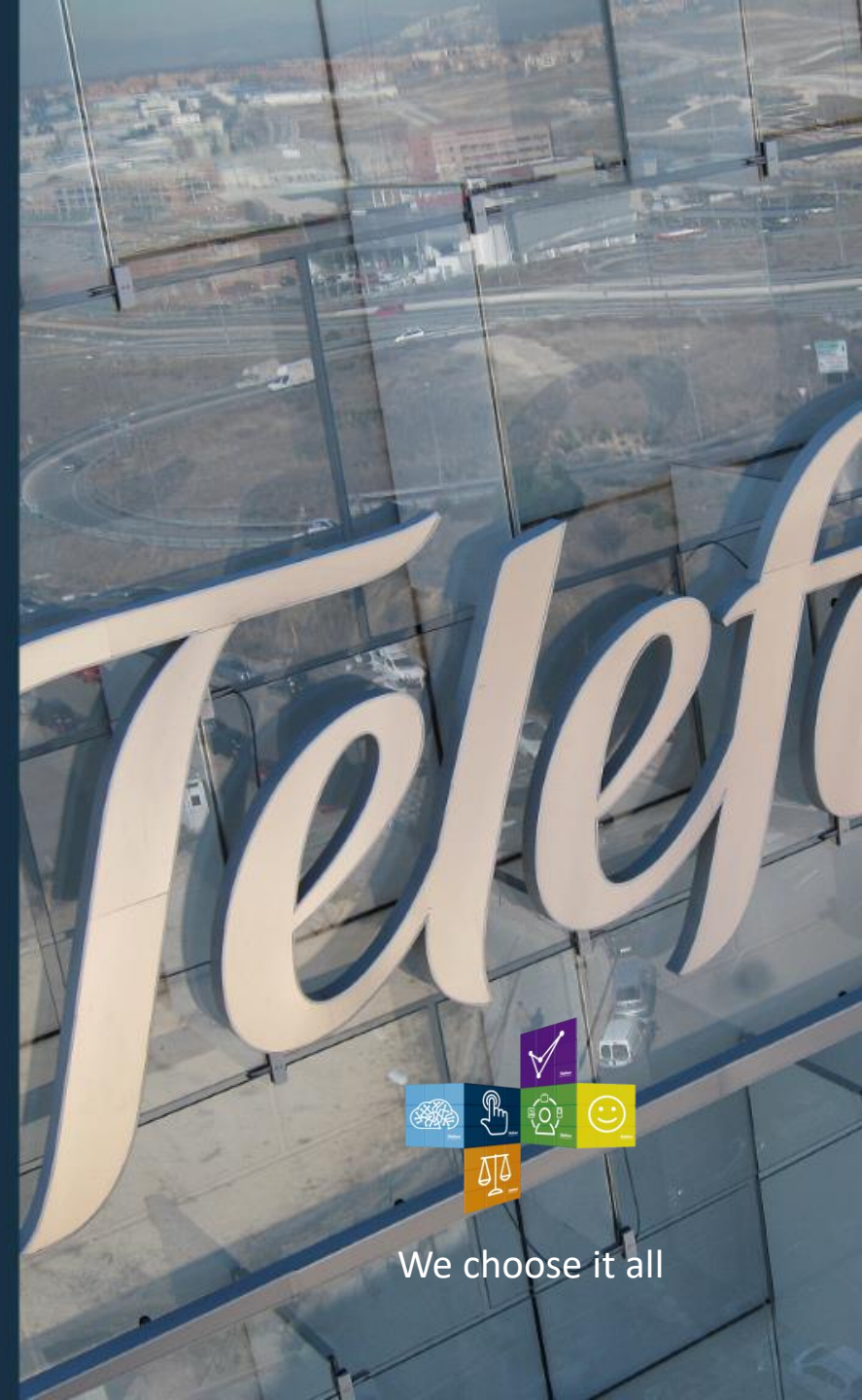


Telefonica

Network and Systems evolution

London, June 19th 2018



We choose it all

Network and Systems Evolution session

Pablo Eguirón

Global Director of Investor Relations

Key Objectives

Laura Abasolo
Chief Financial and Control Officer

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)

Telefónica is a platform company

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

4th PLATFORM

Cognitive Power

3rd PLATFORM

Product & Services

2nd PLATFORM

IT & Systems

1st PLATFORM

Physical Assets

DIGITALIZATION

Build...

