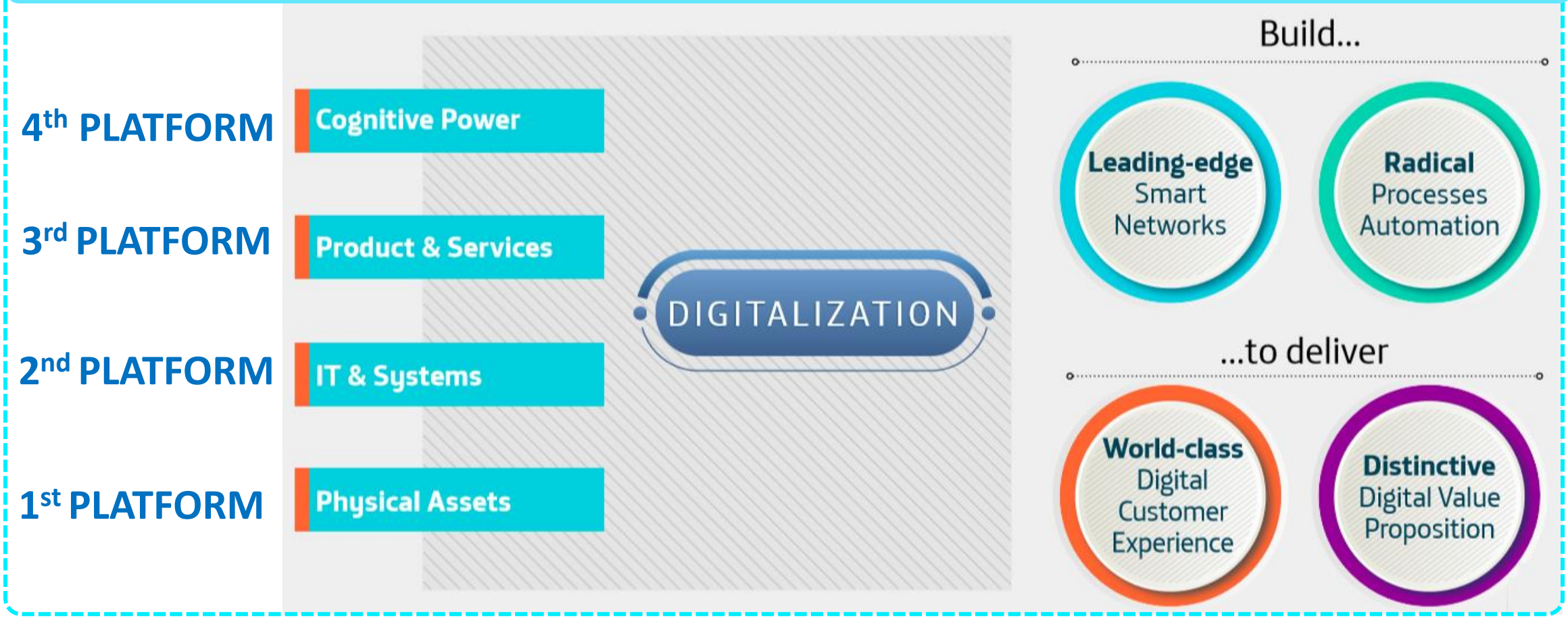
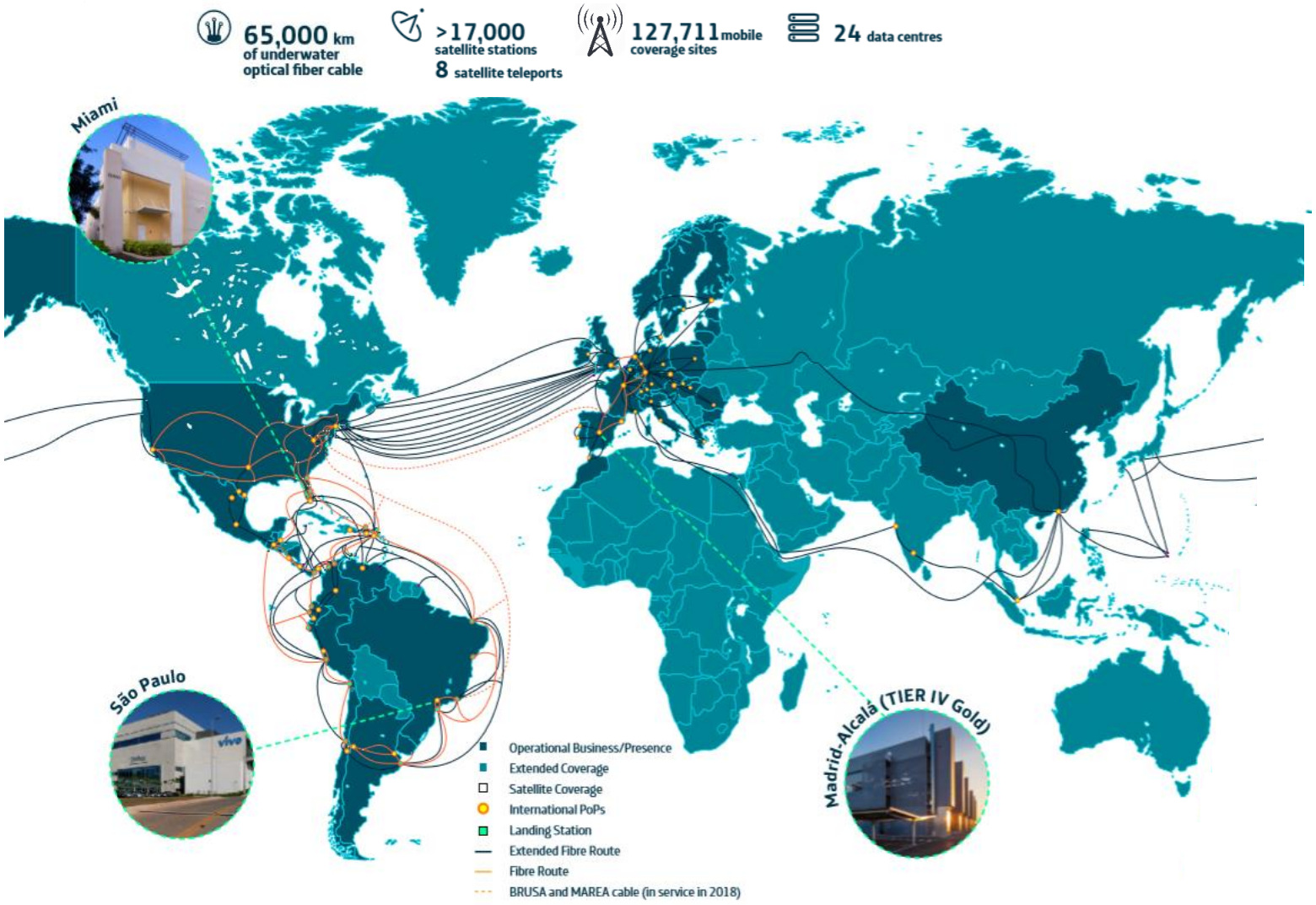
Telefónica is a platform company

Future Network and Systems as enablers that will allow us to be a reference in Digitalization



A path of great effort and consistency deploying infrastructure



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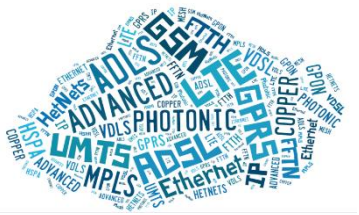
Source: Telefónica 2017 Integrated Annual Report

