5G TELEFONICA TRIALS AND 5G FIRST EXPERIENCES

GSMA CITEL Seminar in WRC-19 (Sharm el Sheik)

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Telefónica en cifras

movistar | O₂ | vivo

- Telefónica tiene operaciones en 14 países*

- Ofrece **servicios de telecomunicaciones y soluciones digitales en más de 170 países** mediante acuerdos estratégicos con partners.

Accesos

Desglosados por mercados

Alemania
47,6 millones

UK
33,6 millones

España
41,9 millones

México
25,1 millones

Colombia
19,3 millones

Perú
19,2 millones

Brasil
94,5 millones

Chile
10,9 millones

Argentina
23,3 millones

Hispam (norte y sur)
119,4 millones de accesos

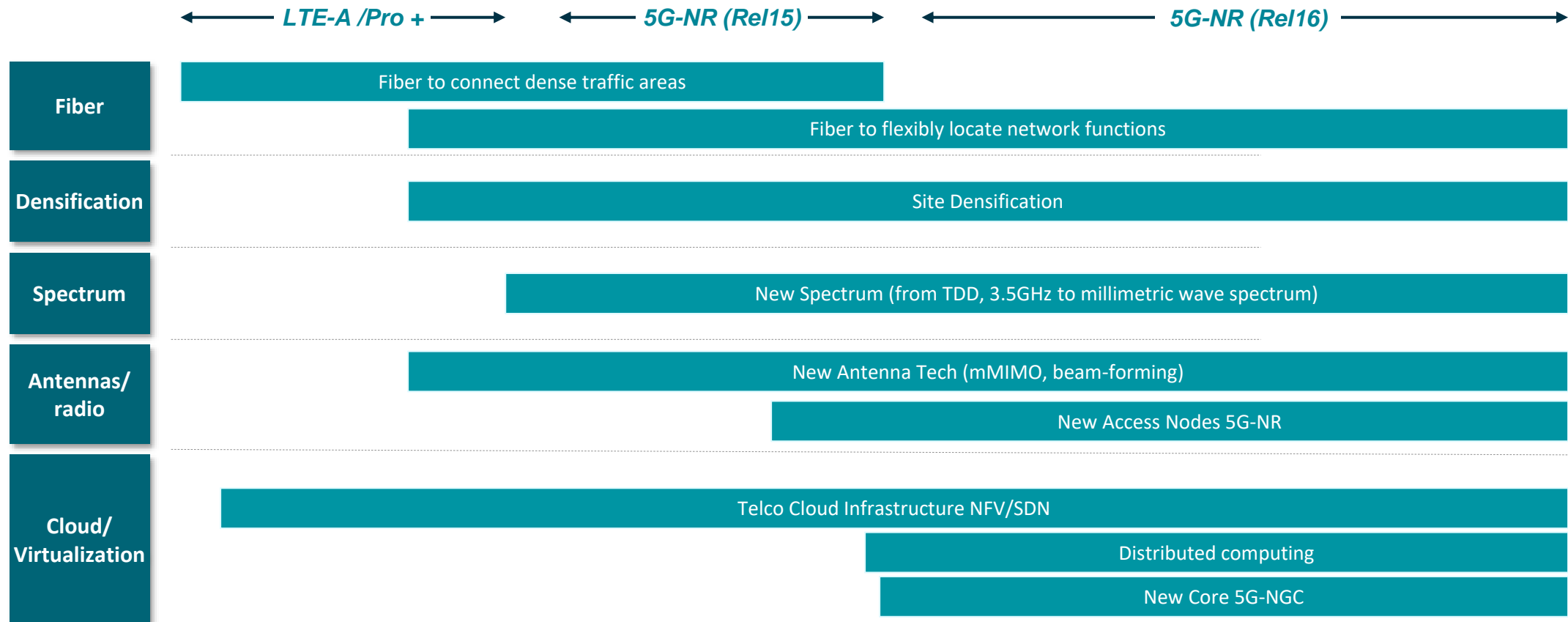**Incluye también:** Uruguay, Costa Rica, El Salvador, Panamá, Venezuela, Ecuador.

