Society AEIT per la Tecnologia dell'Informazione e delle Comunicazioni

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# *Innovative Services and Technologies in the area of ICT*

**Thursday, December 12th 2019**
**Mediterranean Palace Hotel, Thessaloniki**

## Update of 5G & FTTH in Italy

**Andrea Penza**

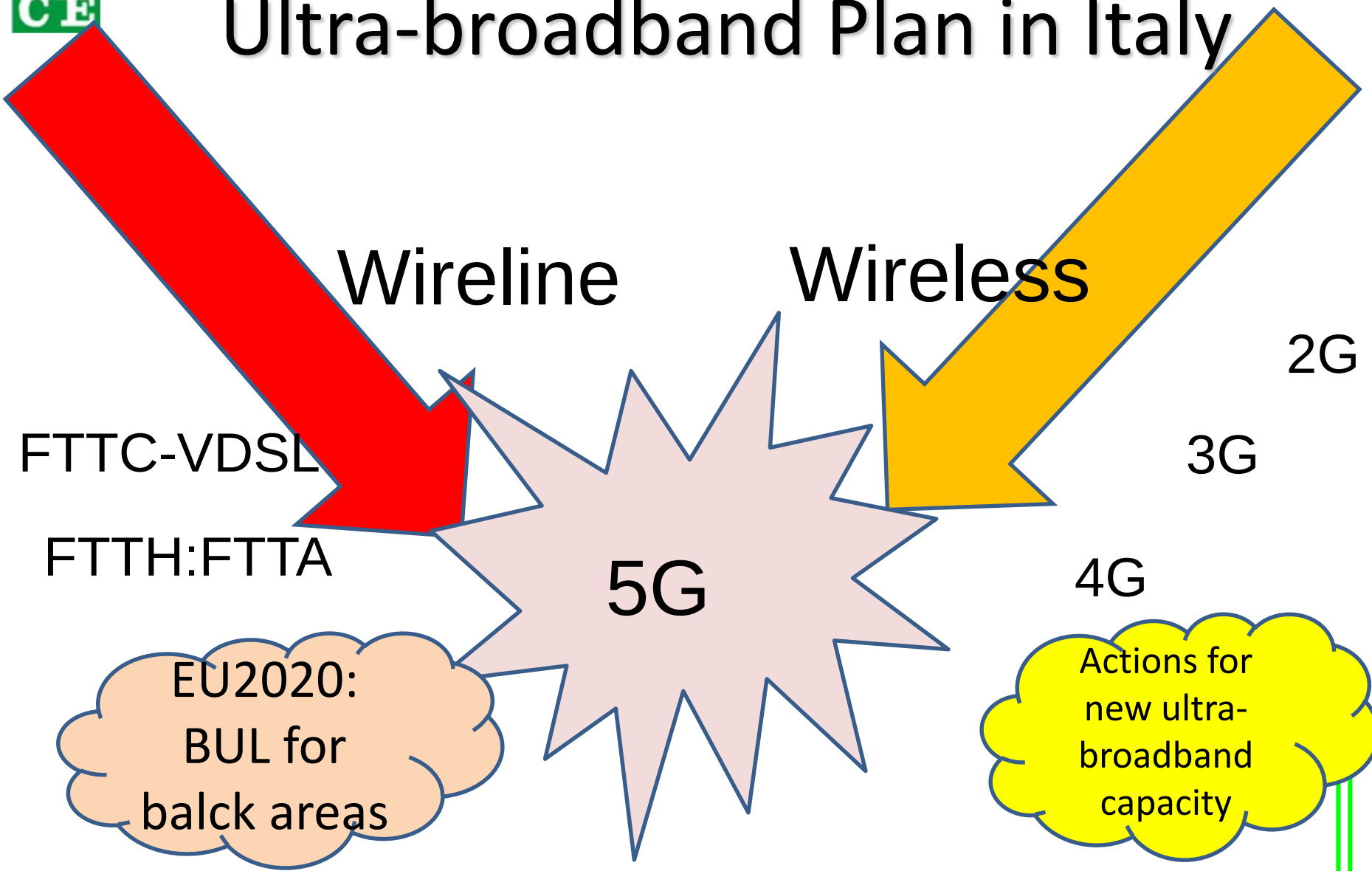
**AICT-FITCE Italy President and INTRATEL CEO**