New customer demand and technology trends: opportunities and challenges

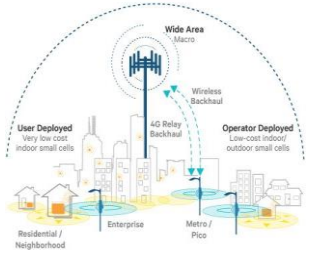
More technologies and spectrum bands

- FTTx
- xGPON
- 5G
- TDD
- mmWave
- Unlicensed
- …



Greater network heterogeneity

- Macro
- Small, pico, femto, micro cells
- FWA (Fixed Wireless Access)



Higher density / capillarity

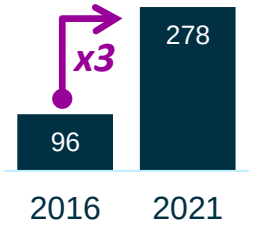
- Small, pico, femto, micro cells
- Massive IoT
- Traffic density
- Network sharing
- …

New services and user demands

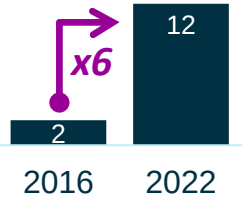
- Virtual / Augmented Reality / Video 360º
- 4K / 8K video
- Connected cars
- Smart cities
- IoT explosion
- …

Huge increase in data traffic

Global IP traffic[1]
(EB/month)



Data traffic per smartphone[2]
(GB/month)



1. Source: Cisco Visual Network Index.
2. Source: Ericsson Mobility Report.

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1

Industrializing FTTH deployments

2

Advancing in LTE deployments while preparing for 5G

3

Towards E2E Digitalization leveraging on BSS and OSS transformation

4

Building a global architecture and common data model to expose capabilities

Industrializing FTTH deployments

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Telefónica is making a great effort in fixed Ultra Broadband deployments

46 m
UBB Premises Passed
+13% yoy

11 m
UBB Connected Homes
+20% yoy

- Spain is **leader in FTTH in Europe**
- **Users and coverage in Spain** > Germany + France + Italy + UK

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Source: Telefónica. Results Q1 2018.
UBB Premises Passed includes FTTx + Cable
UBB Connected Homes includes FTTx + Cable + wholesale

Fiber industrialization in Spain has enabled us to deploy more efficiently in HispAm

Deployment cost reduction while improving quality, productivity and Time to Market

Cost reduction

Home Passed Cost (2012-2015) **-47%**

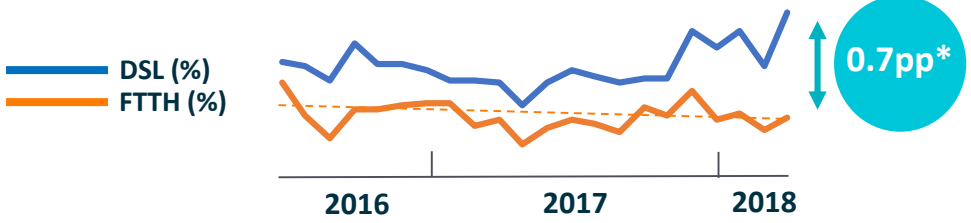
Home Connected Cost (2012-2015) **-22%**

Improving quality

Fault Rate (2 Play) (2015-2017) **-60%**

Fault rate (3 Play) (2015-2017) **-43%**

Fault rate evolution (DSL vs FTTH)



*Average improvement of fault rate (22 months)

Benefiting from knowledge and scale to accelerate deployments in HispAm

Increase in Premises Passed (2017/18E) **+140%**

Increase in Connected Homes (2017/18E) **+150%**

Fault Rate (2 Play) (2017) **-48%**

Fault rate (3 Play) (2017) **-43%**

Vivo 1 –São Paulo

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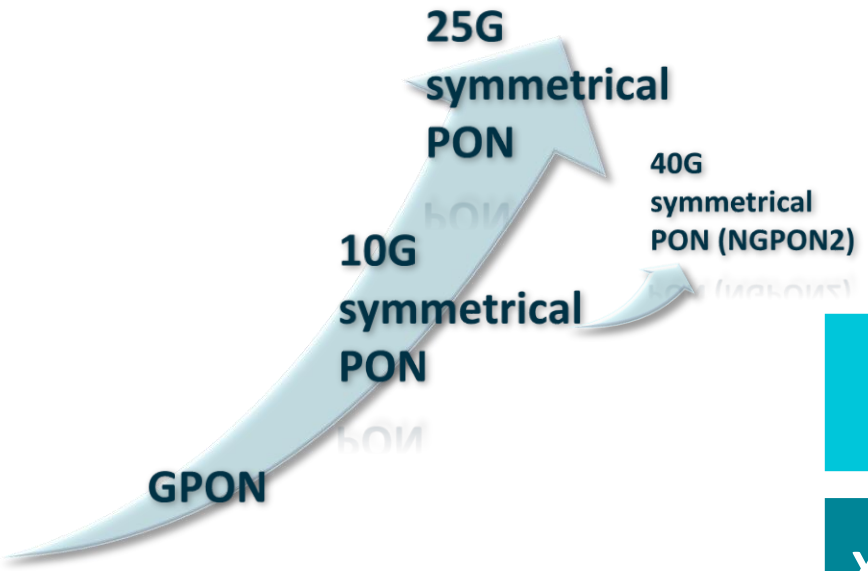
Infrastructure ready to evolve fiber technologies to achieve greater capacity in the future

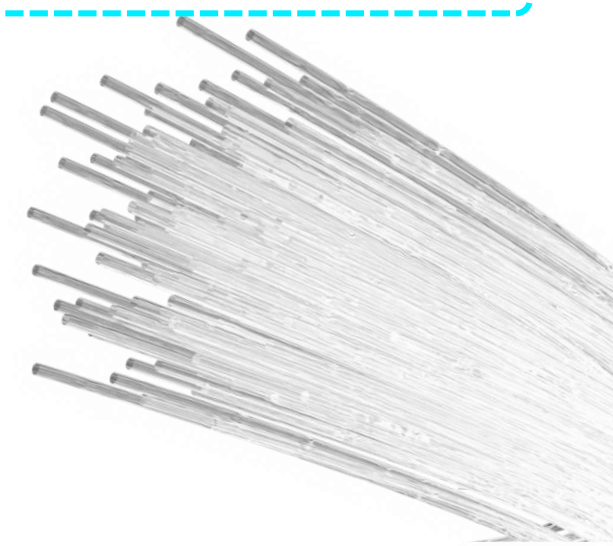
Hyperfast broadband means fiber



GPON Today	2.5 Gbps	1.25 Gbps
XGSPON 2018	10 Gbps	10 Gbps
25G-PON Near Future	25 Gbps	25 Gbps

FTTH deployment plans

- Industrializing fiber rollout
- Accelerating our coverage goals
- Increasing speed
- Improving user experience