Ingresos 2018

- 2%
- 22%
- 26%
- 15%
- 14%
- 21%

- España
- Alemania
- Brasil
- UK
- Hispam
- Otros

Grupo
346,6 Millones de accesos
48.693 Millones € de ingresos

55% de los ingresos en Europa | **43%** en Latinoamérica

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Key (pre)5G technical initiatives

Telefonica is testing and preparing each stage of future 5G rollout, exhausting LTE possibilities while 5G is mature

← **LTE-A /Pro +** →   ← **5G-NR (Rel15)** →   ← **5G-NR (Rel16)** →

Fiber
- Fiber to connect dense traffic areas
- Fiber to flexibly locate network functions

Densification
- Site Densification

Spectrum
- New Spectrum (from TDD, 3.5GHz to millimetric wave spectrum)

Antennas/radio
- New Antenna Tech (mMIMO, beam-forming)
- New Access Nodes 5G-NR

Cloud/Virtualization
- Telco Cloud Infrastructure NFV/SDN
- Distributed computing
- New Core 5G-NGC

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What is Telefónica doing? 5G Tech City Segovia

Scope

- **Location**: Segovia
- **Date**: From Q1 2018
- **Objective**: Deployment on a commercial network in a medium city that provides a real environment to exploit 5G capabilities
- The plan is to deploy the 5G trial and maintain the trial infrastructure for introducing progressively 5G new capabilities

Description

- **Vendor**: Nokia
- 5G Macro cells: 3-4 5G NR nodes in 3.5 GHz band
- **Architecture**: Non Standalone (Option 3.x)

Results

- Detail performance analysis of 5G NR 3x option

Use cases

5G Inmersive Turism (Distributed Reality)

- Partners: Telefónica, Nokia and Samsung

Display of video 4K in mobility (Bus entertainment)

- Partners: Telefónica, Nokia, TELDAT v Avanza

Other Use cases

- **Connected Cars Cellular-V2X**

What is Telefónica doing? 5G Tech City Talavera

Scope

- **Location**: Talavera (Toledo)
- **Date**: From Q1 2018
- **Objective**: Deployment on a commercial network in a medium city that provides a real environment to exploit 5G capabilities
- The plan is to deploy the 5G trial and maintain the trial infrastructure for introducing progressively 5G new capabilities

Description

- **Vendor**: Ericsson
- 5G Macro cells: 3-4 5G NR nodes in 3.5 GHz band
- **Architecture**: Non Standalone (Option 3.x)

Results

- Detail performance analysis of 5G NR 3x option

Use cases

⚠️ **5G use case with autonomous driving and content consumption**

- Partners: Telefónica, Ericsson, CarMedia, and EasyMile

🔍 **Bike Blackout: VR use case of ultra low latency**

Other use cases

- **Connected Cars Cellular-V2X:** Connected car for security using V2X communication

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What is Telefónica doing? 5G Tech City Málaga

Scope

- **Location**: Málaga
- **Date**: From Q2 2018
- **Objective**: Deployment on a 5G network for introducing progressively 5G new capabilities

Description

- **Vendor**: Huawei
- 5G Macro cells (B43:3,6-3,8 GHz): 3-4 5G NR nodes in 3.5 GHz band
- **Architecture**: Non Standalone (Option 3.x)

Results

- Detail performance analysis of 5G NR 3x option

Use cases

5G international videocall with 5G in the real network

Date: Nov. 19-21, 2018

Venue: ExCeL, London

Host: HUAWEI

Co-host with: GSMA, GTI

5G based remoted assisted system for surgeries

- Quirón Salud Málaga Hospital and Telefónica present the first system of expert remote assistance to surgeries based on 5G and the integration of medical data through augmented reality
- Doctor in Málaga performed the surgeries (live, interactive digestive endoscopy interventions retransmitted through 5G) with the real-time assistance from Doctor in Japan. 5G's low latency and high video transmission performance made possible the operations.

