



**POLITECNICO**  
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# Challenges and Opportunities of 5G for Europe

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# Why is 5G different from previous generations?

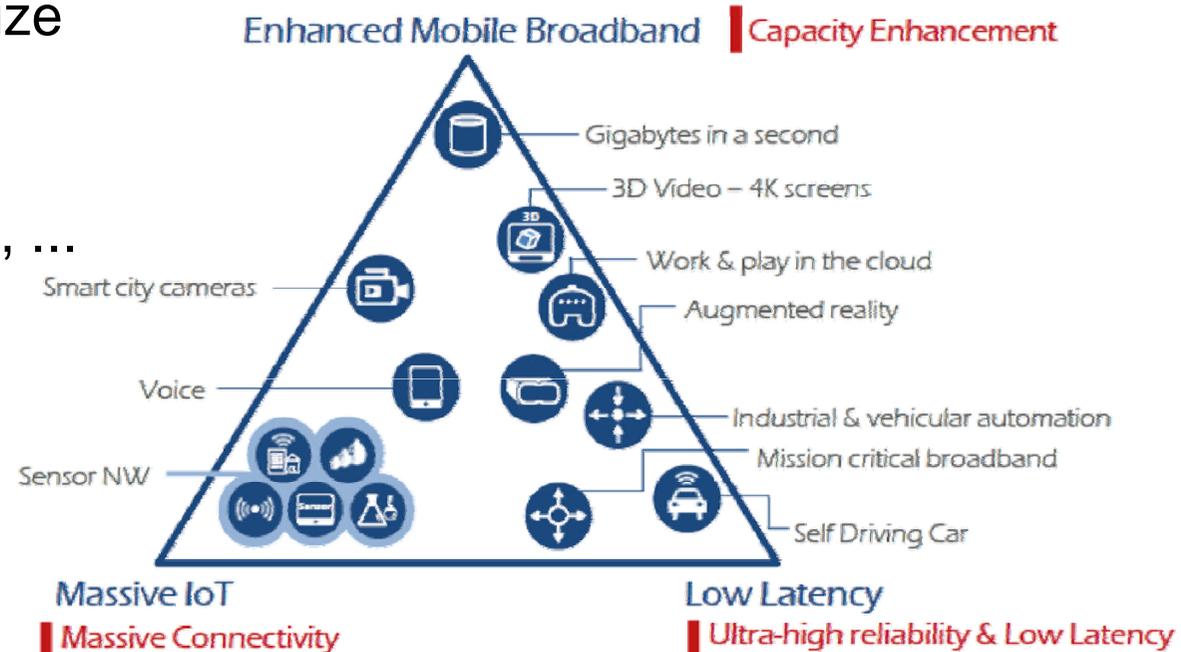


# Why is 5G different from previous generations?

- For the first time 5G allows to optimize not only rate **performance**
- but also: **energy consumption, reliability, delay, number of users, ...**

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5G is able to manage **multiple working conditions** and to serve an **unprecedented number of applications**