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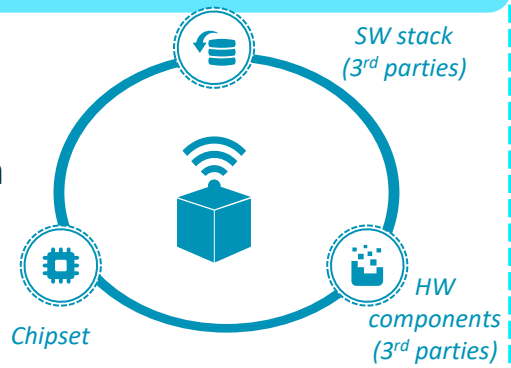
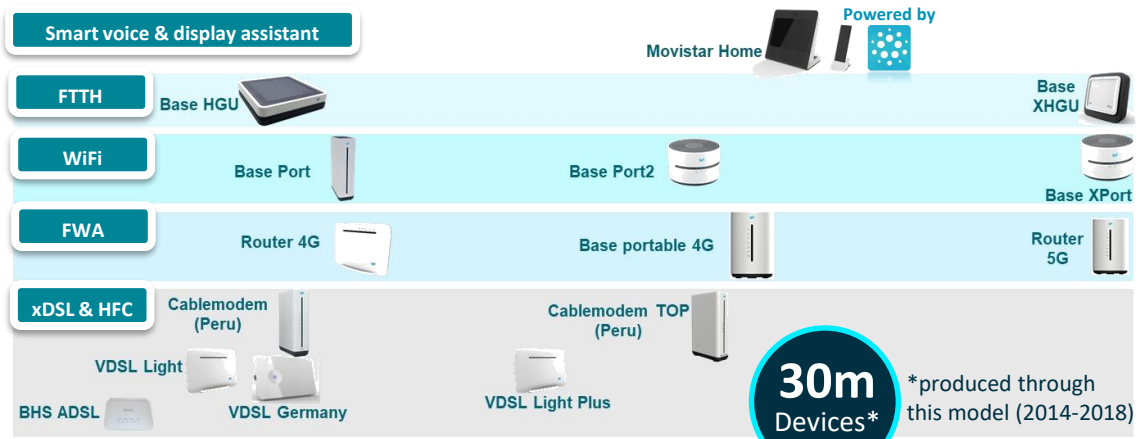
Guaranteeing excellent connectivity by enhancing customer's equipment...

We own our home strategy and our products

- Changing the relationship model with the industry, creating a prosperous 3rd parties ecosystem
- Managing E2E residential equipment industrialization process



Unified and synergic home devices portfolio



30m Devices*

*produced through this model (2014-2018)

Differential connectivity: excellent Wi-Fi quality and Smart Wi-Fi

- Up to 1 Gbps
- Total Wi-Fi coverage at home
- Smart WiFi
- Facing a more complex environment

Iconic device: Home Gateway Unit

> 3m HGU*

*installed in TEF foorprint

Improving quality ratios vs former equipment*

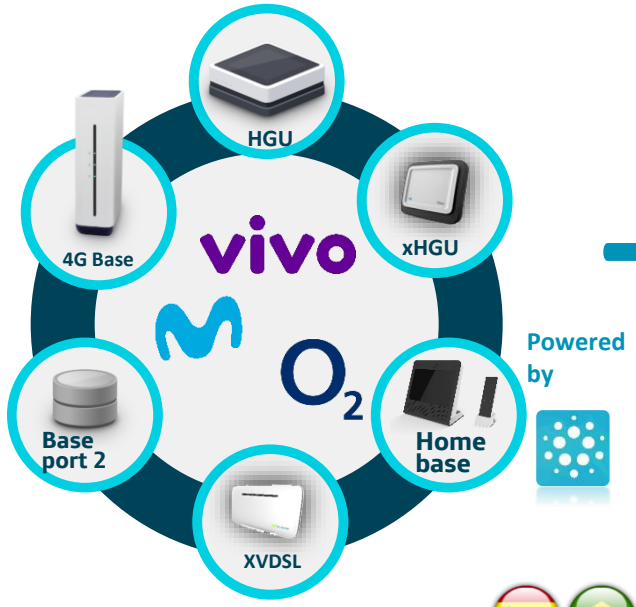
INCIDENT RATE	↓ 43%
SUBSTITUTION RATE	↓ 82%
INSTALLATION TIME	↓ 41%

*Average HGU vs legacy ONT + Router in Spain

… and moving forward to use our smart devices ecosystem as a service platform at home

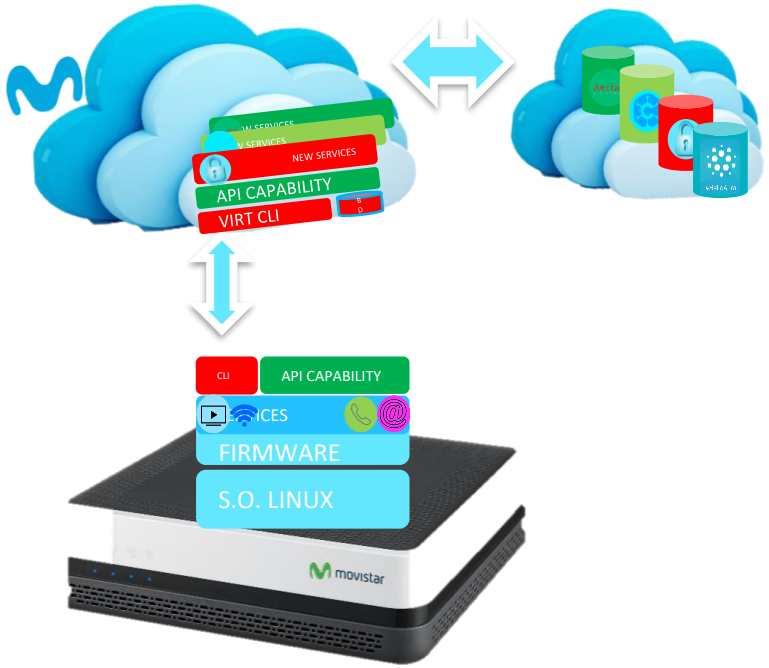
Improving value for our customers

Same service regardless the access + Smart voice assistant

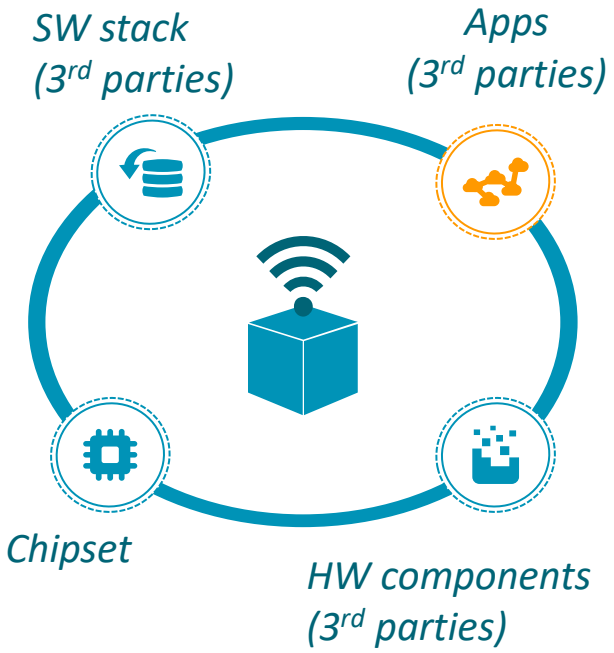


Powered by

Open platform at home to provide new differential B2C and B2B services



Open ecosystem



Evolving our video ecosystem to be ready for the market reality

+5 million users*

Convergent TV ecosystem (Open Platform)