Leading-edge
Smart
Networks

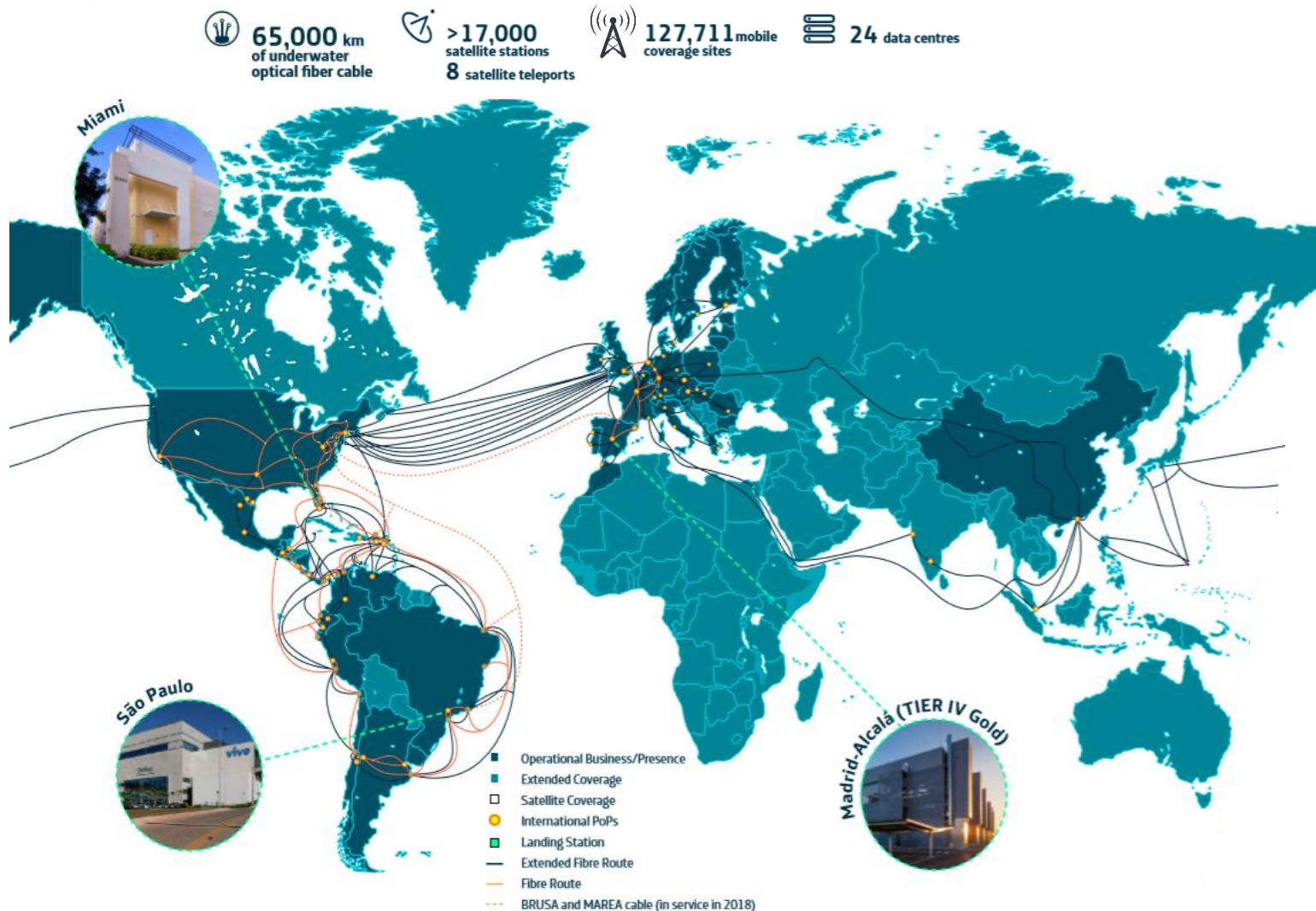
Radical
Processes
Automation

...to deliver

World-class
Digital
Customer
Experience

Distinctive
Digital Value
Proposition

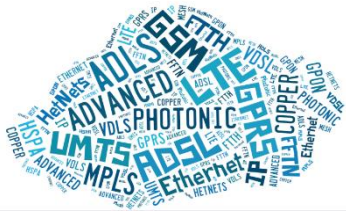
A path of great effort and consistency deploying infrastructure



New customer demand and technology trends: opportunities and challenges

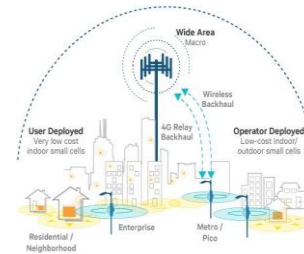
More technologies and spectrum bands

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



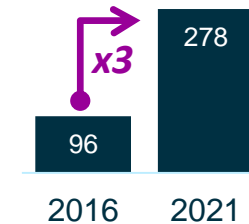
Greater network heterogeneity

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

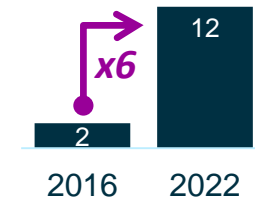


Huge increase in data traffic

Global IP traffic¹
(EB/month)



Data traffic per smartphone²
(GB/month)



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

Higher density / capillarity

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



New services and user demands

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



1

**Industrializing FTTH
deployments**

2

**Advancing in LTE deployments
while preparing for 5G**

3

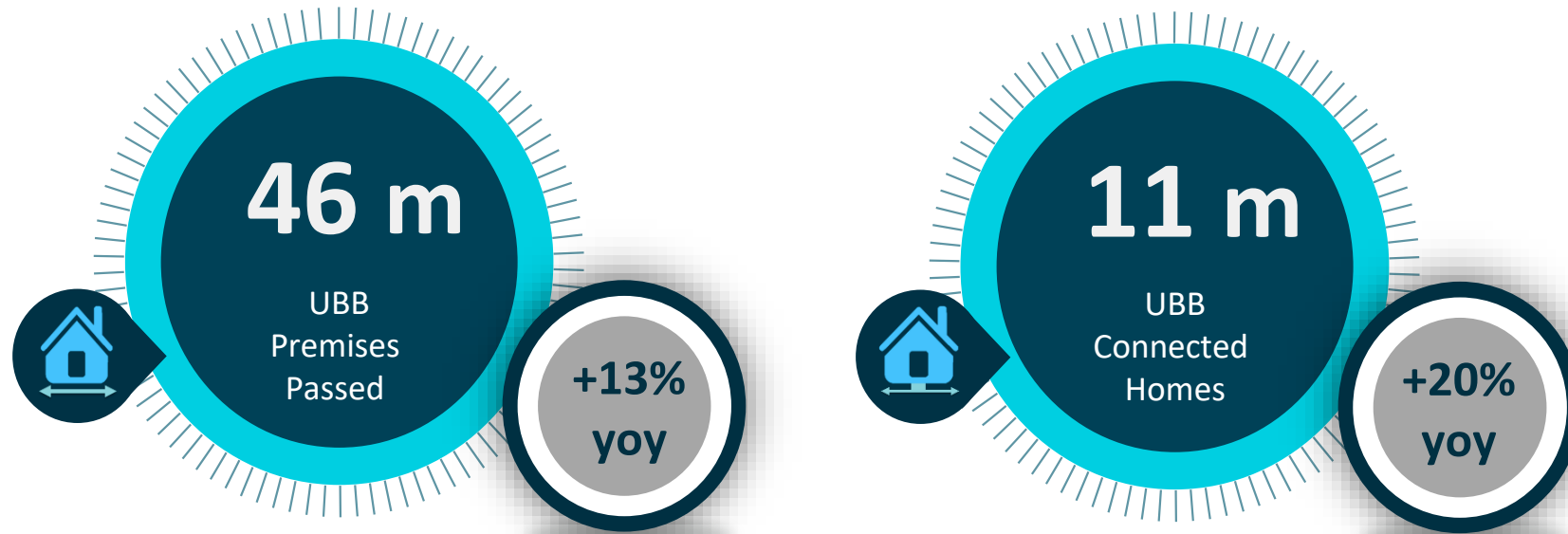
**Towards E2E Digitalization
leveraging on BSS and OSS
transformation**