**UBIQUITY**

ENHANCED ACCESS NETWORK CAPABILITY

APPLICATION & ENVIRONMENT VIRTUALIZATION

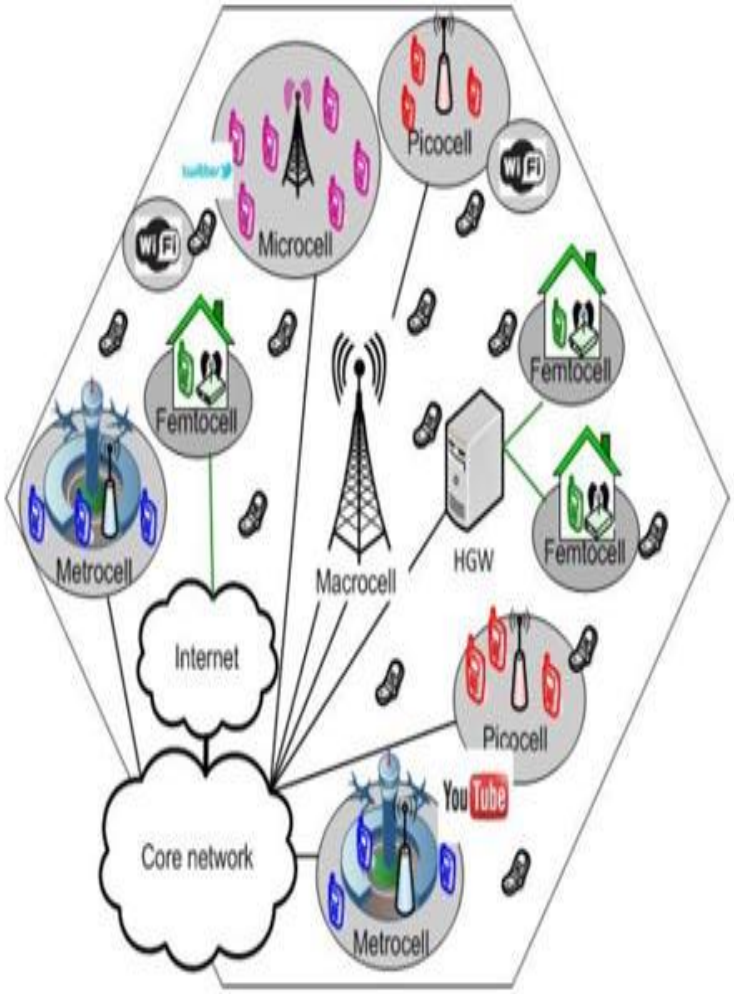
# Ultra-broadband Plan in Italy




Fiber to the x (FTTx), x: Curb, Home, Antenna

# 5G : Main features

- From 2G to 4G : increment of capability:
- Distributed network: macro-cells and small cells (micro, pico, femto, relay).
  - **Densification of the network**
  - More capability, less latency
- Coverage
  - According to the required SNR for each service
  - QoS/QoE.
- **Coesistency**.
- **Handover**
- **New frequency bands: 700 MHz (deep indoor), 3.6 GHz (BB enhancement), 26 GHZ**



