the next technology business driver

orange™

Mobile Market trends

Mobile industry set to reach major milestones to 2025

4G will become the leading mobile network technology in 2019

Internet of Things, 25 billion connection by 2025

Innovation, fast-evolving ecosystem of the digital edge

Artificial intelligence as next frontier

orange™

*GSMA

Global Market overview

Unique mobile subscribers

2017
5.0bn

66% PENETRATION RATE 71%
(% of population)

2025
5.9bn

2.1%
YoY 2017 -2025

Mobile Internes users

2017
3.3bn

43% PENETRATION RATE 61%
(% of population)

2025
5.0bn

5.3%
YoY 2017 -2025

SIM connections

2017
7.8bn

103% PENETRATION RATE 110%
(% of population)

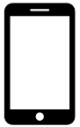
2025
9.0bn

5.3%
YoY 2017 -2025

*GSMA

Global Market overview

Smartphones
% of connections



2017
57%

2025
77%

Internet of Things

2025
25.1bn

Mobile Operator revenues

2017
1.05tn$

2025
1.10tn$

Mobile industry contribution to GDP

2017
3.6tn$

4.5%

2022
4.6tn$

Employment jobs

2017
29m

*GSMA

Mobile technology timelines

The next revolution is here

1980s
1G

mobile voice

1990s
2G

mobile coverage
voice plans

2000s
3G

smartphone adoption
data usage
segmented data plans

2010s
4G

unlimited voice / SMS
the smartphone is king
same network for all
multi SIM
multi screen
family offers
convergent bundles
Wi-Fi for intensive use

2020s
5G

Connectivity
Internet of Things

Business Models
Agility

Technology
Programmability

5G vision & mission

“5G is an end-to-end ecosystem to enable a fully mobile and connected society. It empowers value creation towards customers and partners through existing and emerging use cases, delivered with consistent experience, and enabled by sustainable business models.” *

5G is intended to deliver solutions, architectures and techs for the next coming decades with huge potential to revive existing verticals and create new markets such as Smart Cities, e-Health, Intelligent Transport, Education, Agriculture, Media and Entertainment.