Future Use cases

- VR Basket competition retransmission: Video 4K and 360º

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What is Telefónica doing? 5G Tech City Alcobendas

Scope

- **Location**: Alc4bendas (Madrid)
- **Date**: From Q2 2018
- **Objective**: Deployment on a 5G network for introducing progressively 5G new capabilities

Description

- **Vendor**: ZTE
- 5G Macro cells (B43:3,6-3,8 GHz): 4 5G NR nodes in 3.5 GHz band
- **Radio Solution**: Massive MIMO
- **Architecture**: Standalone (option 2)

Results

- Detail performance analysis of NSA and SA option for radio point of view

Use cases

5G technology applied to the banking sector

- Banco Santander and Telefónica have launched a joint innovation project on 5G technology applied to the banking sector
- This is the first banking offices connected by 5G technology in Europe.
- The project comprises of three use cases:
  1. **4K videoconference between two bank offices that offers**, through the 5G network, an ultra-high resolution image (4096x2160) and natural motion thanks to its 30 frames per second with zero delay.
  2. **5G storage, a low latency cloud storage** solution provided by Telefónica and based on the Hitachi Content Platform Anywhere Edge solution embedded on Telefónica's edge computing infrastructure.
  3. **Virtual visit** to co-working spaces developed in collaboration with Idronia that use **Virtual Reality, 360 video and Edge Computing technologies**. This immersive reality service allows customers to remotely visit co-working spaces such as the Santander Work Cafe located at the Santander banking office in the center of Madrid.

What is Telefonica doing? Connected Car

5GBarcelona, the 5G hub for Southern Europe

Scope

- **Location**: Barcelona
- **Date**: Demo Mobile World Congress
- **Objective**: Telefónica is upgrading its networks to 5G, so we are able to connect the city with the car.
- **Partners:** SEAT, **Telefónica**, FICOSA, ETRA, Qualcomm y 5G Barcelona

Motivation

C-V2X technology over 5G with our 5G Connected Car is the first step on the track for a completely autonomous and cooperative driving.

Use cases

- **Safety Use Cases:**
- Warning of pedestrian at crossing with low visibility
- Warning of bike in cyclist lane during turn right
- Warning of unforeseen road-objects

- **Infotainment use case:**
- Making the onboard experience even more exciting

5G is the driver for vehicle communications, providing ultra-low latencies and intelligence at the network edge, **being able to make decisions in advance in order to improve road safety**

Thanks to the big bandwith offered by 5G, the **travelling experience improves**, offering, for example, **ultra high definition video streaming**.

TEF is member of the 5GAA from 2017

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5G enables "Fixed Wireless Access" (FWA)

5G FWA-trial (12/18-02/19) from TEF DE and Samsung proves successful:

- (Wireless) Internet surfing at the "lighting speed" of up to 1 GB/s
  - Streaming films in 8K UHD
  - Typical everyday applications of the highest quality
- New customer experience was made possible thanks to a wireless connection for private households: 800 MHz @ 26 GHz (26,65 - 27,5 GHz)
- The combination of newly developed technology and special software enables high transmission speeds of several gigabits per second over the 'last mile'.

https://www.telefonica.de/fixed/news/6191/conclusion-of-three-month-pilot-in-hamburg-5-g-fixed-wireless-access-from-telefonica-deutschland-and-samsung-proves-successful.html

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5G Industrial IoT: Factory 56 Daimler

Mobile network of the future in "Factory 56" in Sindelfingen: Mercedes-Benz Cars and Telefónica Deutschland establish the world's first 5G network for automobile production

Scope

- **Location**: Sindelfingen (Germany)
- **Date**: Kick-off: April 19. Ongoing
- **Objective**: First 5G Industrial IoT
- **Partners: Telefónica**, Daimler and Ericsson

First use cases

- Autonomous Guide Vehicle
- Factory automation

First 5G indoor mobile network provides gigabit data rates with short latency times for industrial data communication and digitilised vehicle assembly in "Factory 56" at the Mercedes-Benz Sindelfingen plant

The 5G network facilitates smart production at Mercedes-Benz Cars by allowing the wireless networking of all production systems and machines, thereby setting new standards for flexibility, efficiency and Industry 4.0 in automobile production

Telecommunications company Telefónica Deutschland is setting up the 5G network, which will then be operated by Mercedes-Benz Cars

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5G launch O2 UK

Network rollout begins across the UK today in Belfast, Cardiff, Edinburgh, London, Slough and Leeds, reaching a total of 20 towns and cities in 2019

Exclusive partnership with MelodyVR and Oculus from Facebook gives music fans intimate access to gigs and musicians through cutting edge Virtual Reality

The network will be live in a total of 20 towns and cities by the end of the year, and 50 by summer 2020

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