# 5G : Typologies of specific data flows

## 5G: Multiple inter-operable standards?

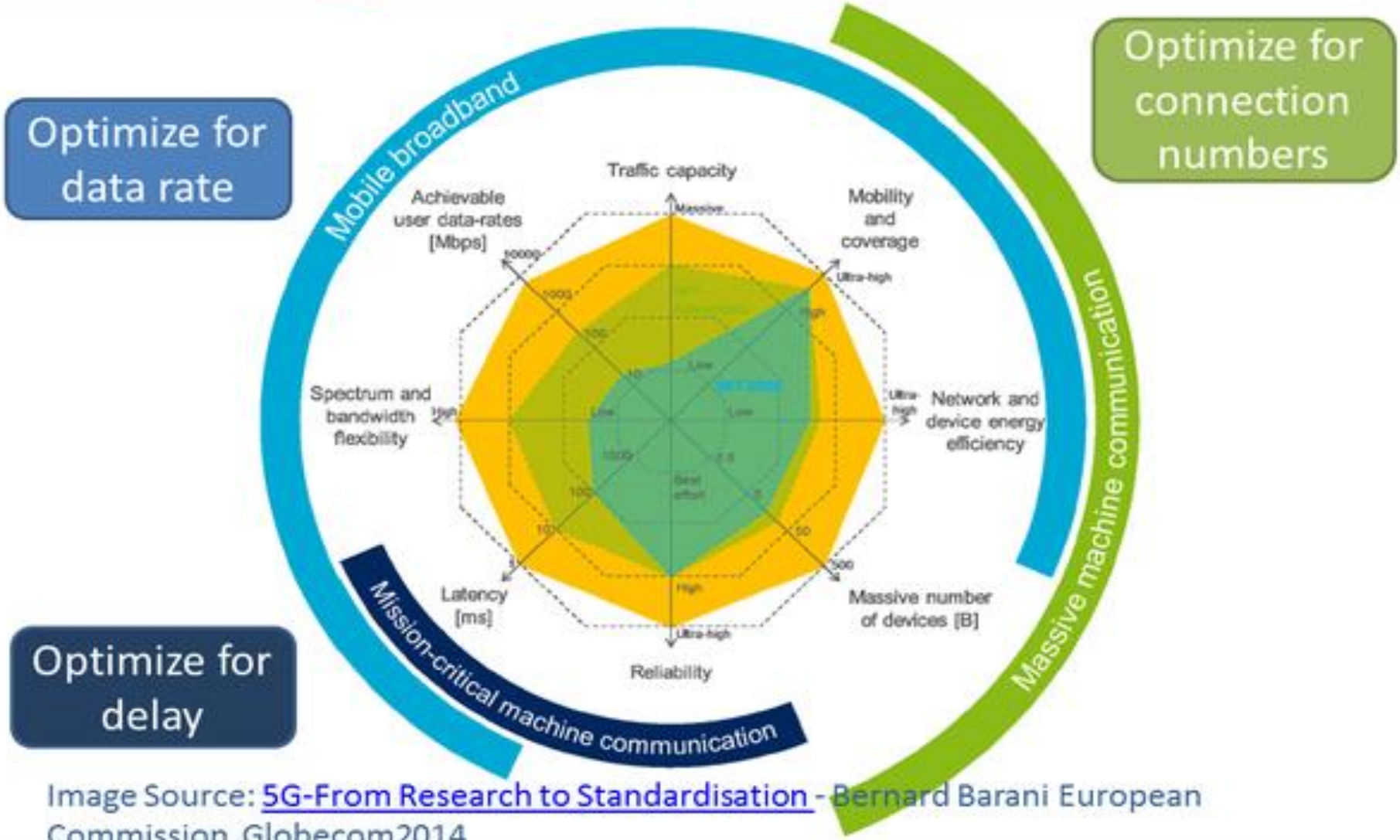



Image Source: 5G-From Research to Standardisation - Bernard Barani European Commission, Globecom2014

# 5G : Traffic typologies and services

- Enhanced Mobile Broadband (eMBB):
  - High capacity
  - Higher radio bandwidth
- Massive machine type communications (mMTC):
  - Machine to Machine (M2M) (not IP necessary)
  - Internet of things (IoT)
  - High density devices
- Ultra-reliable and low latency communications (URLLC):
  - Tactile, driving,….

# 5G vision (1)

- Moreover 5G systems will be based on
  - Full virtualization of network functions
  - Usage of small cells for the management of hetereogeneous networks
  - Usage of multiple radio interface
  - Usage of radio spectrum with millimetric waves
- **5G vision as a mobile pl**atform for implementing vertical markets enabled by IOT, each of them with different requirements in terms of broadband capability, latency, reability, ….
  - Transport & Automotive
  - Manufacturing & Industry
  - Energy
  - Media & Entertainment
  - Health

# 5G vision (2)

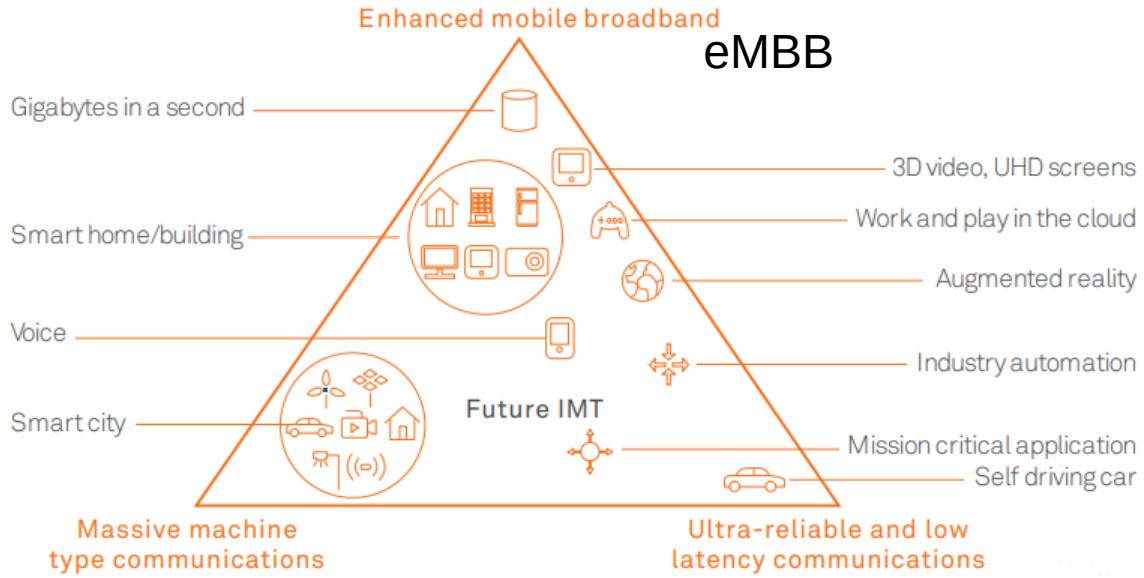
Each vertical market can require the implementation of different 5G typologies of services .