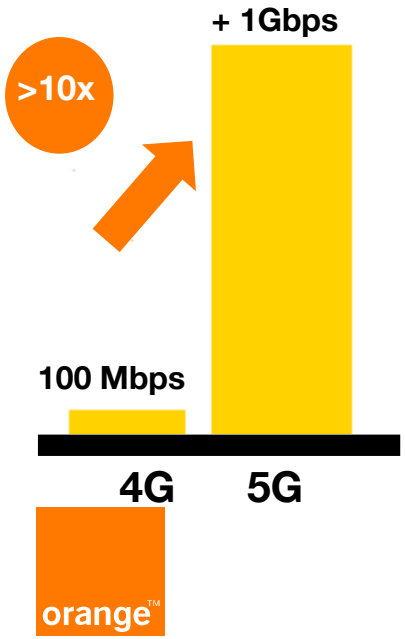
orange™

*NGMN

5G promises: faster, higher

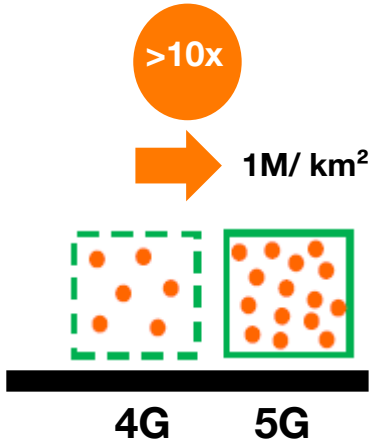
Faster data rate

5G wireless speeds compared with fiber



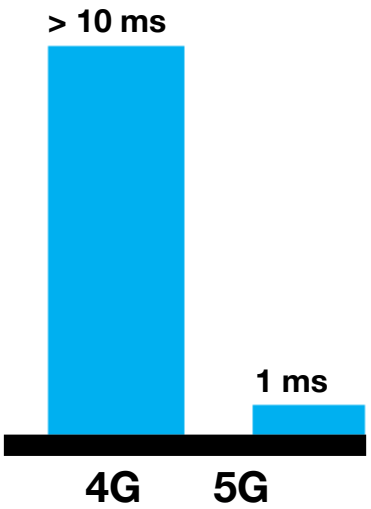
Higher device density

IOT enabler



Reduced latency

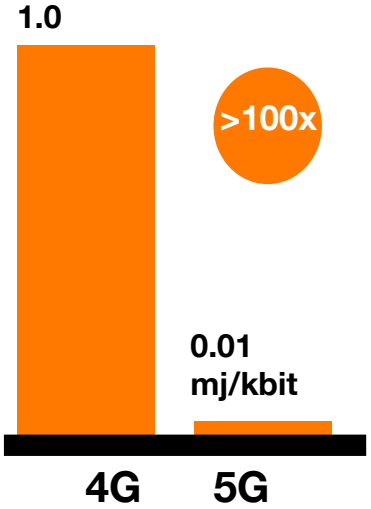
Real-time application



Lower Energy

Network Efficiency

Network slicing



*www.bain.com

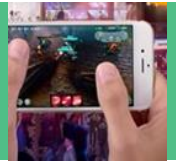
5G new services panel

- High Reliability
- High Capacity
- High Speed
- Low Latency
- Massive Connectivity

Broadband Access in Dense Areas
service availability in densely-populated areas

Higher User Mobility
services at speeds greater than 500km/h

Broadband Access Everywhere
50+ Mbps everywhere at ultra-low cost



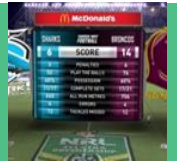
Ultra-reliable Communications
robots control
e-Health

Lifeline Communications
natural disasters

Massive Internet of Things
low-cost / long-range / low-power

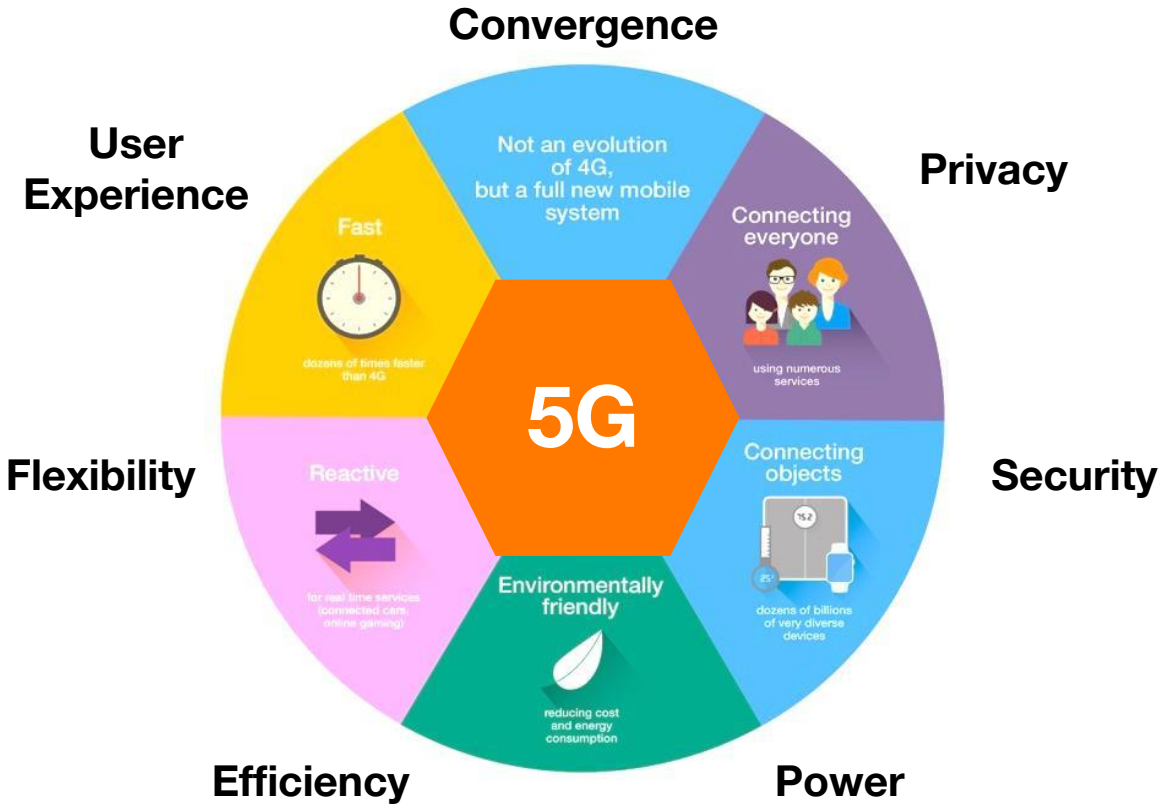
Extreme Real-Time Communications
autonomous driving & AI

