# LTE-Advanced Pro and its evolutions



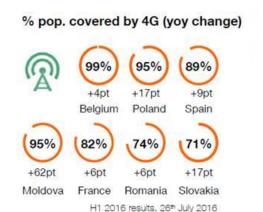


## **Orange mobile services today**

Mobile networks in 29 countries
188 millions customers worldwide
108 millions in MEA

4G/LTE services in 16 countries
23 millions 4G customers in Europe

>95% 4G coverage across European footprint planned in 2018





IoT radio under deployment in France

## Orange LTE networks main technical features

Commercially deployed

- 2Tx/2Rx MIMO
- 2DL carrier aggregation
- Volte
- BBU-RRH deployment

**Under testing/study** 

- 3/4DL carrier aggregation
- 4x4 MIMO
- 256 QAM
- Licensed Assisted Access
- LTE cat. 1 UE
- 4G RAN virtualisation

MBB experience enhancements / Gbps peak rates

complement to licensed spectrum?

**IoT** 

flexibility, efficiency

#### **Drivers for LTE-Advanced Pro**

Mobile broadband customer experience

- higher data rates
- higher capacity
- higher cell-edge throughput
- reduced latency

Diversification to support new connectivity needs

- Internet of Things
- Professional Mobile Radio, including Public Safety
- Vehicle-to-X (V2X) Commun.

Main Rel-13/14 LTE-A Pro enablers

Extended CA

Adv. Rx, MUST E-BF, FD-MIMO

LAA

**Shorter TTI** 

Cat. M1

D<sub>2</sub>D

V2X

Bridging the gap with the coming 5G

#### Future of LTE-Advanced Pro vs. 5G

#### The future of LTE-Advanced Pro is 5G

But at least in the early years of 5G, LTE-A evolutions are expected to be needed because existing LTE spectrum will be maintained

- to serve LTE-only devices
- to support specialized services launched before 5G (e.g. IoT, some PMR services, V2V?)

So enhancements compatible with legacy devices are expected to be needed

- to maximise 5G QoE (5G devices will operate on LTE and 5G new radio)
- to support capacity needs
- to support evolutions of specialized services on LTE spectrum

### Possible LTE-A evolutions beyond Rel-14

# Mobile broadband

Enhancements towards more capacity, higher experienced data rates, more consistent user experience

# Verticals support

Enhancements towards increased reliability and further reduced latency

#### How?

- Application of generic and compatible 5G features
- Exploitation of centralized RAN virtualization, e.g. for interference mitigation
- Prioritize software upgrades of pure LTE equipments, as large investments will likely be on 5G infrastructure

# Thank you