4

**Building a global architecture
and common data model to
expose capabilities**

Industrializing FTTH deployments

Telefónica is making a great effort in fixed Ultra Broadband deployments



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

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

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

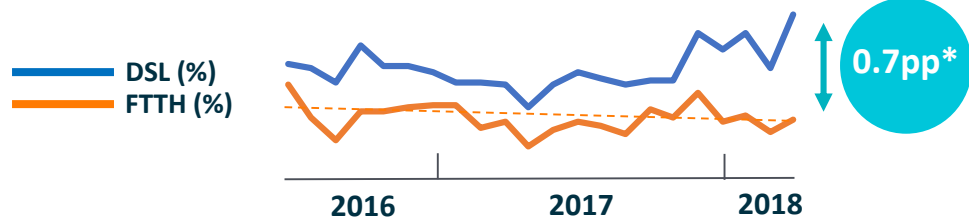
Cost reduction



Improving quality

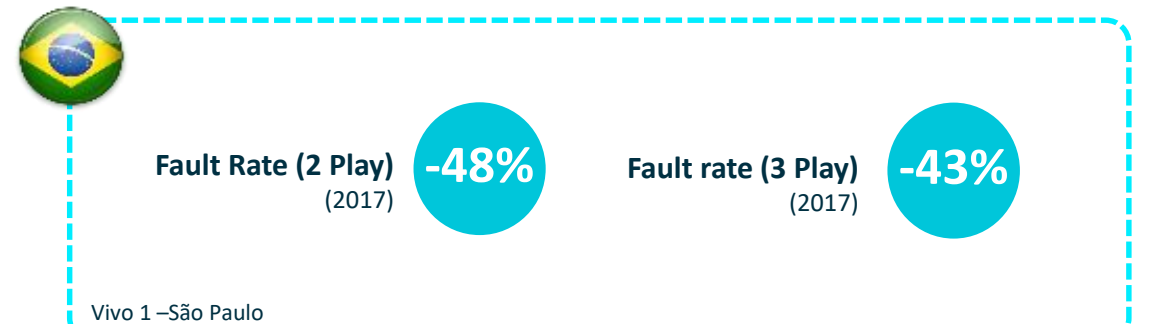
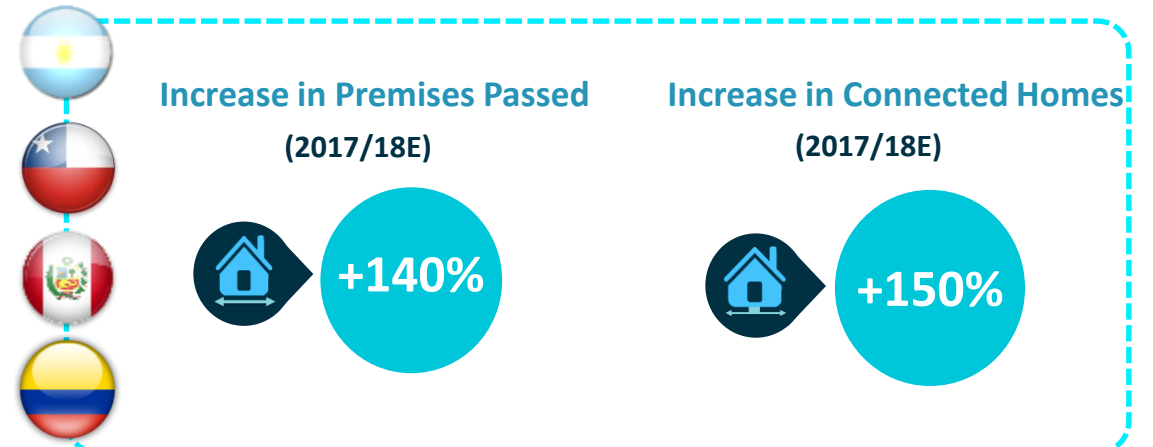


Fault rate evolution (DSL vs FTTH)



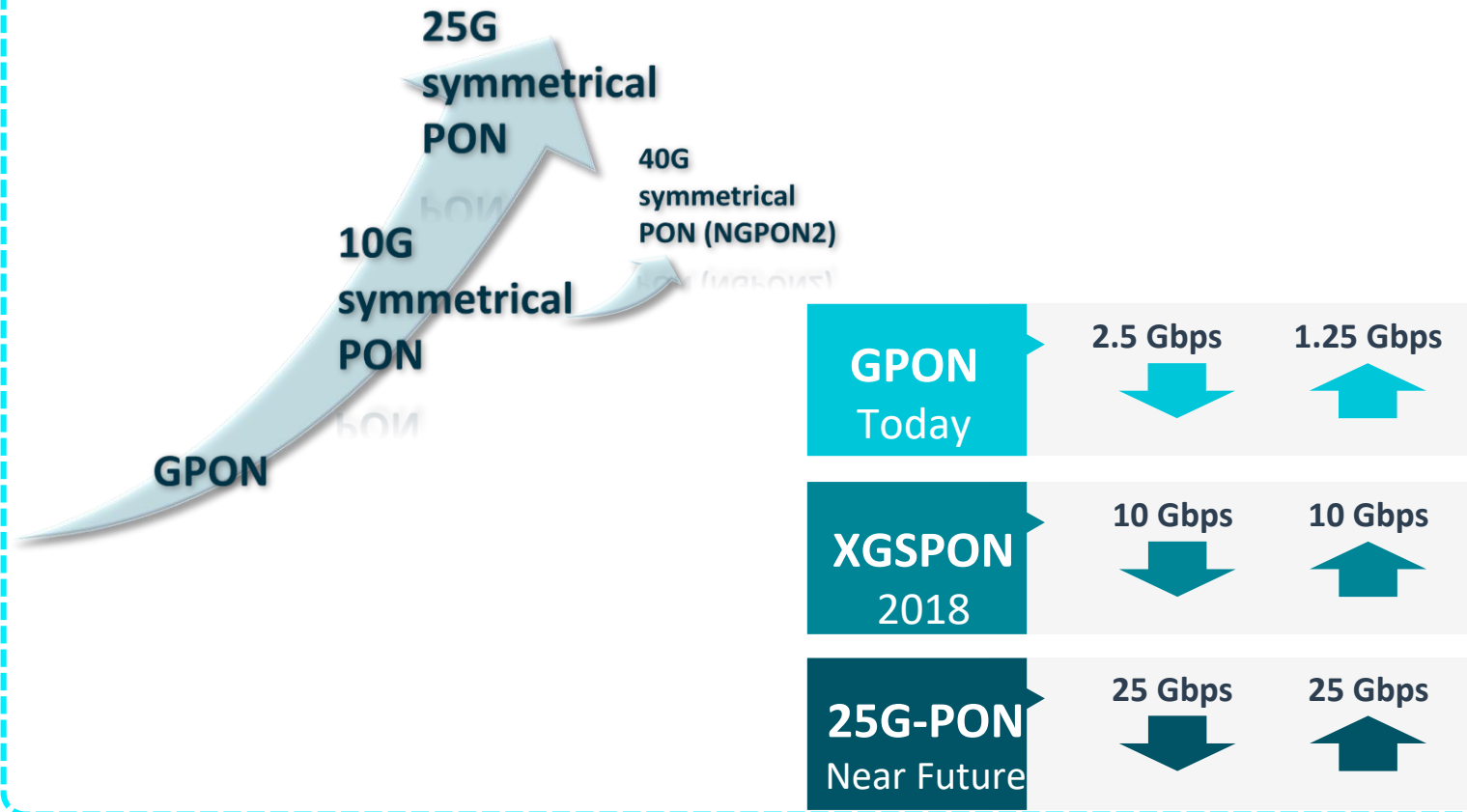
*Average improvement of fault rate (22 months)

Benefiting from knowledge and scale to accelerate deployments in HispAm



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

Hyperfast broadband means fiber



FTTH deployment plans

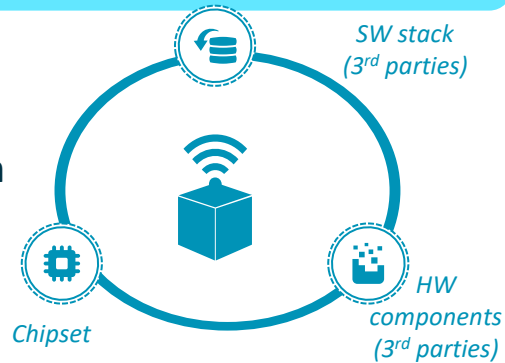
- Industrializing fiber rollout
- Accelerating our coverage goals
- Increasing speed
- Improving user experience



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

Smart voice & display assistant Powered by Movistar Home

FTTH	Base HGU	Base XHGU	
WiFi	Base Port	Base Port2	Base XPort
FWA	Router 4G	Base portable 4G	Router 5G
xDSL & HFC	Cablemodem (Peru)	Cablemodem TOP (Peru)	
	VDSL Light	VDSL Light Plus	
BHS ADSL	VDSL Germany		