Broadcast-like Services
8K & mobile TV
AR / VR

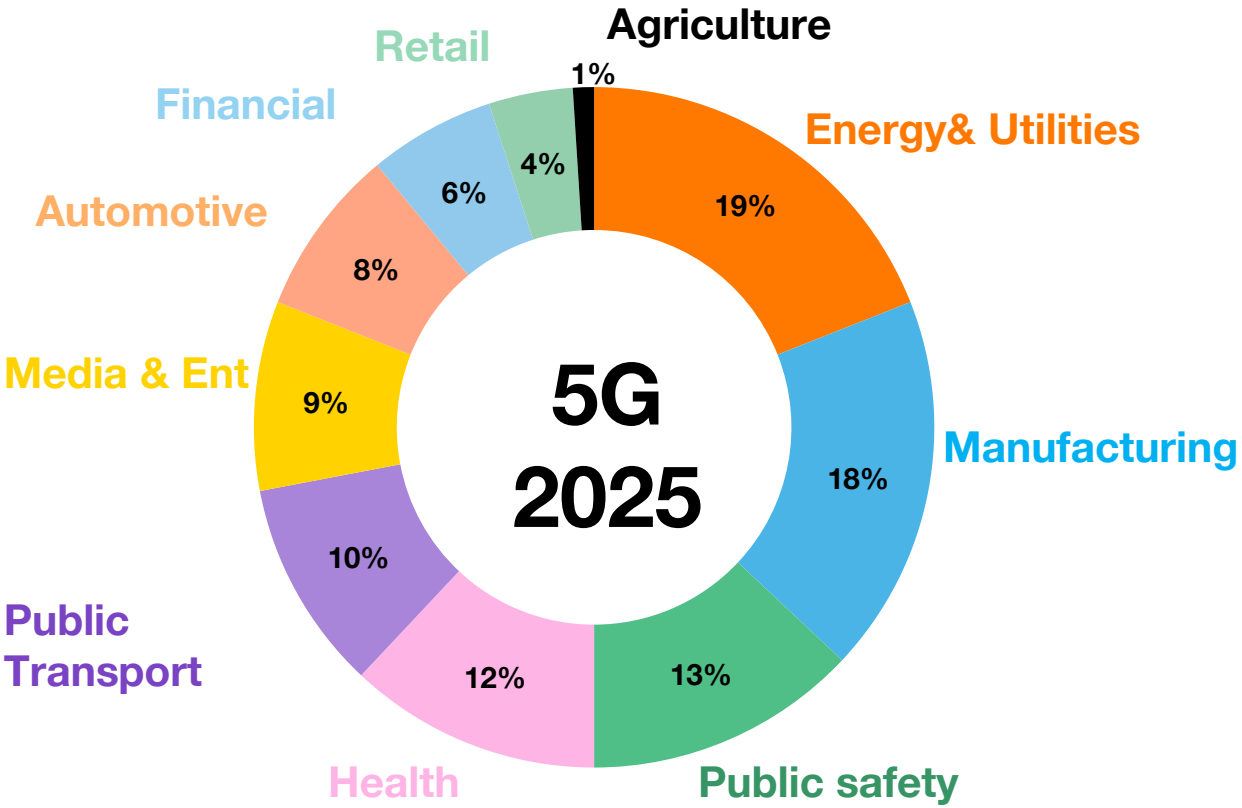


orange™

5G key features



5G B2B opportunities



5G technical principles

Radio | Network | Operation | Cloud Apps

1 **eMBB** (High to Very High Broadband Mobile Access)

2 **FWA** (Fixed Wireless Access)

3 Specialized Services

URLLC (Ultra Reliable, Low Latency Communications)

Massive IoT (Low Power, Long Range / M2M Communications)