- FBB (Cable, XDSL, FTTX)
- MBB (3G, 4G)

Next Set Top Box generation

- STBs portfolio simplification
- Device´s evolution (UHD, HDR,..)
- All video services (DTH / CATV / IPTV / OTT)

Management E2E

- Maximizing product sharing
- Global and local team

Unified video services evolution

- Homogenous user experience in all devices, access networks and video commercial proposal

Service Quality

99.99% service availability

Cost Sustainability

Open “best of breed” solution

Future proof ecosystem

New formats and integration with third party platforms

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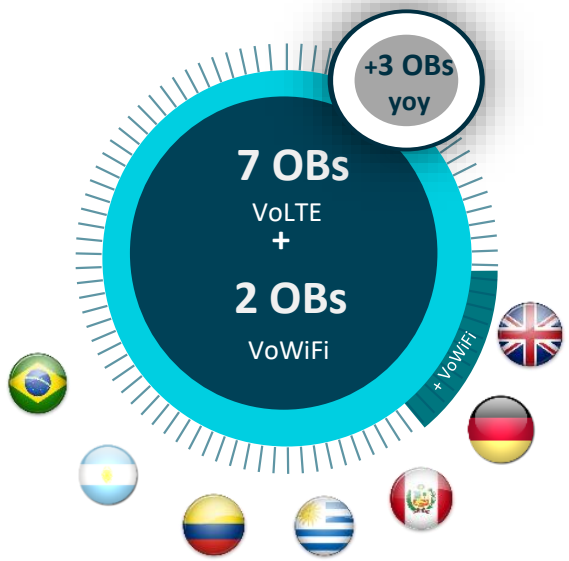
* April 2018

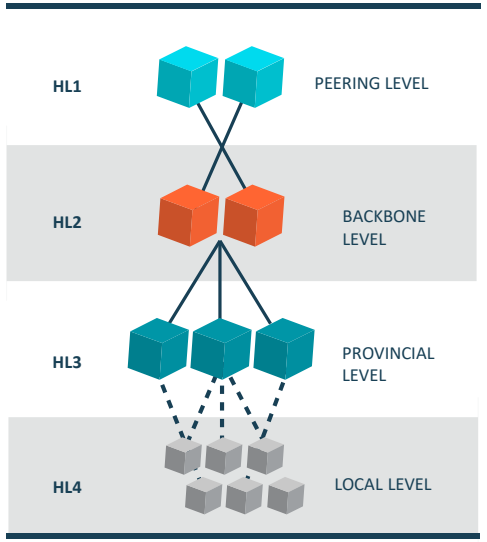
Managing our legacy while advancing towards an All-IP Network

All-IP transformation

- **VoIP commercial offer** in a transparent way for the customer
- **Compaction and shutdown plans** for PSTN
- **Spain pioneer** in Central Office decommissioning



Transforming our Transport Network

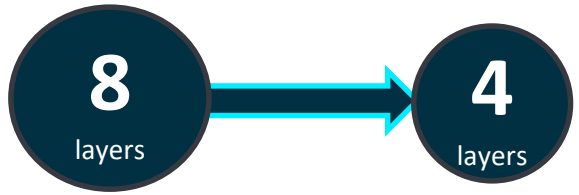


IP over Optics technology

Less layers
(collapsing from 8 to 4)

Scalable and resilience
(MPLS and SDN architecture)

Simplification
(less than half of the equipment)



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PSTN: Public Switched Telephone Network; VoIP: Voice over IP
Data as Q1 2018

Advancing in LTE deployments while preparing for 5G

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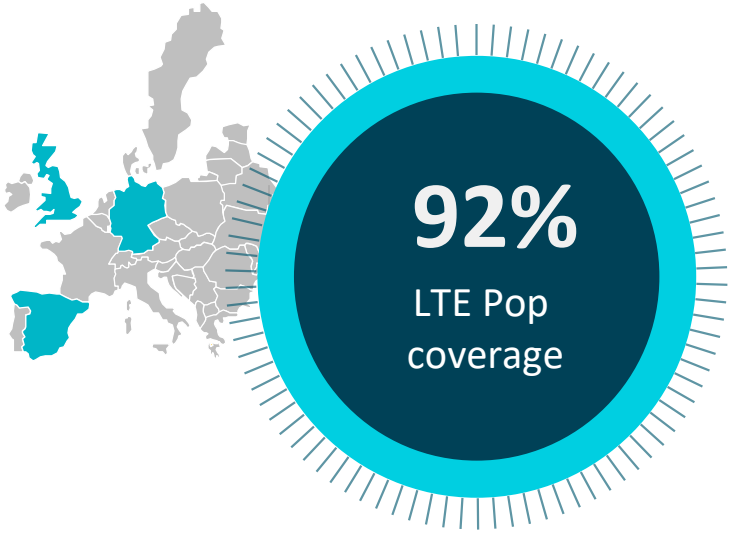
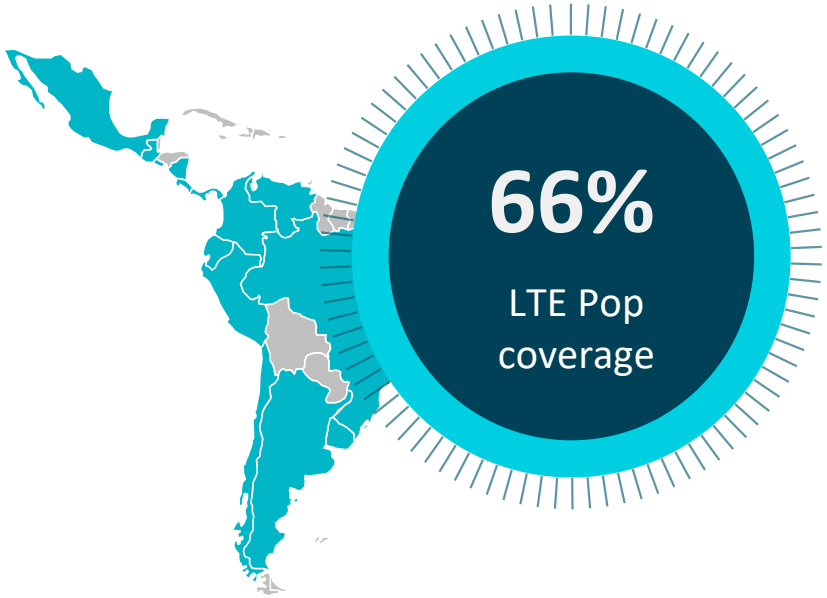
Telefónica is advancing in LTE deployments in all our footprint





Total sites LTE
>75k

3G/4G Sites with UBB
97%

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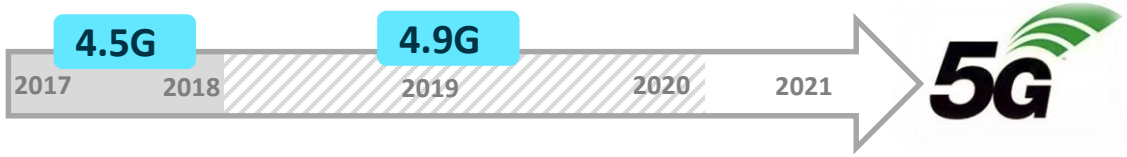
Source: Telefónica. Results Q1 2018.

