

## 5G: A multi-service network

In addition to higher throughput than previous generations of mobile networks, 5G offers smarter, more powerful, and more energy-efficient connectivity. For the general public, 5G offers smoother access to services when on the move and richer, more immersive experiences. For companies, 5G streamlines industrial processes and improves their way of working. Services in smart cities including the management of water, energy, waste and transport for example will also be redesigned with 5G.

### Orange's ambitions for 5G:

Thanks to its network expertise, research and innovation capacity, ecosystem and international presence, Orange is a leading European operator in 4G and the leading FTTH operator in Europe. With 5G and in addition to existing networks, Orange aims to maintain its leadership position and provide new services adapted to its customers' changing usage patterns.

In the long term, 5G will offer speeds up to 10 times faster than 4G. For instance, it will be possible to download a 4 GB HD film in between 2 and 3 minutes in 5G (estimated value according to average download time) instead of 13 minutes in 4G.

### Orange is considering the development of 5G in three key areas:

#### 1. Improving mobile broadband for new immersive experiences

5G is gradually being deployed on existing 4G sites, which will allow much higher throughput than 4G from the outset. It will enable 360° immersive experiences (which combine augmented reality with virtual reality) and will be accessible for everyday communication, education, entertainment and work. It will also significantly boost the performance of cloud services.

#### 2. New applications to support the transformation of businesses and society and leverage real-time usage

Companies will be able to exploit data when it is produced, which will make them more agile, more in tune with their customers' needs, and more responsive in their markets. This will be made possible with 5G, the Internet of Things, edge computing and artificial intelligence.

A new world of opportunities will open for different business sectors, such as industrial, health, media, transportation and smart cities. Examples include:

- Transmitting critical data in near real-time to patients that are hospitalised, or at home, or for remote surgical procedures.
- Developing new capabilities in hospitals, but also in factories, to massively connect objects, collect data, and analyse it in an increasingly relevant way using Artificial Intelligence. In industries, for example, data from valve remote controls or probe readings will be leveraged in real time.
- Operating industrial robots and making them co-operate with each other to improve the productivity of production sites or to automate the monitoring of buildings.
- Experiencing events in a fully immersive way, from the pitch or the stadium stands, thanks to this very high-speed connectivity that enables real-time data transmission, virtual reality video streaming and differentiated live audio streams, allowing users to choose what they want to listen to.
- Enabling further developments in the field of mobility: first and foremost, the fluidity and autonomous capability of transport. Offering appropriate service capabilities for the various connected vehicles (cars, trucks, shuttles or trains) by dynamically adapting to the various requirements of road safety, software downloads, information uploads or vehicle-to-vehicle communications.

For Private Mobile Radio (PMR) used for critical communications in industrial environments, airports and Smart Cities, 5G will provide the high availability and security expected to enable the use of IoT in near real-time, as well as group video communications and business applications. 5G will be key to the digital transformation of activities related to population safety and critical industrial processes.

From 2023, when new 5G core networks will be deployed, 5G networks will be able to offer low latency and enable network slicing, which prioritises certain 'slices' of the network to cover critical uses or specific needs.

In an forthcoming update to the 5G standard, 5G will enable the connection of millions of sensors and objects across the same area and improve their battery life.

### **3. An alternative solution for fixed broadband access in countries where fibre infrastructure is not widely deployed**

5G will use new frequency bands with capabilities similar to those of fibre optics. With 5G, people living in countries or territories where fibre cannot be deployed will benefit from broadband at home. This technology will enable businesses and players in smart cities to wirelessly connect factories and urban infrastructures. It will also provide an easy-to-activate solution to connect pop-up stores or mobile construction sites, in the event of an outage of the company's main network, or for tele-medicine.

#### **Main achievements**

Since 2012, Orange has actively contributed to **research activities** as part of the **5G PPP European Public Private Partnership** and in collaboration with the ANR (*Agence nationale de la recherche française* - the French National Research Agency).

Orange is also heavily involved in the standardisation of 5G through **3GPP**, the global mobile standardisation body, to which it is the third-largest contributing operator.