30m Devices* *produced through this model (2014-2018)

Telefonica

We choose it all

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 footprint



Improving quality ratios vs former equipment*

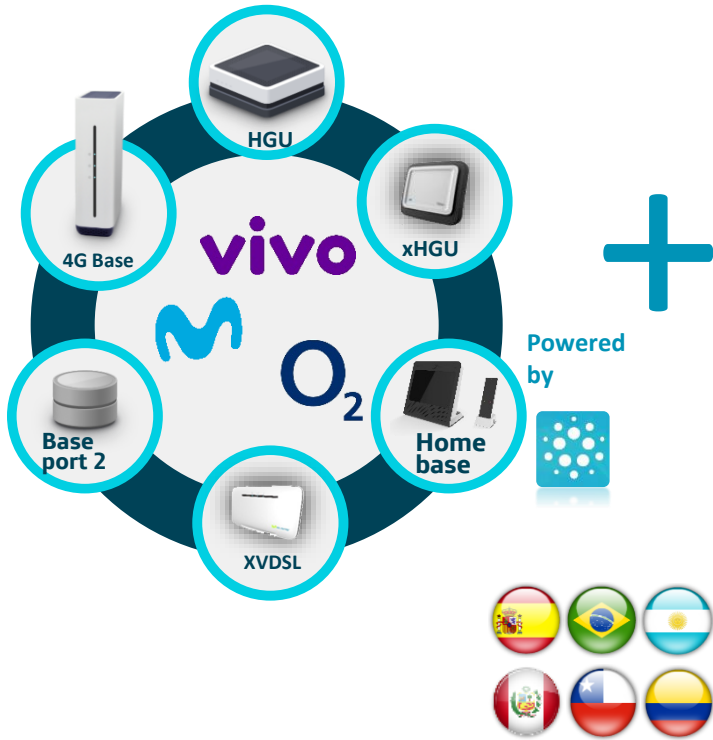
INCIDENT RATE	↓ 43%
SUBSTITUTION RATE	↓ 82%
INSTALLATION TIME	↓ 41%

*Average HGU vs legacy ONT + Router in Spain

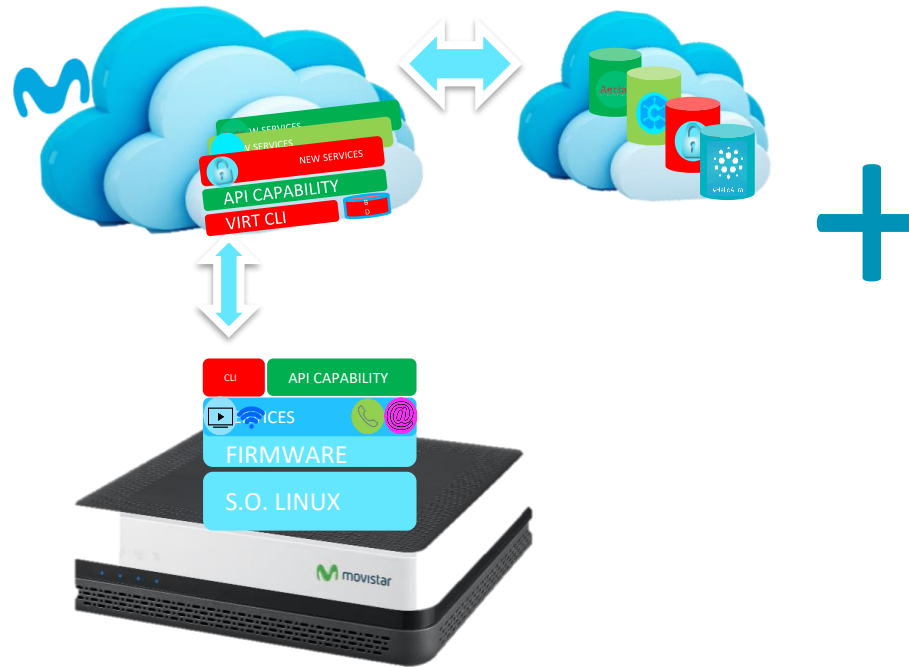
... and moving forward to use our smart devices ecosystem as a service platform at home

Improving value for our customers

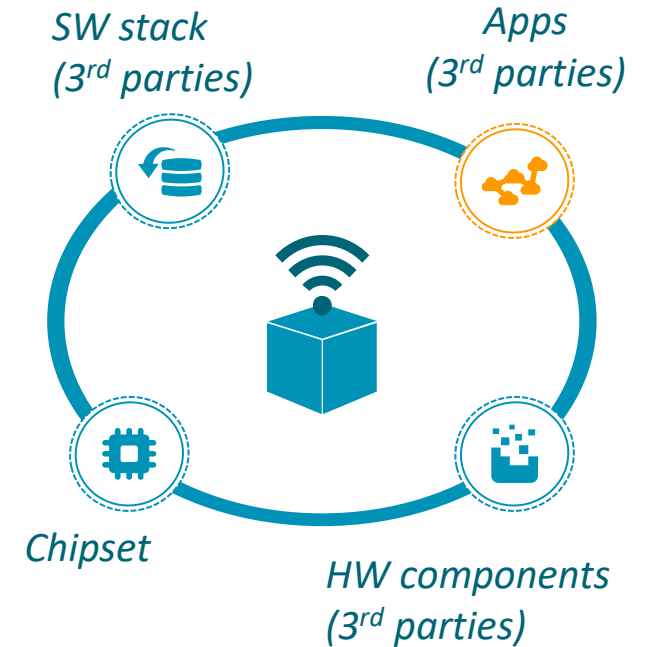
Same service regardless the access +
Smart voice assistant