Extending coverage and capacity to offer support to new services

Evolving to 5G



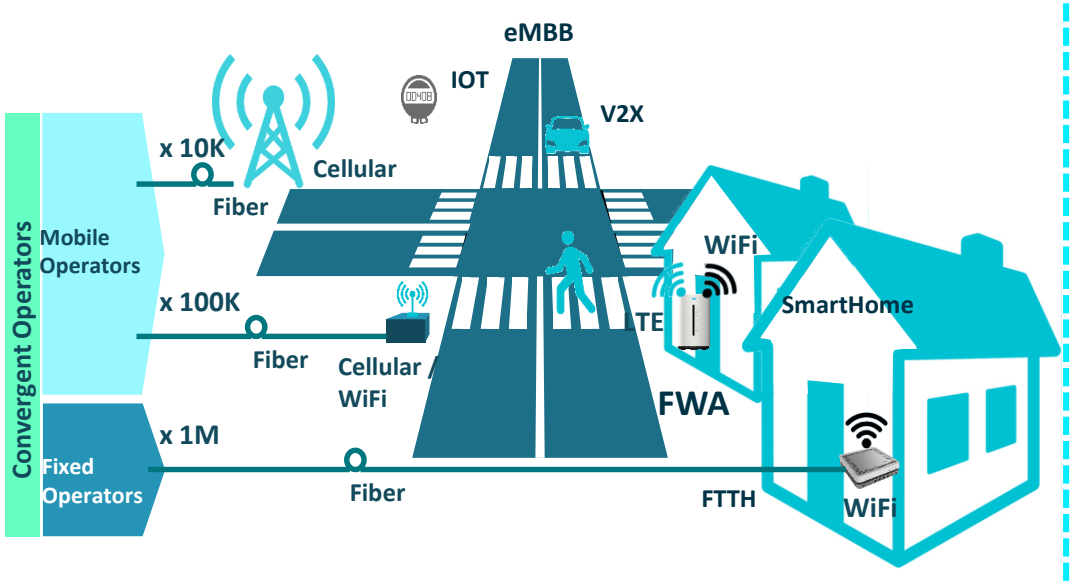
Coverage
- Extending 4G PoP coverage in all our footprint

New services
- NB-IoT / LTE-M. IoT and Industry 4.0
- Fixed Wireless Access (FWA)
- Vehicular comms (V2X)
- 5G devices (H2 19E)

Capacity
- Spectrum management (refarming)
- Carrier Aggregation (up to 3-5)
- Multi and Massive MIMO Antennas

New Architectures
- Single RAN
- Heterogeneous Networks
- Virtualization in the Mobile Access

Moving towards a convergent UBB access



Possible scenarios representation

K: kilo = x 1,000. M: million = x 1,000,000 (potential customers/connections)

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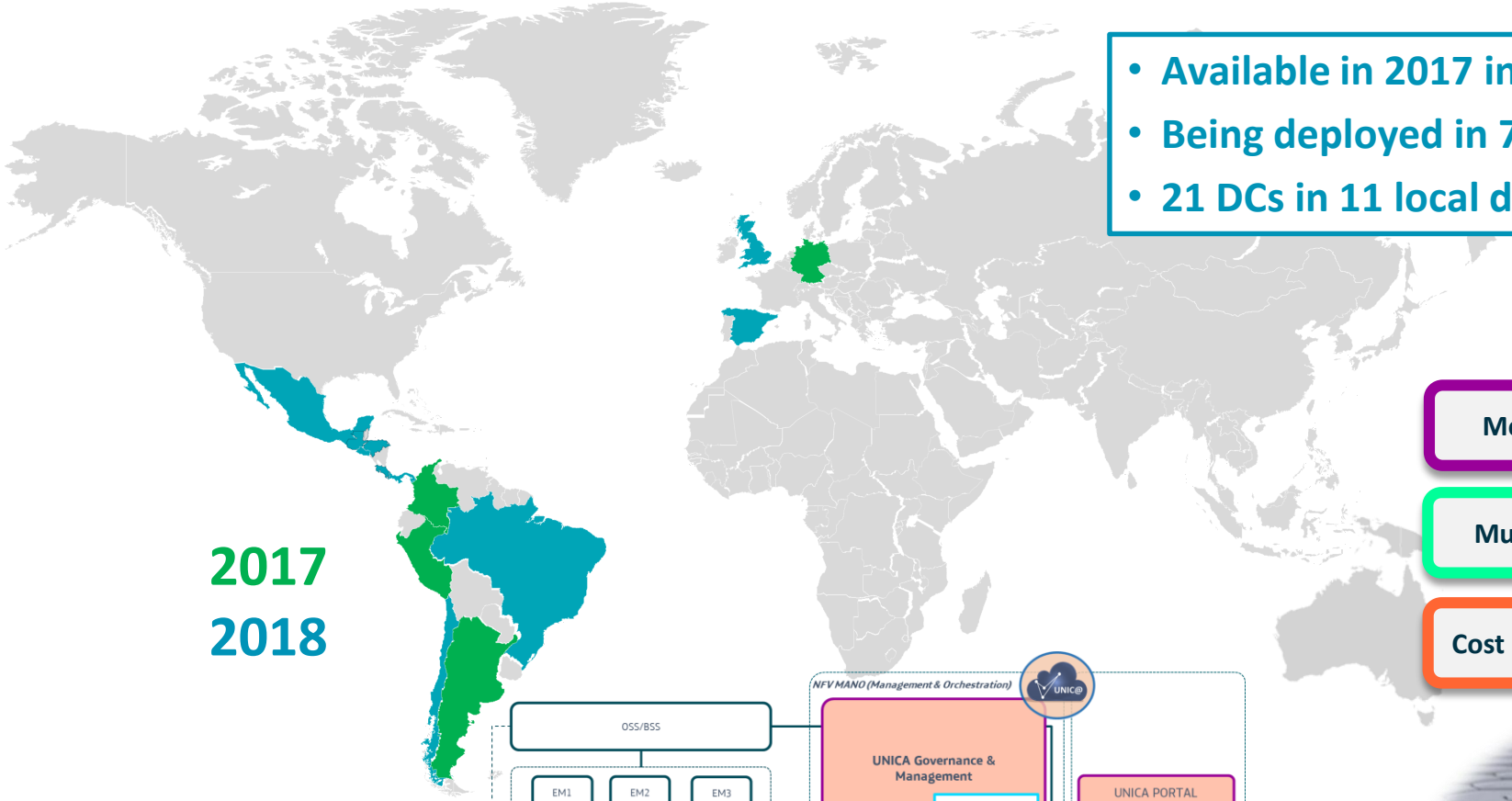
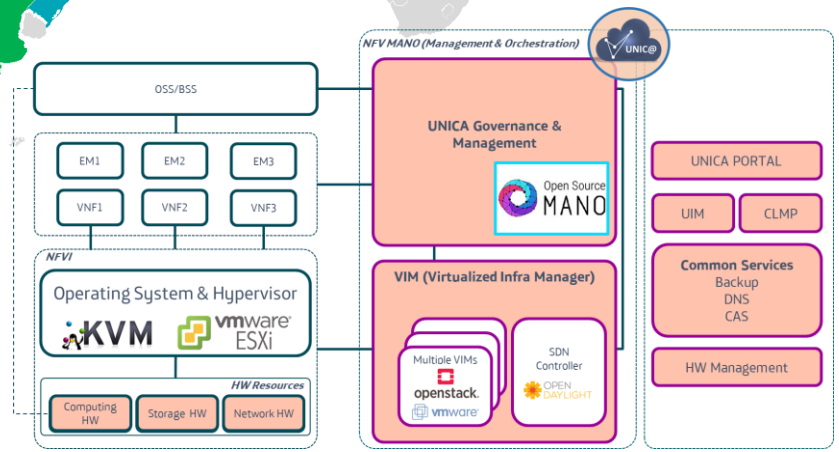
MIMO: massive input massive output
RAN: Radio Access Network