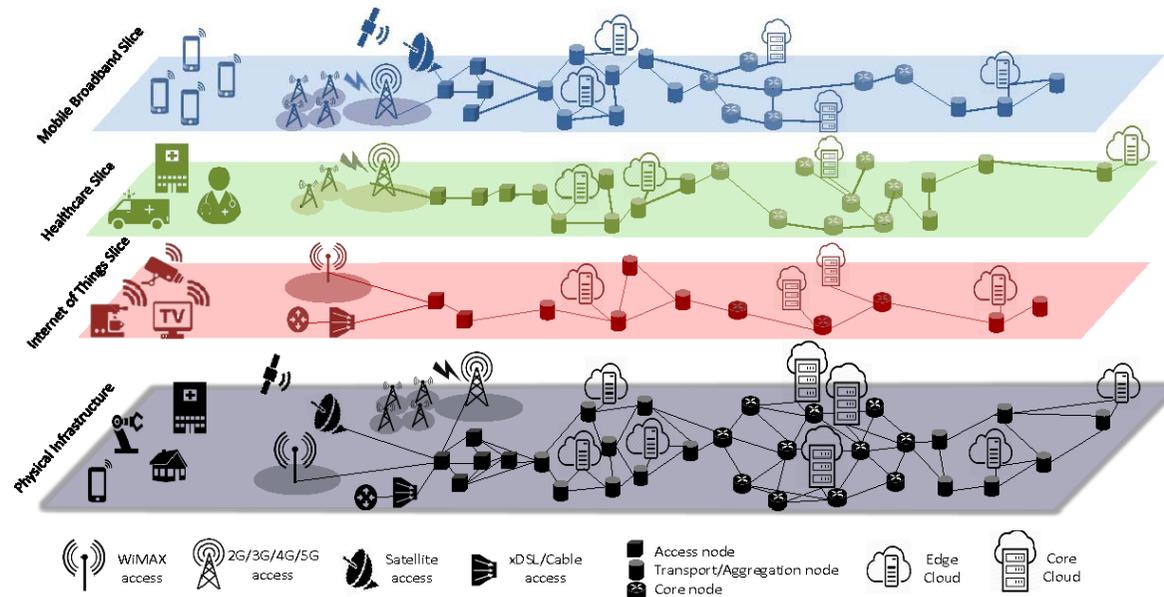


Source ETRI graphic from ITU-R IMT 2020 requirements

# Why is 5G different from previous generations?

- **Virtualization** technologies allow the creation of a number of somewhat separated virtual networks
- Specialized chains of **service functions** can be activated depending on applications

2 5G network can be **sliced** into specialized virtual networks that can be managed by **new players**

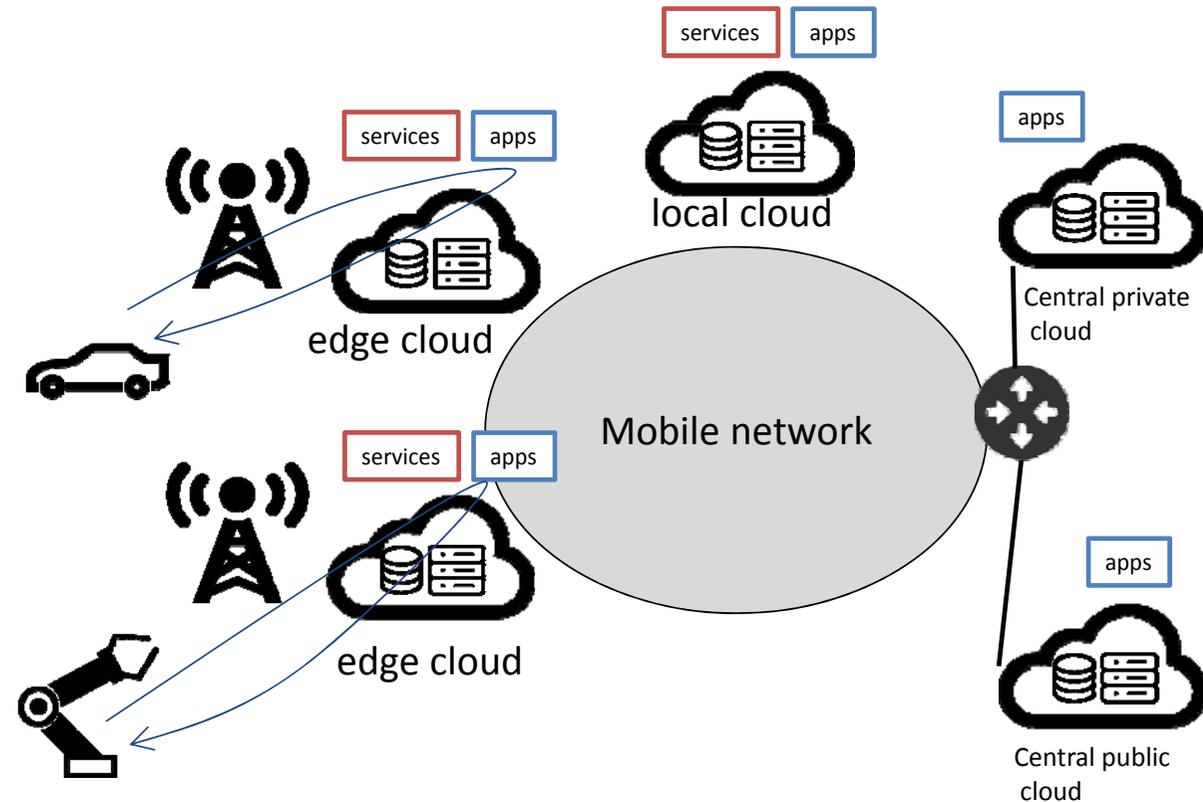


Source: IEEE Communications Magazine, vol. 55, issue 5

# Why is 5G different from previous generations?

- **Mobile Edge Cloud** adds computing capacity in the access network
- The network does not only provide pipes for bits, but **platforms** for hosting applications and providing services

