

PRESS RELEASE

Nokia and Telefónica to define 5G network evolution with agreement to evaluate 4.5G Pro and 4.9G technologies

- Evaluation of technologies to provide the most effective path to 5G and enable Telefónica to create and deliver new services
- Trials of Nokia 4.5G, 4.5G Pro and 4.9G will help efficiently evolve network performance to meet increasing demand
- Focus on innovations including massive MIMO, Cloud RAN, Multi-access Edge Computing and network slicing

Madrid/Espoo, Finland, September 13, 2017 – Nokia and Telefónica have signed an agreement to evaluate technologies enabling an efficient network evolution to 5G in line with Telefónica's business objectives. The companies will assess how higher performance 4G and 5G networks will lead to the creation of compelling new services.

Nokia has created a path to 5G for operators such as Telefónica using its 4.5G, 4.5G Pro and 4.9G technologies, which deliver advances such as increased speed, capacity and improved latency where and when needed. Under the agreement, Nokia will focus on trials that maximize the use of Telefónica's existing network assets, ultimately helping it meet the growing and evolving demands of individual subscribers and the internet of things (IoT).

Leveraging licensed and unlicensed spectrum as well as Nokia massive MIMO capabilities, the companies will conduct trials to increase capacity in busy city center hot spots as well as in suburban and rural areas, particularly in markets where traditional LTE spectrum is limited. Other trials will use Nokia Multi-access Edge Computing (MEC) for the delivery of ultra-low latency communications. MEC allows data to be processed closer to the end-user to enable the faster network response time required by critical machine-to-machine type communications in enterprises such as factories and mines, and to deliver an immersive virtual reality video experience in stadiums.

Nokia and Telefónica will also investigate network-slicing techniques on a cloud-native core network using Telefónica's UNICA cloud platform. This will allow Telefónica to leverage a common network infrastructure to deliver discrete services to a variety of new and existing customers. Telefónica established the UNICA program with the aim of using network functions virtualization and software defined networking to transform the way it delivers customer services, meeting new customer demands rapidly and in the most efficient way.

Enrique Blanco, Systems and Network Global Director at Telefónica said: "As demand rises, we want to deliver the greatest possible network experience even as we expand our offering to both existing and new customers. Working with Nokia we will explore the potential of key technologies that allow us to do this in the most effective way on the path to 5G."

Pedro Hernández, Vice President of Telefónica Global Business at Nokia, said: "Nokia has defined a comprehensive portfolio of technologies and services that will allow any operator to move to the cloud and 5G at a pace that meets their objectives and the demands of their customers. We are pleased to leverage these technologies and expertise to help Telefónica transform its network and evolve its service offer to anticipate and satisfy changing market demands."

About Telefónica

Telefónica is one of the largest telecommunications companies in the world by market capitalization and number of customers with a comprehensive offering and quality of connectivity that is delivered over world class fixed, mobile and broadband networks. As a growing company it prides itself on providing a differential experience based both on its corporate values and a public position that defends customer interests.

The company has a significant presence in 21 countries and 346 million accesses around the world. Telefónica has a strong presence in Spain, Europe and Latin America, where the company focuses an important part of its growth strategy.

Telefónica is a 100% listed company, with more than 1.5 million direct shareholders. Its share capital currently comprises 5,037,804,990 ordinary shares traded on the Spanish Stock Market and on those in London, New York, Lima, and Buenos Aires.

About Nokia

We create the technology to connect the world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers, governments, large enterprises and consumers, with the industry's most complete, end-to-end portfolio of products, services and licensing.

From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in virtual reality and digital health, we are shaping the future of technology to transform the human experience. www.nokia.com

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