IoT: Internet of Things
FWA: Fixed Wireless Access
eMBB: enhanced Mobile Broadband

A strong Network Virtualization program: UNICA, one of the first industrial Telco Clouds…

- Available in 2017 in 4 Telefonica operations
- Being deployed in 7 new markets along 2018
- 21 DCs in 11 local domains + 1 global domain





Modular | Open | Secure

Multi-site | Elastic | Multi-tenant

Cost Effective | Multi-vendor | Standard aligned

Robust | Flexible

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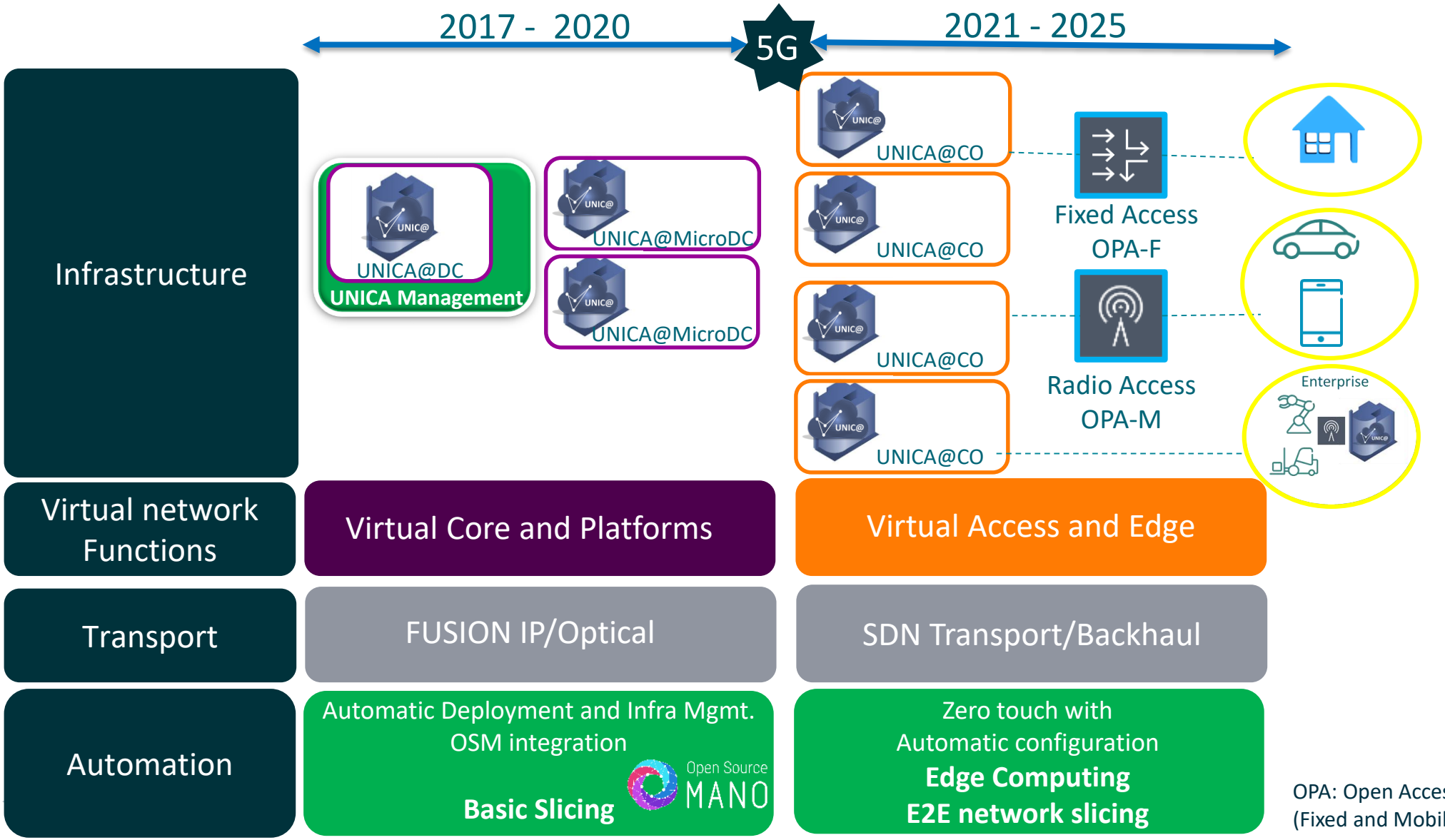
… enabling a future proof network designed to be agilely changed and operated in an automated fashion

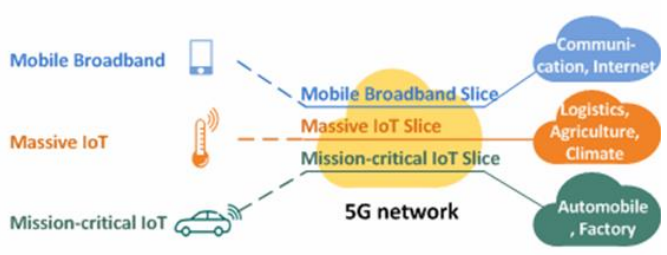


OPA: Open Access
(Fixed and Mobile)

Driving additional value and bringing new business opportunities with all these new network capabilities

Network Slicing

- **E2E logical (virtual) networks** that consist of a mix of shared and dedicated virtual network functions
- These **differentiated capabilities** (latency, performance, reliability, availability…) are **tuned for each use case or service**



Edge Computing

- Placing **computing and storage assets close to the end user**
- **Increase efficiency in the use of network resources** (e.g. transport capacity), improve QoE, reduce latency, and increase security and privacy

VIDEO

CONNECTED CARS / AUTONOMOUS DRIVING

VIRTUAL & AUGMENTED REALITY

ARTIFICIAL INTELLIGENCE

Network as a Service (NaaS)

- Sale of **network services to third parties** that want to deliver services to their customers without building their own network infrastructure
- **Services:**
  - Wide Area Networking (WAN) connectivity
  - Edge Computing capacity
  - Data-center connectivity
  - Bandwidth on demand (BoD)
  - Security services
  - Content Distribution
  - other applications

QoE: Quality of service

Towards E2E Digitalization leveraging on BSS and OSS transformation

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Advancing in Full Stack deployments while consolidating global management models to enhance digital experience