**3** 5G transforms the network into a **programmable** platform available for **user applications**



**Why taking the opportunities 5G offers is crucial for economy?**



# What opportunities for Economy?

- Advanced connectivity is the key element for a full **digital transformation** that was missing so far
- Upcoming 5G applications are now being designed to serve a wide and unprecedented range of sectors, including **manufactory, services, logistics, health, education, entertainment**, etc.
- 5G provides a body to the brain of **artificial intelligence**

Digital transformation

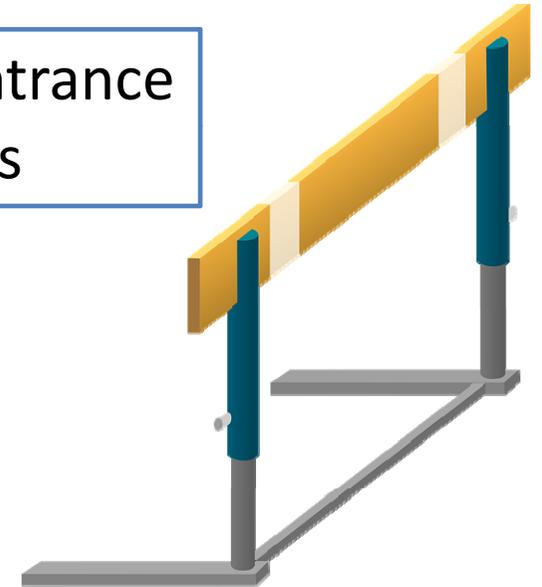


Taking or not full advantage of the opportunities 5G offers can make a big difference for the future of European digital economy

# What opportunities for Economy?

- The availability of a obliquus advanced network infrastructure **lowers the barriers** for the introductions of innovative solutions
- Disruptive new ideas can be more easily introduced and quickly spread even by small players like **startups and small companies** that are an important part of European economy

Low entrance barriers



Like smart phones have provided a platform over which the app-economy has developed in the cyberspace, 5G can provide the **platform for the digital applications in the physical world**

# What opportunities for Economy?

- Differently from traditional Internet that generated value at global level, **5G is more locally rooted**
- 5G is more connected with the **physical world** and applications can hardly be general enough to serve a global market
- It is necessary then to rely on **local economic ecosystems** for the creation of solutions and products

Global innovation  
with local impact



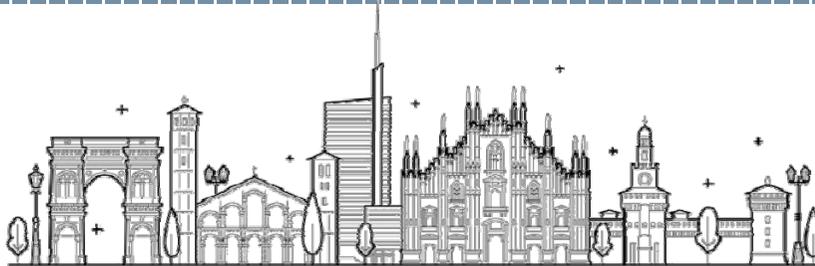
European economy has the opportunity to retain most of the value created by the 5G transformation and don't let it fly away