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



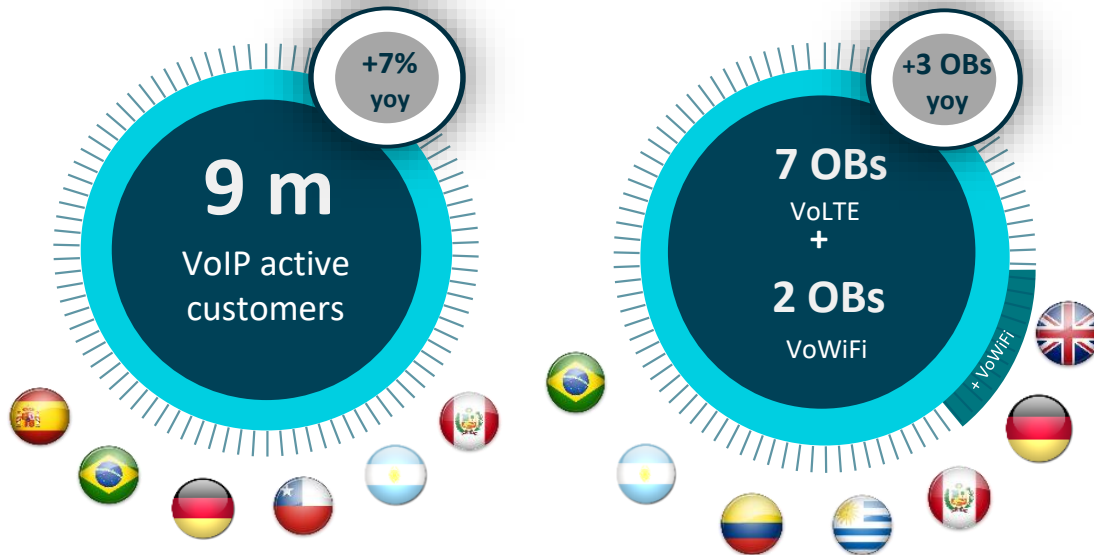
We choose it all

* April 2018

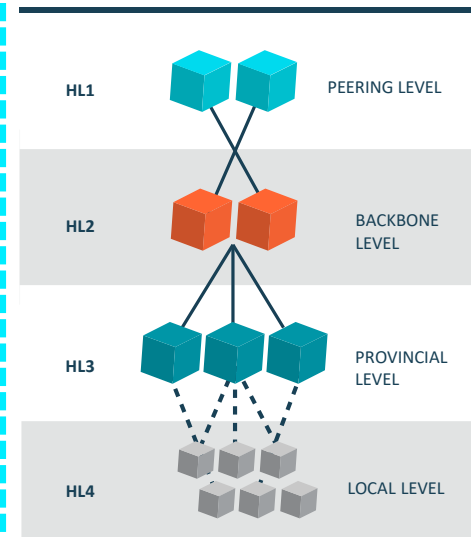
Managing our legacy while advancing towards an All-IP Network

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)

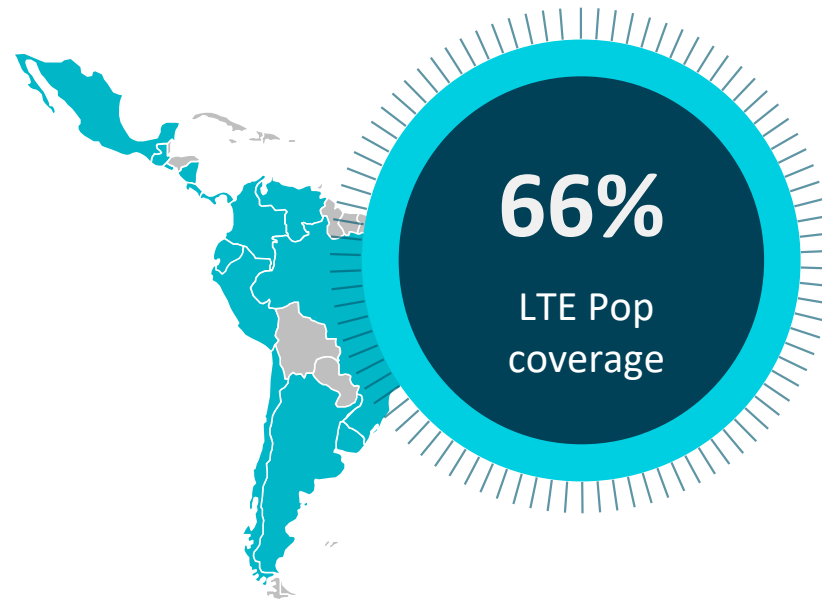
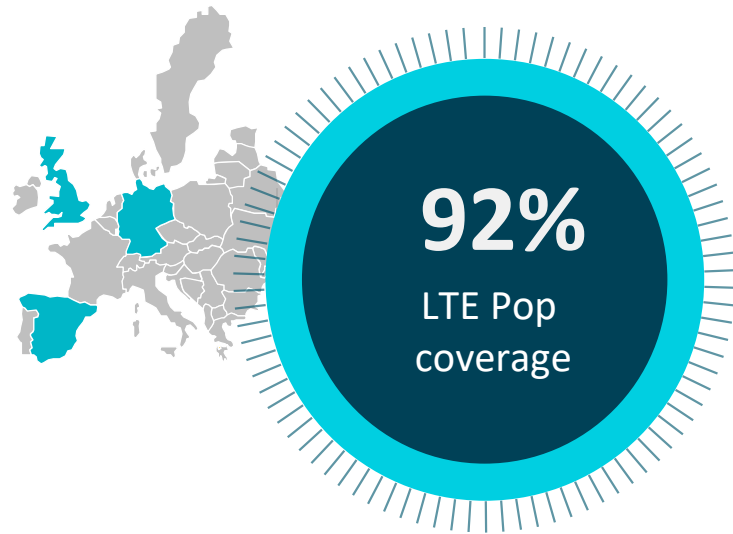
Scalable and resilience
(MPLS and SDN architecture)

Simplification
(less than half of the equipment)



Advancing in LTE deployments while preparing for 5G

Telefónica is advancing in LTE deployments in all our footprint



Total sites
LTE
>75k

3G/4G Sites
with UBB
97%

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)