Transforming business support processes and systems in all our footprint

7 OBs with > 60 % migrated
2 OBs Fully migrated

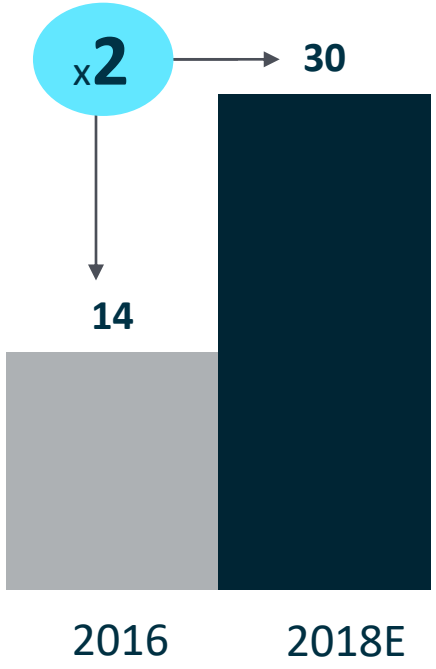
Initial stage

Migration started

Advanced state / Fully Migrated

Accelerating the migration of our customers to Full Stack

% of customers migrated



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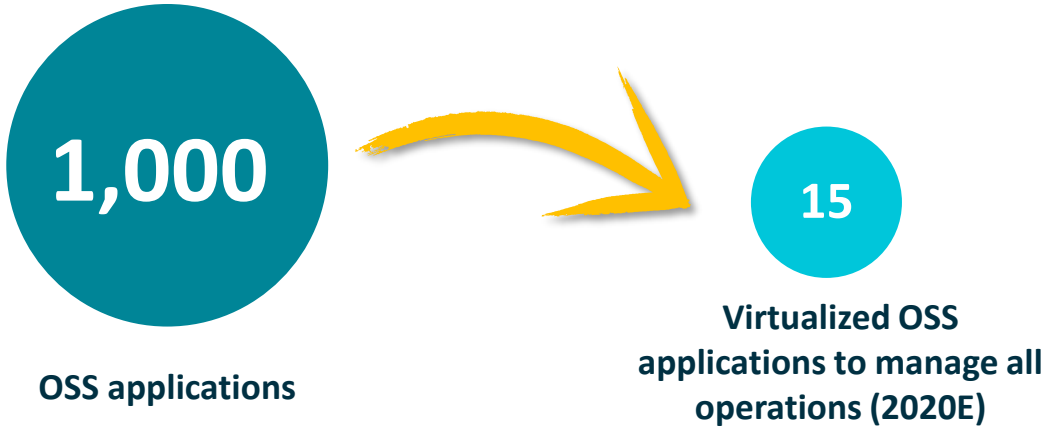
Building a unified Operational Support Systems (OSS) Map

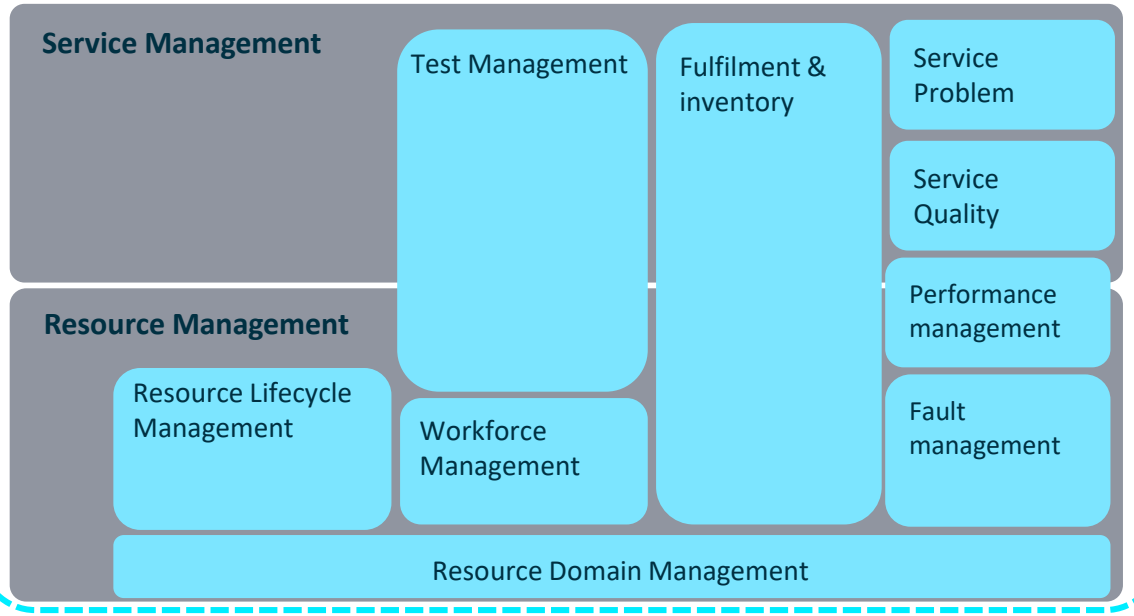
OSS simplification and automation

Same processes and same tools across all 17 Operating Business



Unified OSS strategy for all Operating Business

Common Map
Best of Breed Solutions



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Transforming Global Operation levels (L1, L2 & L3) to make our Network Operation Center (NOC) more efficient…

Attention levels at Network Operation Center (NOC)

L3: Supplier support →

Global supplier model
- Unified and standardized model of support contracts
- Common technical and economic templates

L2: Advanced remote support →

Internal knowledge to give support
- Internal teams with deep network and systems knowledge formed by Telefónica experts

L1: Basic support →

Standardized and outsourced support
- Standard and global automation model

L0: Automatic monitoring →

Unified network monitoring
- Unified monitoring and first resolution of networks and systems

… and evolving towards customer centric operations through Service Operation Centers (SOC)

Evolving from network centric operations to customer centric operations

Become a truly Customer-Centric Telco

Deliver the best customer experience

Offer high quality services

Vision

User Experience

Device & Apps analysis

Service Quality Assurance

Network Traffic Analytics

Phase I

Phase II

Creating value based on real-time analysis of customer experience

Revenue	Customer retention	•**Faster resolution** causing **5% churn reduction** •**Service Monitor of VIPs, VAPs and Enterprise Customers** (segmentation approach ARPU/VIP) •**Proactive Management** of user perceived quality
Revenue	Revenue generation	•**Marketing campaign** support (MCS) •**Service monetization** and fast restoration •Ability to offer **premium services, CSI/NPS Increase**
Cost	OpEx reduction	•**Reduced Call** Centre and NOC workload •**Proactive trend** analysis and Service performance •**Dynamic SLA** to drive operation efficiency (FCR)
Cost	Improve CapEx allocation	•**Improved utilization** of Network resources •**Analysis** and Management of **Service Capacity** •**Flexible Business Model**