Standards | Devices | Spectrum

Efficiency: Power, Latency, Resiliency, Secured ICT, Costs

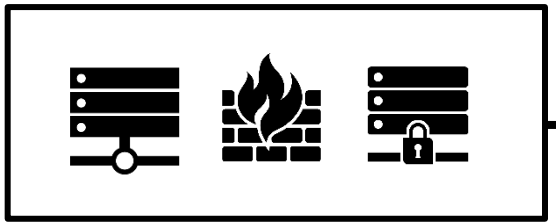
orange™

Future network transformation

From dedicated network functions

to Software network functions

service configuration



Virtualization

SDN

Automation

Business Model	Online Self Services Real time customer journey Transformation through automation
Network	Fast deployment Reduce Time-to-Market Savings-> reducing costs of operations

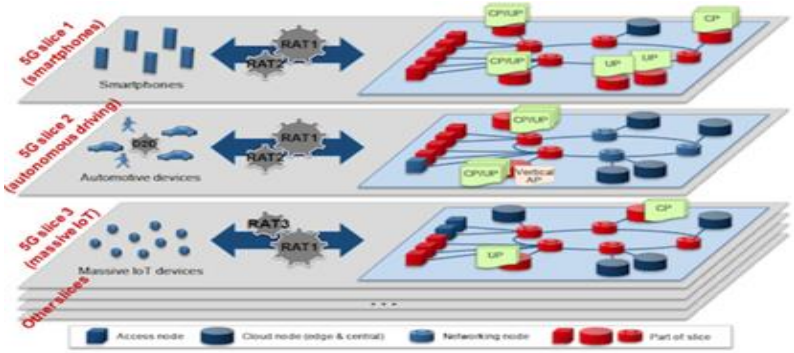
ITN
Virtualization
&
Automation

orange™

5G network slicing

Economic context for deploying

- One big network for all services types
- Separate dedicated core networks per service type
- Network slice per service type (Service n slice)



Slicing motivation

Less Opex

Increase revenue

Benefits Services

orange™

5G security threats & mitigation

Devices	Radio network	Core Network	External
Malware	MEC Vulnerability	Malicious Apps	API vulnerabilities
DDoS Attacks	Rogue nodes	CP & UP Sniffing	App vulnerabilities
Firmware Hacks	Jamming	API vulnerabilities	IoT Apps
Device Tampering	MitM attacks	Slice&Virtualization	
MitM attacks		DDoS attacks	