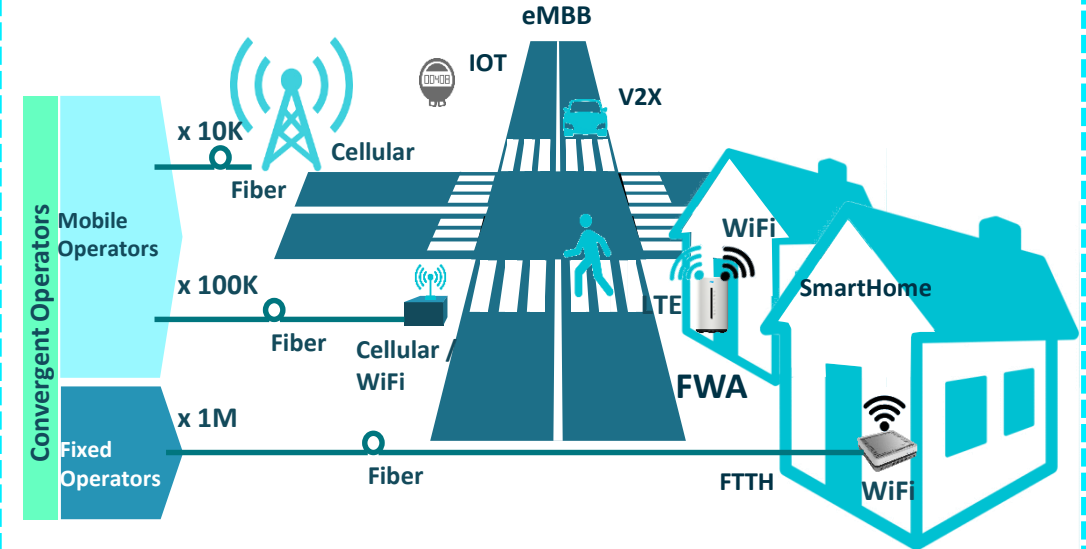
Capacity

- 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

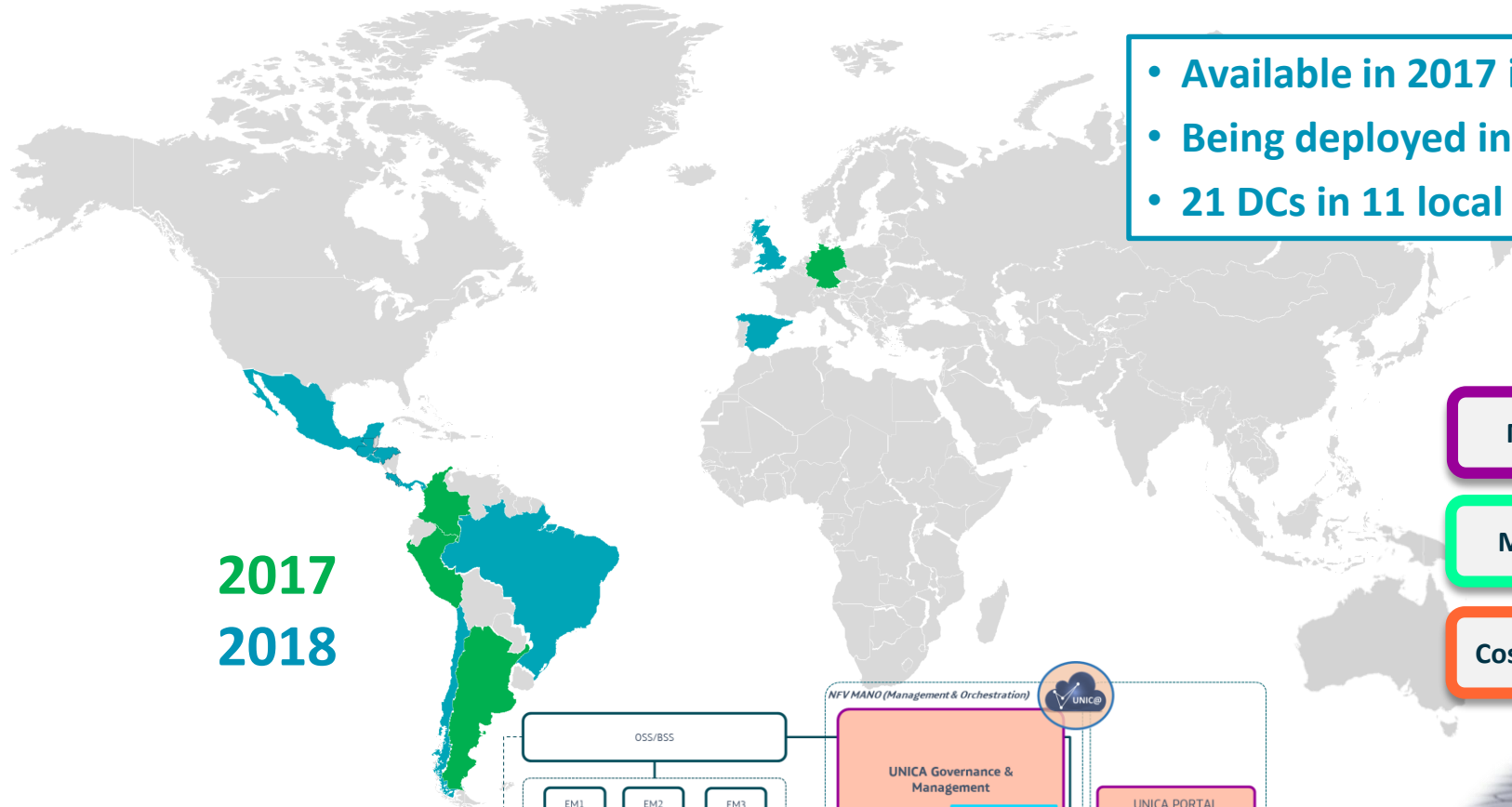
Moving towards a convergent UBB access



Possible scenarios representation

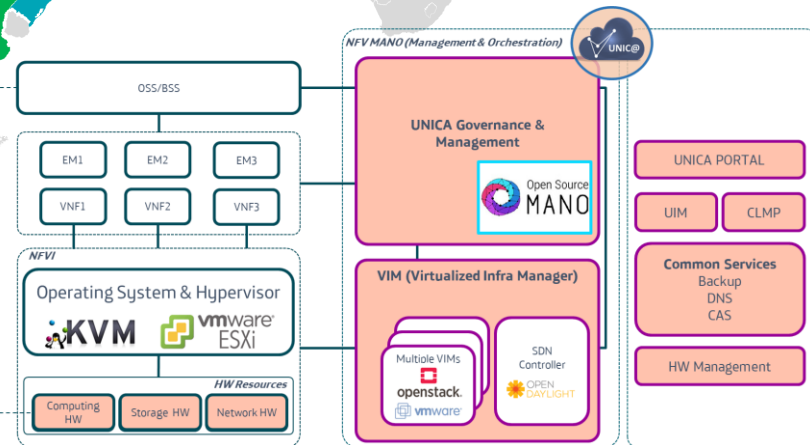
K: kilo = x 1,000. M: million = x 1,000,000 (potential customers/connections)