In addition to research and standardisation, **several major European initiatives have been carried out with technological and innovation partners to prepare for the arrival of 5G:**

- In January 2017, Orange joined forces with Nokia to test the different uses of 5G for businesses on their co-innovation platform (located at Nokia's site in Saclay, in the French department of Essonne).
- In February 2017, Orange announced a partnership with UTAC CERAM, the world leader in vehicle testing and certification, including autonomous vehicles, to provide 4G/5G connectivity on the Linas-Montlhéry site. Orange, together with Ericsson, has rolled out 4G public connectivity on the test track and provided experimental private 4G/5G connectivity to test the 5G functionalities necessary to autonomous vehicles. Field experiments began in 2019.
- Orange sees 5G as a supplementary technology to fibre to bring broadband to more remote or less accessible territories that cannot have fibre. Orange conducted real-world testing in Romania, in partnership with Samsung and Cisco, between June and mid-July 2018.
- In France, Orange has deployed experimental 5G networks in Lille and Douai, using Ericsson's equipment, and in Marseille using Nokia's equipment, for end-to-end technical testing.
- In April 2019, Orange made the first fully 5G data call in Valencia, Spain, using 5G Standalone (5G SA) technology.

Orange has also launched several initiatives as part of an **open innovation approach**, including:

- The opening of a 5G Co-Innovation Lab on the Orange Gardens site in Châtillon, near Paris, at the end of 2018. Partners can test their solutions with 5G network coverage.
- The possibility for start-ups selected as part of challenges or the Orange Fab acceleration programme to receive the support of experts and to test their offerings and services on Orange's 5G network.

- The *Concours Jeunes Talents* (Young Talent Contest) for students, challenging them on the invention of new uses that could emerge with the 5G network.
- The launch of two open 5G experimentation platforms in France, in the 26 GHz band, to test uses requiring ultra-high speed in areas with very high traffic (stations, airports, stadiums, concert venues, for example).

Orange also wants **to develop future uses of 5G with businesses in Europe**. Several co-innovation projects with leading French companies have been announced, including:

- LACROIX Group, on the electronics factory of the future and the optimisation of the production line thanks to automated guided vehicles (AGVs) and other autonomous vehicles connected to 5G.
- Schneider Electric, on the indoor 5G coverage of their industrial campus and the testing of 5G-connected augmented reality solutions for real-time maintenance operations.
- SNCF (the French state-owned railway company) and Nokia, on new, in-station services, such as a rapid download of high-definition video content testing in Rennes.
- The Olympique de Marseille football club, to anticipate and respond to the needs and future 5G uses of spectators and businesses in the Orange Vélodrome.

In Belgium, Orange announced the opening of an Industry 4.0 Innovation Campus in December 2019. This uses a fully 5G standalone test network deployed in the port of Antwerp.

- In January 2020, the Port of Antwerp, the chemical company Borealis and the high-tech polymer manufacturer Covestro announced their willingness to jointly test solutions to optimise the ship towing process and to increase the safety of operators in the field.

### Orange's roadmap for 5G

Orange has been conducting 5G tests with users in a dozen pilot cities in Europe since September 2019.

On 5<sup>th</sup> November 2019, Orange Romania was the first Orange Group country to open a 5G commercial network in three of Romania's largest cities: Bucharest, Cluj-Napoca and Iași. The 5G network will be extended to other cities throughout 2020 and in subsequent years.

In 2020, Orange is planning to commercially launch 5G in the majority of its European countries, based on availability of frequencies and usage trends.

### Recent news:

**22 January 2020:** Orange Industry 4.0 Campus welcomes co-innovation of Port of Antwerp, Borealis, Covestro and other industrial partners, maximizing 5G potential in the port of Antwerp

**12 December 2019:** Orange Belgium is the first to launch a 5G testing hub for business in Belgium: the Orange Industry 4.0 Campus in the port of Antwerp

**11 December 2019:** Orange Luxembourg in the starting blocks for the launch of 5G (in French)

**5 December 2019:** Orange presents its new strategic plan Engage 2025

**21 November 2019:** Orange launches industry's first 'own-branded' 5G smartphone in Europe — the Orange Neva Jet

**24 October 2019:** Orange Poland launches 5G tests in Lublin. Ten base stations have been deployed in the city in collaboration with Nokia (in Polish)

**7 November 2019:** The Orange Vélodrome enriches its connectivity with an experimental 5G antenna (in French)

**5 November 2019:** Orange's first commercial 5G network launched in Romania

**17 September 2019:** Orange launches two open 5G experimentation platforms in the 26 GHz band

**17 September 2019:** Launch of the Young Talent Contest "invent the future with 5G" (in French)

**10 September 2019:** Orange Poland and Ericsson launch a 5G test network in Warsaw. It offers a download speed of close to 900 Mbps (in Polish)

**18 April 2019:** Orange is bringing together French companies to test and develop 5G uses