Identity | Authentication | Confidentiality | Integrity | Availability | Privacy

orange™

Infrastructure | Users | Network | Application

5G Intelligent Connectivity

Fusion of 5G, AI and IoT

Smart Platforms with AI

5G Network

IoT – Everything Connected

Smarter and productive

Applicability

Entertainment - Gaming

Autonomous Transportation

Enhanced Public Services

Industry

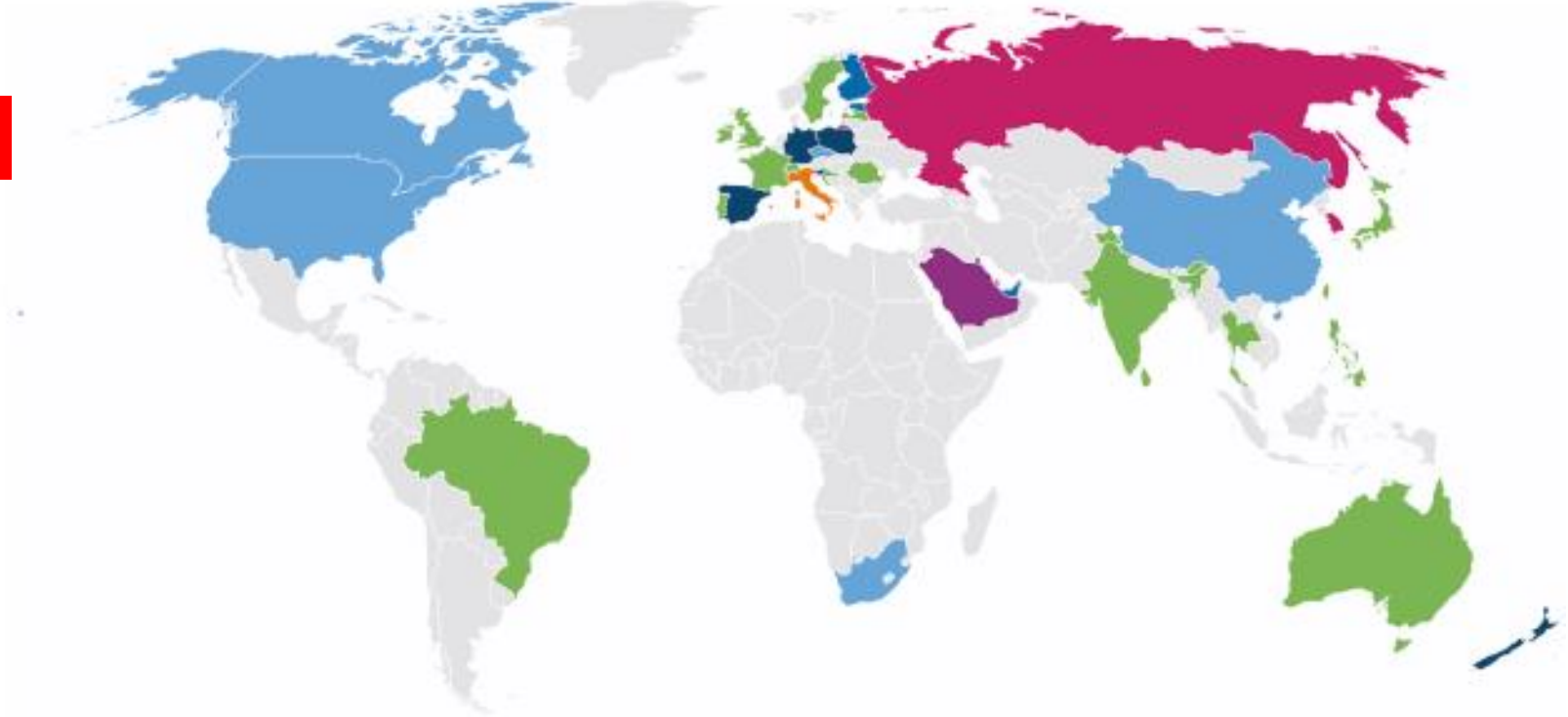
Sustainability

Connectivity

5G worldwide deployments plans

2025

14%
of connections

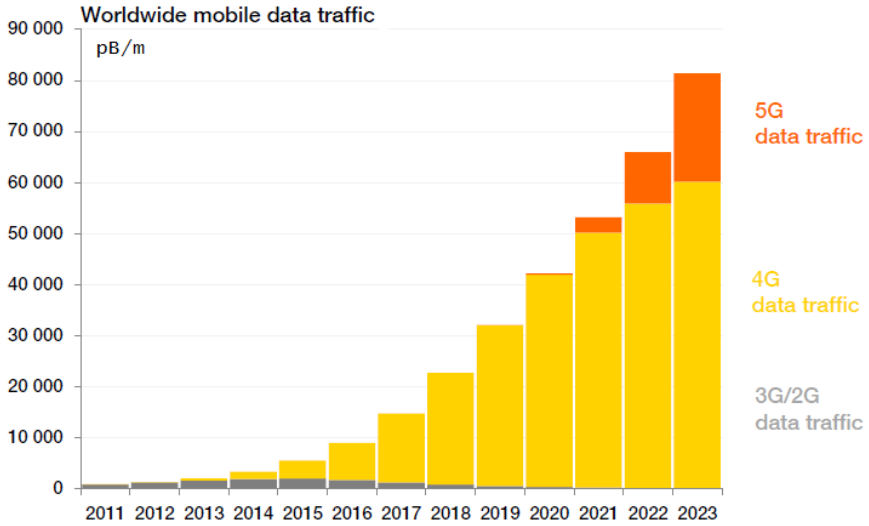


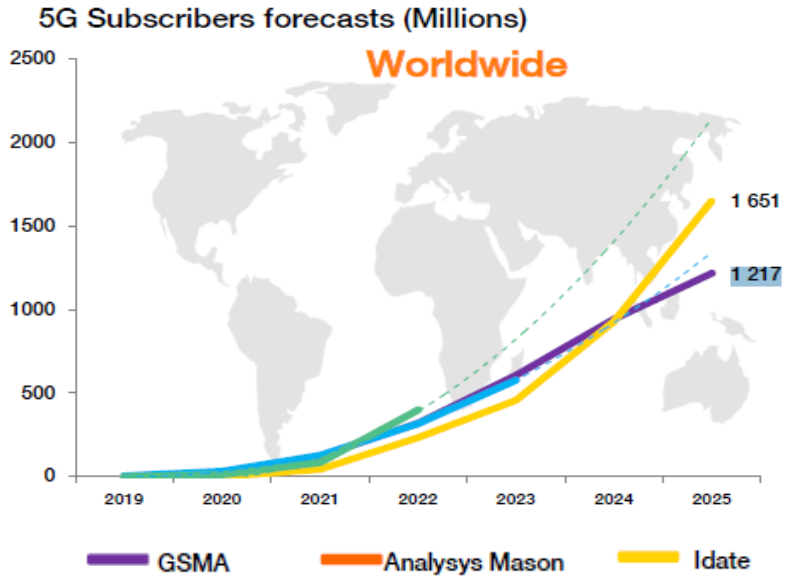