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

2017
2018

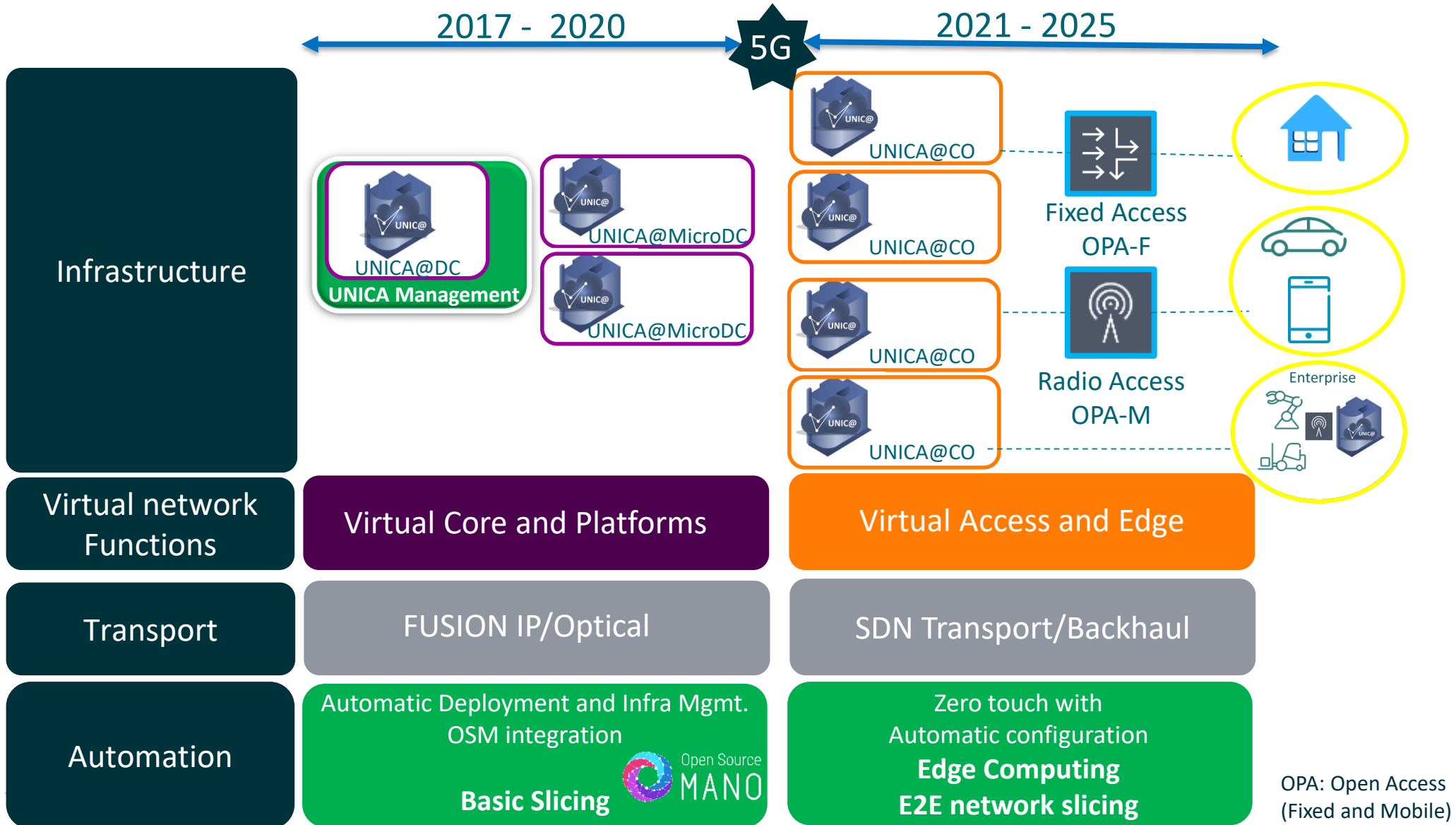


Modular	Open	Secure
Multi-site	Elastic	Multi-tenant
Cost Effective	Multi-vendor	Standard aligned

Robust Flexible

UNIC@

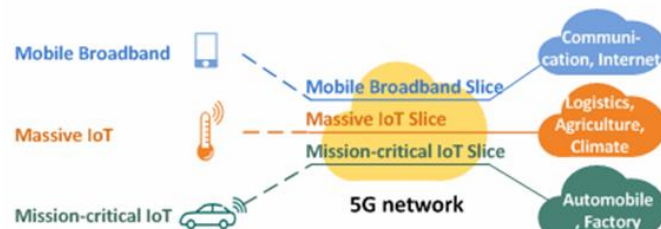
... enabling a future proof network designed to be agilely changed and operated in an automated fashion



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)

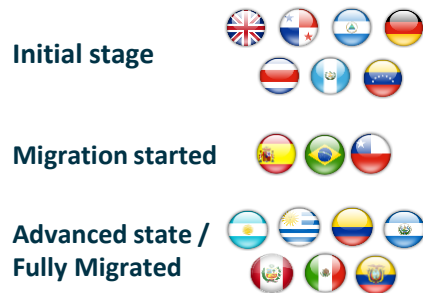
- Sale of **network services to third parties** that want to deliver services to their customers without building their own network infrastructure
- **Services:**
 - Wide Area Networking (WAN) connectivity
 - Edge Computing capacity
 - Data-center connectivity
 - Bandwidth on demand (BoD)
 - Security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

Towards E2E Digitalization leveraging on BSS and OSS transformation

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

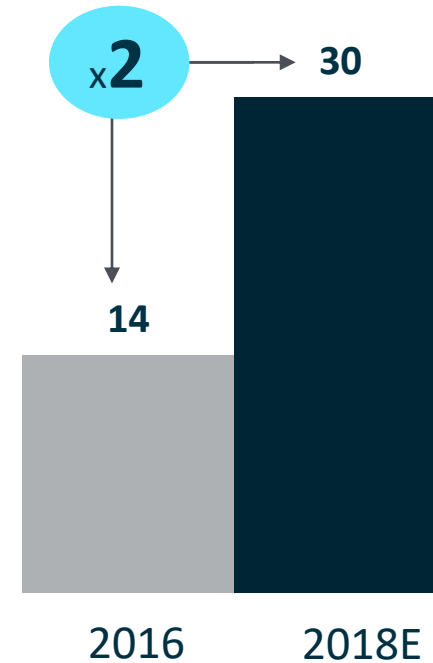
Transforming business support processes and systems in all our footprint

7 OBs with > 60 % migrated
2 OBs Fully migrated



Accelerating the migration of our customers to Full Stack

% of customers migrated



Building a unified Operational Support Systems (OSS) Map

OSS simplification and automation

Same processes and same tools across all 17 Operating Business

1,000

OSS applications

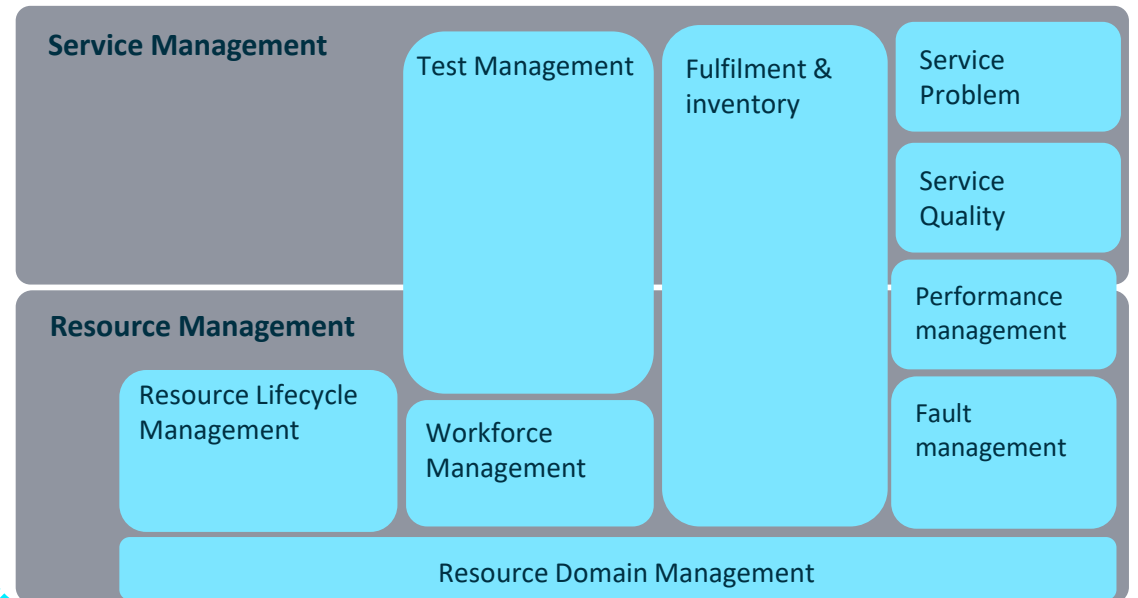


15

Virtualized OSS applications to manage all operations (2020E)

Unified OSS strategy for all Operating Business

Common Map
Best of Breed Solutions



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

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 generation

- Marketing campaign support (MCS)
- Service monetization and fast restoration
- Ability to offer premium services, CSI/NPS Increase