**What are the lessons we are learning  
from the 5G trials?**



# 5G trial in Milan



Vodafone + 28 Partners + 10 Public entities  
> 90 M€ investments

## University & Research Centers



## Local Enterprises & Public Entities



## Technology Partners



## Industrial Partners



## 41 Use Cases across 7 sectors with high social relevance



### Health & Wellbeing

**9** Connected Ambulance  
Robotics for hospital & surgery  
Wearables

Increased access to and efficiency of health services



### Manufacturing & Industry 4.0

**12** Cooperative robotics  
Enhanced retail experience  
Smart agriculture

Production efficiency and better use of scarce resources



### Security & Surveillance

**5** Security of railway stations  
Enhanced public safety and emergency services

Enhanced public safety



### Education, Learning & Entertainment

**7** Classes 4.0 e Augmented Reality  
VR for immersive experience  
Tourism 4.0

Access to education and entertainment



### Smart Energy, Smart Grid & Smart City

**3** Smart Energy & Smart Grid  
Smart City & Smart Campus  
Citizen 4.0

Public services management efficiency



### Digital Divide

**1** Fixed Wireless Access

Broadband connectivity to remote areas



### Mobility & Transport

**4** Urban Cross Traffic Cooperation  
Enhanced assisted driving

Enhanced mobility safety

# Is there a difference between theory and practice of 5G?

- The benefits of an advanced infrastructure like 5G don't come for free but from **hard experimental work**
- Putting the pieces of an application together is not easy from a technical point of view, and transforming it into a **sound business model** may be even more difficult
- We need deep changes into the **relations between telco industry and the other industrial sectors**
- **Open innovation** is the key model

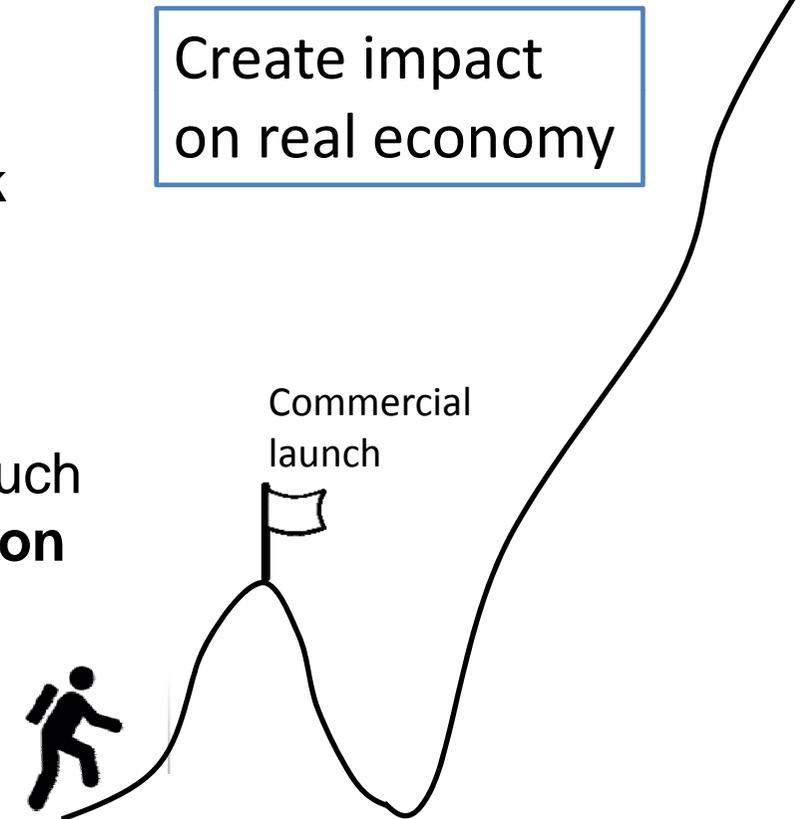


**What are the challenges we will face in the next few years?**



# What are the challenges?

- **5G has been launched** in most countries this year
- But it would be **a mistake to think that most work is done** and now it entirely up to market players to take advantage of the new technology
- The next few years are crucial to determine how much the potential of 5G will be transformed into **impact on the real economy**
- The **role of public policies** here is fundamental



# What are the challenges?

- It is necessary to create the conditions for a **fast roll out** of 5G networks in all countries
- European network service market is the most competitive in the world with clear advantages for end users, but with some issues when new **investments in the infrastructure** must be done
- The different limits set by some countries on **electromagnetic emissions** can lead to significant extra costs for the network deployment

Foster  
investments



# What are the challenges?

- Fostering the **collaboration** between players of the telecommunications sector and the other industrial sectors that can benefit from 5G
- Stimulating the growth of **local ecosystems** that exploit the cultural and economic differences to generate tailored digital innovation
- Facilitate the creation of funding opportunities for **start-ups** and small companies and the use of the open innovation model

Stimulate  
collaboration



# Conclusion

 **5G is an opportunity for European countries like Italy** to regain a prominent role in the digital economy

 The **European differences** at local level with 5G can be **turned into an advantage**

 Public policies should ensure that **enough investments** are done in the infrastructure and stimulate a new **inter-sector collaboration** spirit