Expected 2020
Expected 2019
Expected 2021
Event services

orange™

*https://uk5g.org GSA Report August 2018

5G worldwide data traffic in 2023



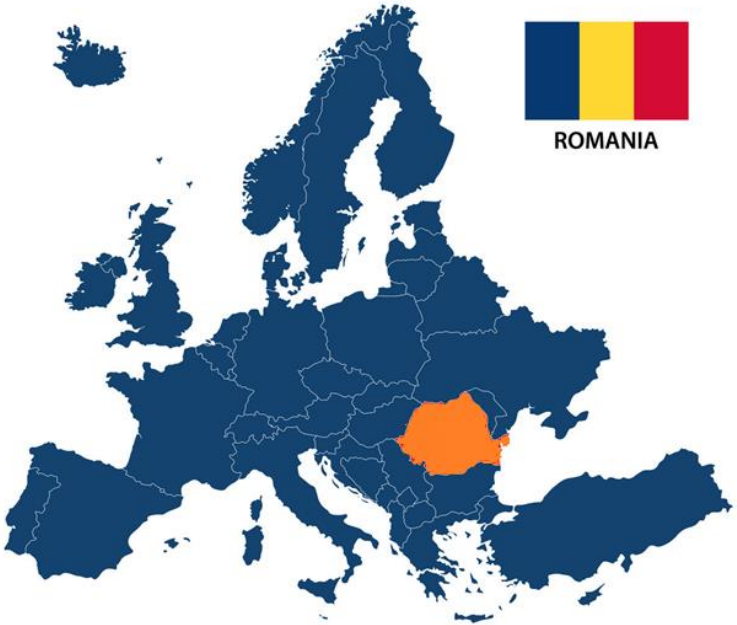


*Analysys Mason – Mars 2018

www.cisco.com

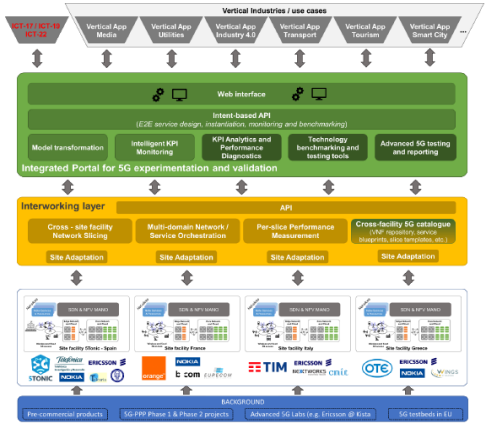
ORANGE 5G R&D Activities

5G-PPP Activities



5G-EVE

5G European Validation platform for Extensive trials



5G-EVE creates the foundations for a pervasive roll-out of end-to-end 5G networks in Europe by offering to vertical industries and to all 5GPPP Phase3 projects facilities to validate their network KPIs and their services.