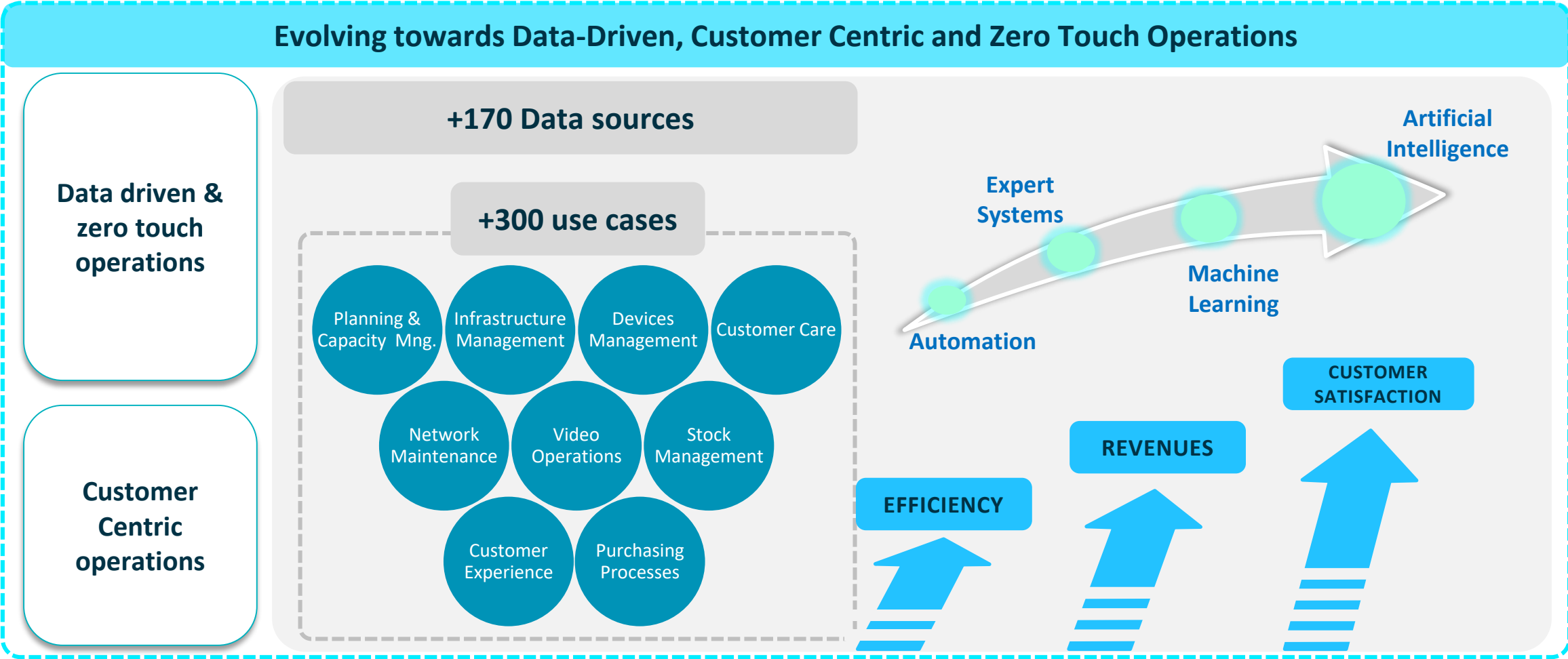
OpEx reduction

- Reduced Call Centre and NOC workload
- Proactive trend analysis and Service performance
- Dynamic SLA to drive operation efficiency (FCR)

Improve CapEx allocation

- Improved utilization of Network resources
- Analysis and Management of Service Capacity
- Flexible Business Model

Evolving our operations towards extreme automation leveraging on Artificial Intelligence

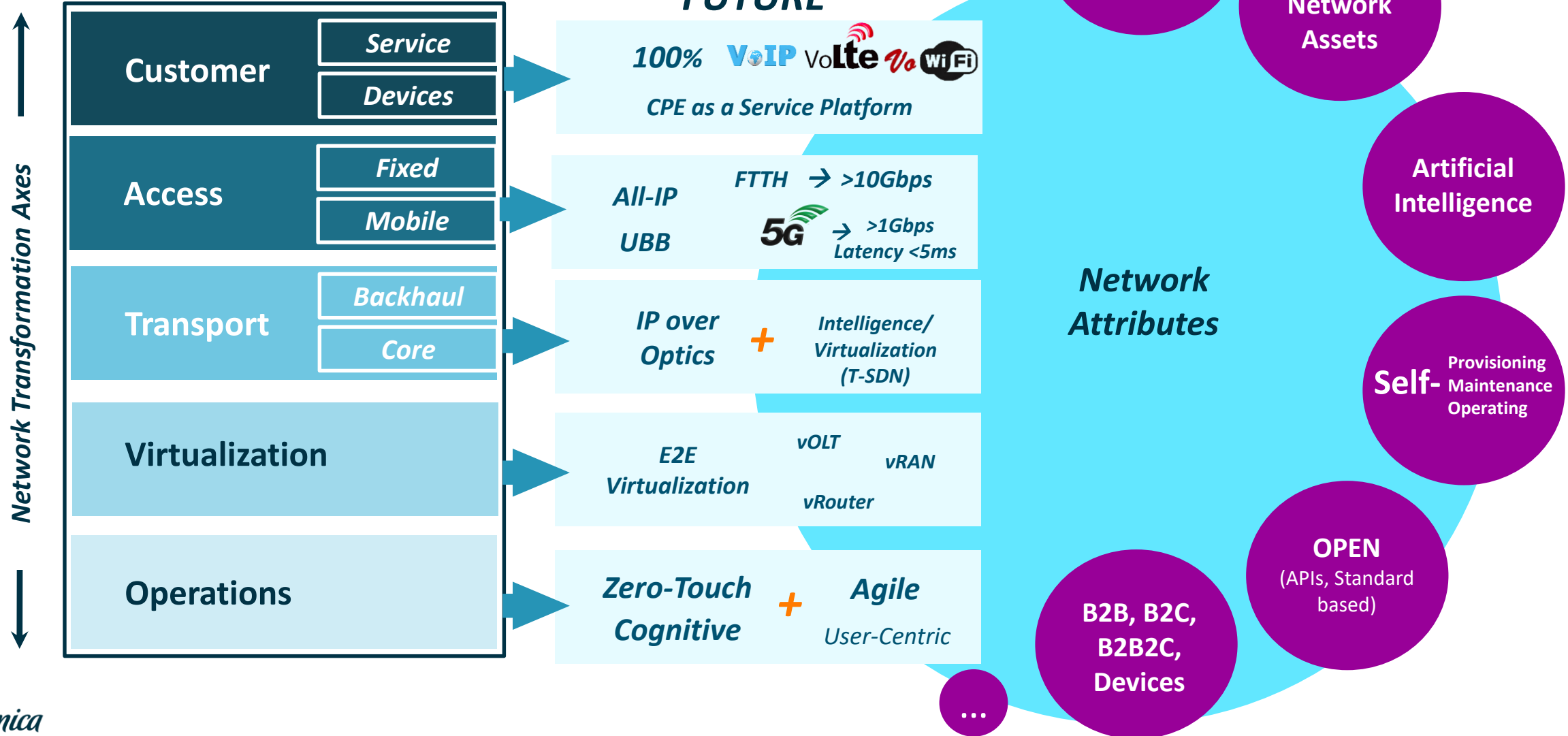


Building a global architecture and common data model to expose capabilities

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



So, which future network are we evolving towards?



Key Takeaways

Laura Abasolo
Chief Financial and Control Officer

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

Telefonica

We choose it all



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