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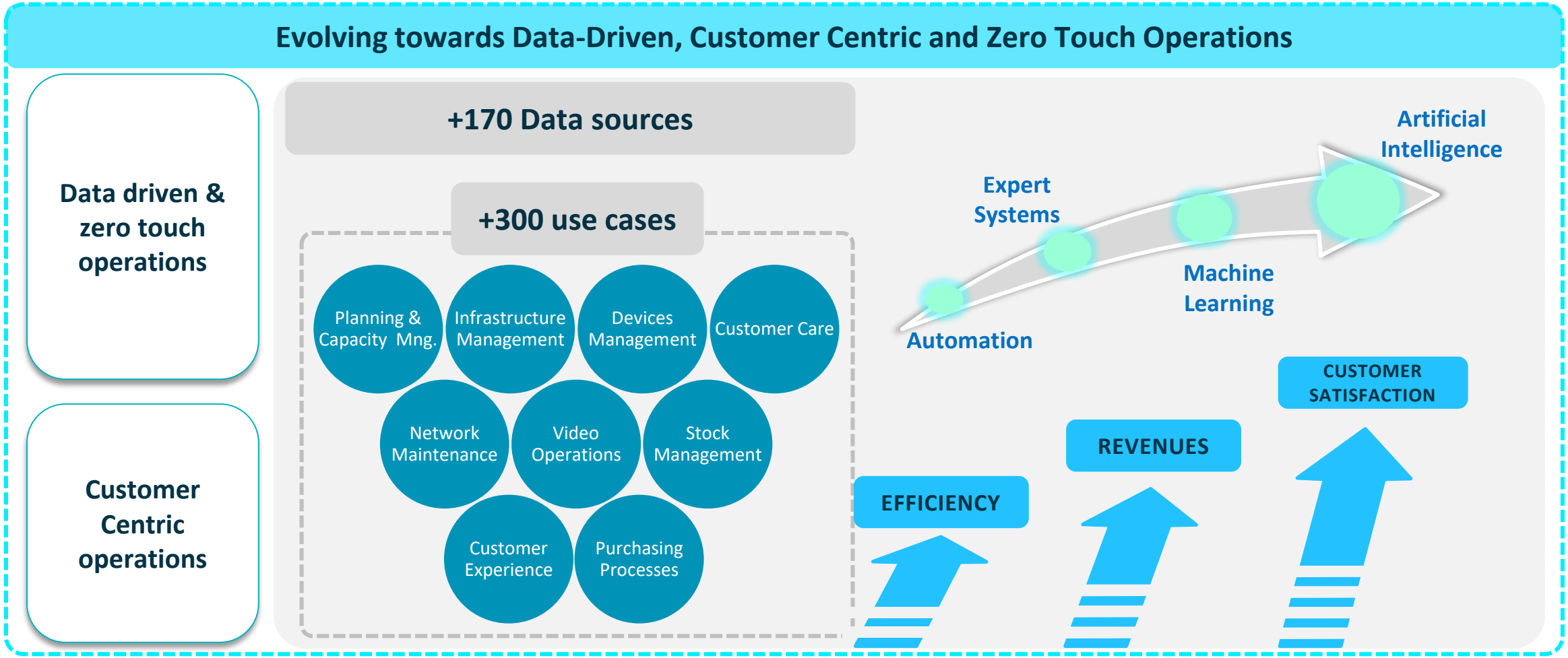
MCS: marketing campaign support
NPS: net promoter score
CSI: customer satisfaction index

VAP: very annoyed person
NOC: network operation center
FCR: first call resolution

Evolving our operations towards extreme automation leveraging on Artificial Intelligence



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Building a global architecture and common data model to expose capabilities

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Enabling management and operation data flow between all Telefónica's platforms

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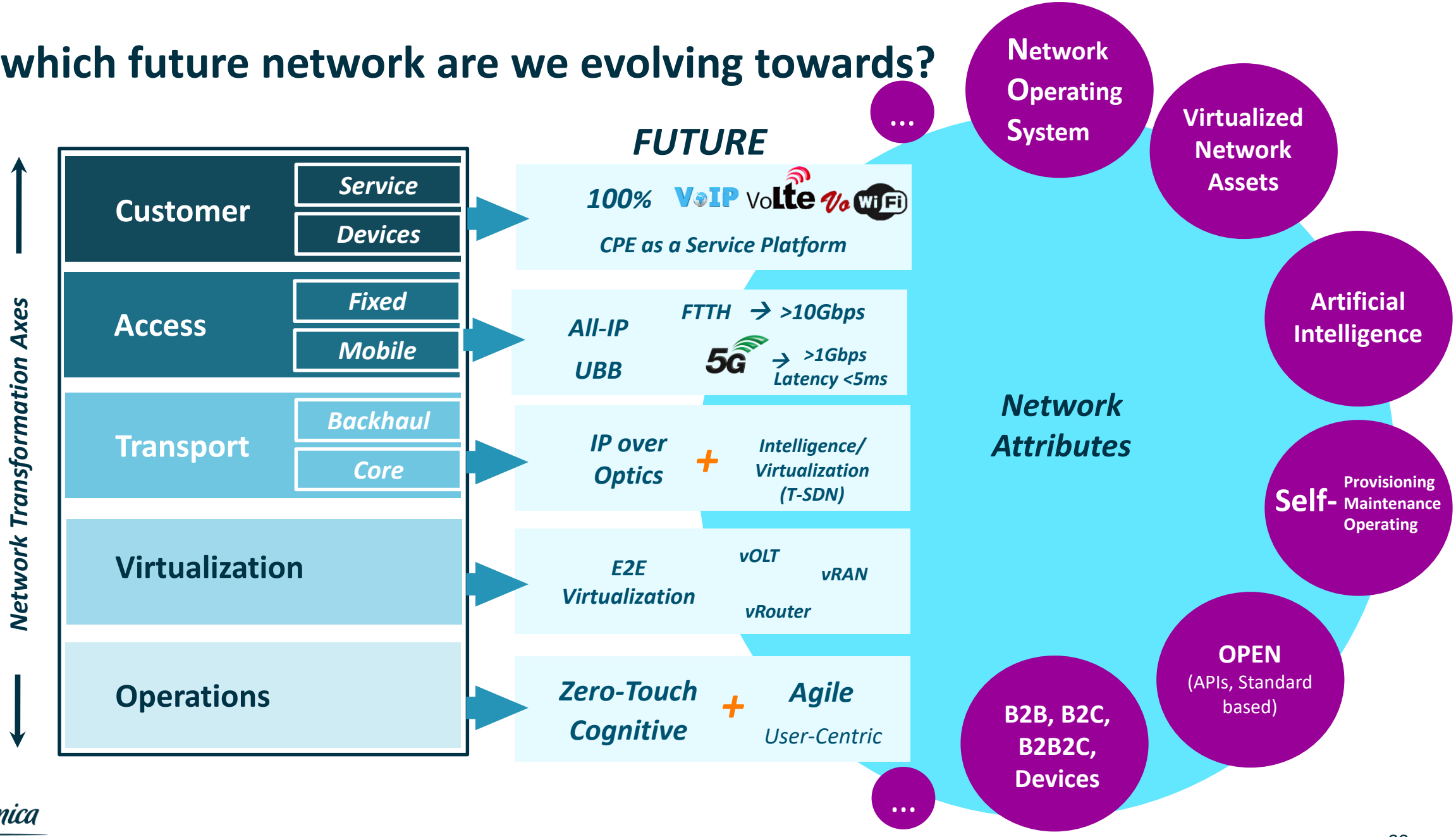
So, which future network are we evolving towards?



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Key Takeaways

Laura Abasolo

Chief Financial and Control Officer

Telefónica

Key Takeaways

Differential platform

We accelerate transformation and deliver spread efficiency

11M UBB base (+20% y-o-y) 4 OBs in UNICA

-47% cost/Fibre prem. passed (Spain)

30m in-house home devices 61% E2E Digitalisation

Customer centric

Privileged position to capture future growth

ARPU uplift; +10% LTE; +20% Fiber

53% Connectivity + SoC/Group Revenue

Open Ecosystem 5G Artificial Intelligence

Sustainable and profitable

More resilient network and business

CapEx peak behind Data Analytics

Cutting-edge services (IoT, Edge..) SON, Zero touch

Value creation through transformation

Q&A Session

Laura Abasolo
Enrique Blanco

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