H2020 grant no. 815074, 28 partners from 7 countries, 16 mEuro budget (240kE ORO), 36 months

https://www.5g-eve.eu

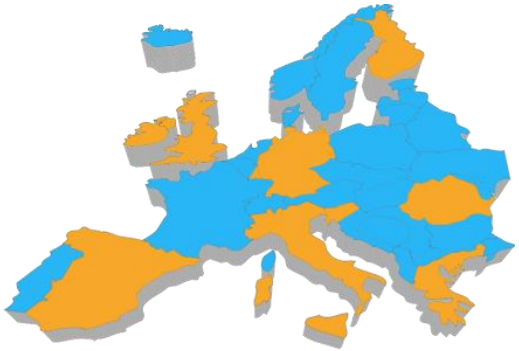
orange™

5G EVE

5G PPP
PUBLIC-PRIVATE PARTNERSHIP

MATILDA

A holistic, innovative framework for the design, development and orchestration of 5G-ready applications and network services over sliced programmable infrastructure



The vision of MATILDA is to design and implement a holistic 5G end-to-end services operational framework tackling the lifecycle of design, development and orchestration of 5G-ready applications and 5G network services over programmable infrastructure, following a unified programmability model and a set of control abstractions.

H2020 grant no. 761898, 18 partners from 11 countries, 6.6 mEuro budget (383kE ORO), 30 months

http://www.matilda-5g.eu

orange™

MATILDA

5G PPP
PUBLIC-PRIVATE PARTNERSHIP

SLICENET

End-to-End Cognitive Network Slicing and Slice Management Framework in Virtualized Multi-Domain, Multi-Tenant 5G Networks

Design, prototype and demonstrate an innovative, verticals-oriented, QoE-driven 5G network slicing framework focusing on cognitive network management and control for end-to-end slicing operation and slice-based/enabled services across multiple operator domains in SDN/NFV-enabled 5G networks.

H2020 grant no. 761913, 15 partners from 11 countries, 8 mEuro budget (660kE ORO), 36 months

https://slicenet.eu

orange™

SLICENET

5G PPP
PUBLIC-PRIVATE PARTNERSHIP

Orange FAB Romania

to make
technology available to everyone and
innovation enables us to do this

Program tracks

- **Smart Territories**
- **Future of life**
- **Networks of the Future**
- **Security**

Community outreach efforts

15 one-to-one sessions with 70 startups in Bucharest, Cluj, Iasi and Piatra Neamt

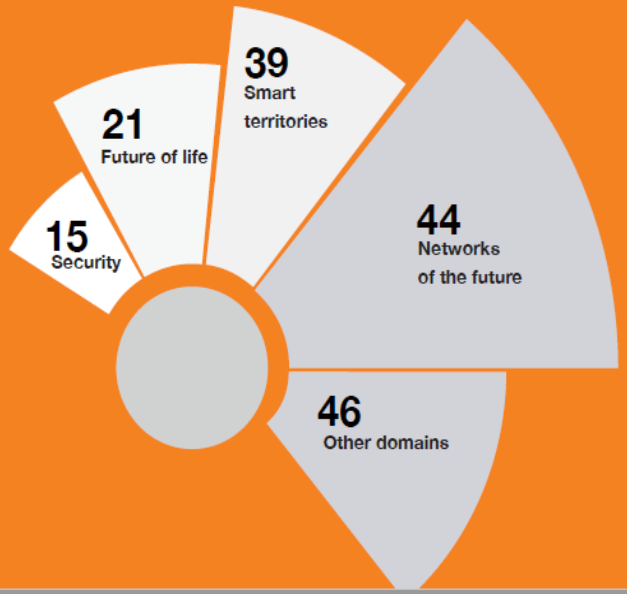
Breakfast events with startups and managers from Orange

Demo Nights with a total of 30 startups pitching

visibility and support in approximately **300 community meetups** all over the country

Over the past year, we have evaluated and discussed with **156 startups** in various domains. Here is distribution following the tracks of the Orange Fab program.

Out of these we have further selected the 10 best startups that we are currently working with.



5G key messages

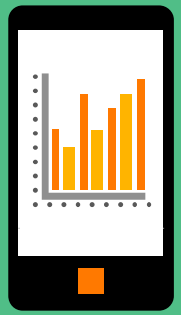
5G

major challenge for future

smart and ultra connected

new business opportunities

development of smartphones and apps



2025

anticipation

Internet users

mobile data traffic

connected things

5G Innovation

features, progressively rolled out

performance

technology valorization

Thank you