For example Industrial IOT & Industrial 4.0 require the following services :

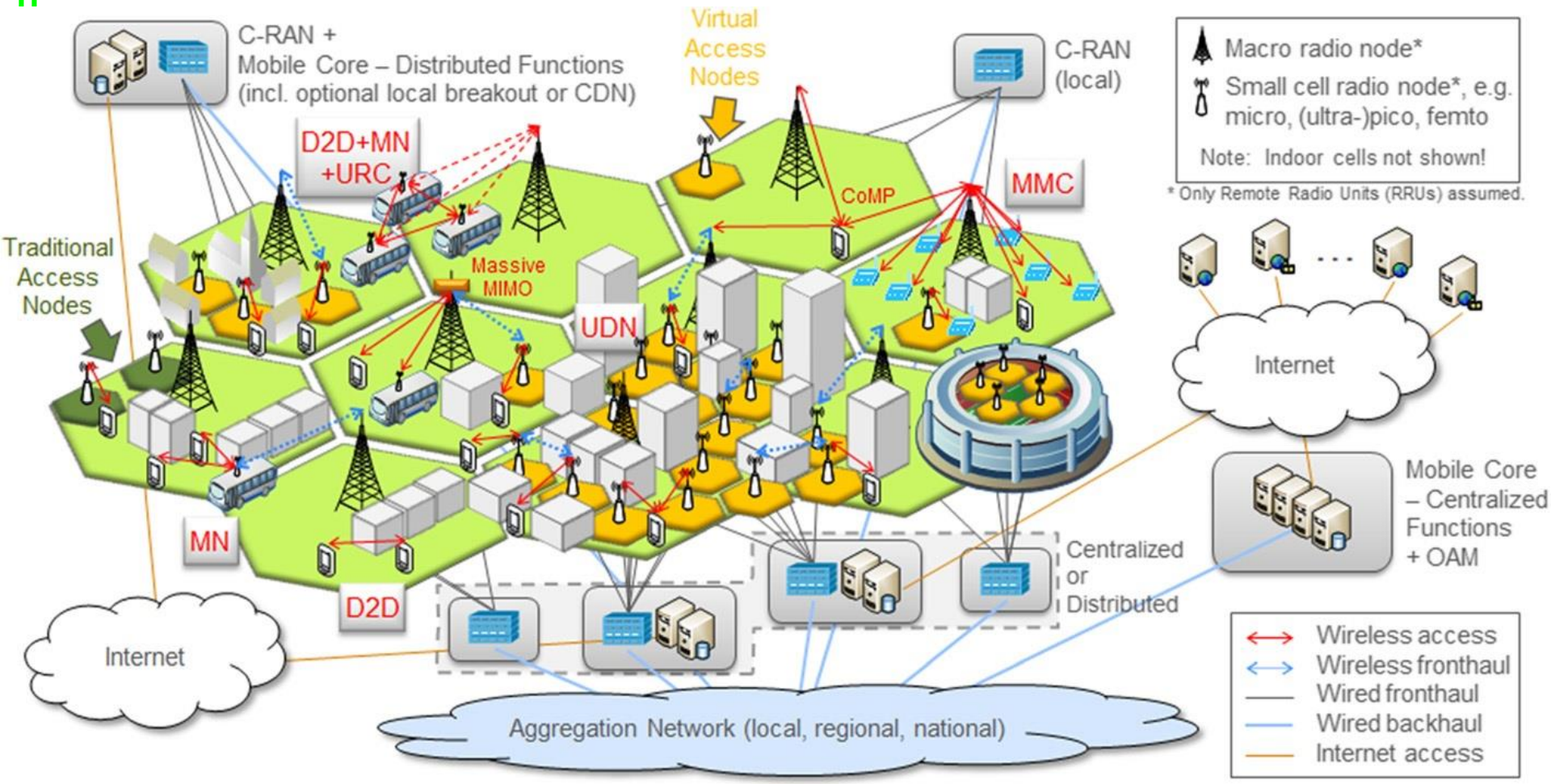
- Enhanced Multimedia Broadband (usage of augmented reality in teh industry)
- Massive machine Type Communications (sensors in industrial machines for preventive maintenance)
- Ultra Reliable Low Latency Communications (control of robot in industrial machines

# 3GPP R15 (Non-Standalone 5G) - NSA 5G

## The three main use case of 5G (IMT 2020)



# 5G Network : HetNet



# 5G Frequency Spectum and field test in Italy (1)

- 5G Frequency Spectrum has been chosen by European Union in order to be used by enabled subjects within most of the member countries
- **700 MHz**
- **3.4-3.8 GHz**
- **24-28 GHz with spectrum availability of around 1GHz**

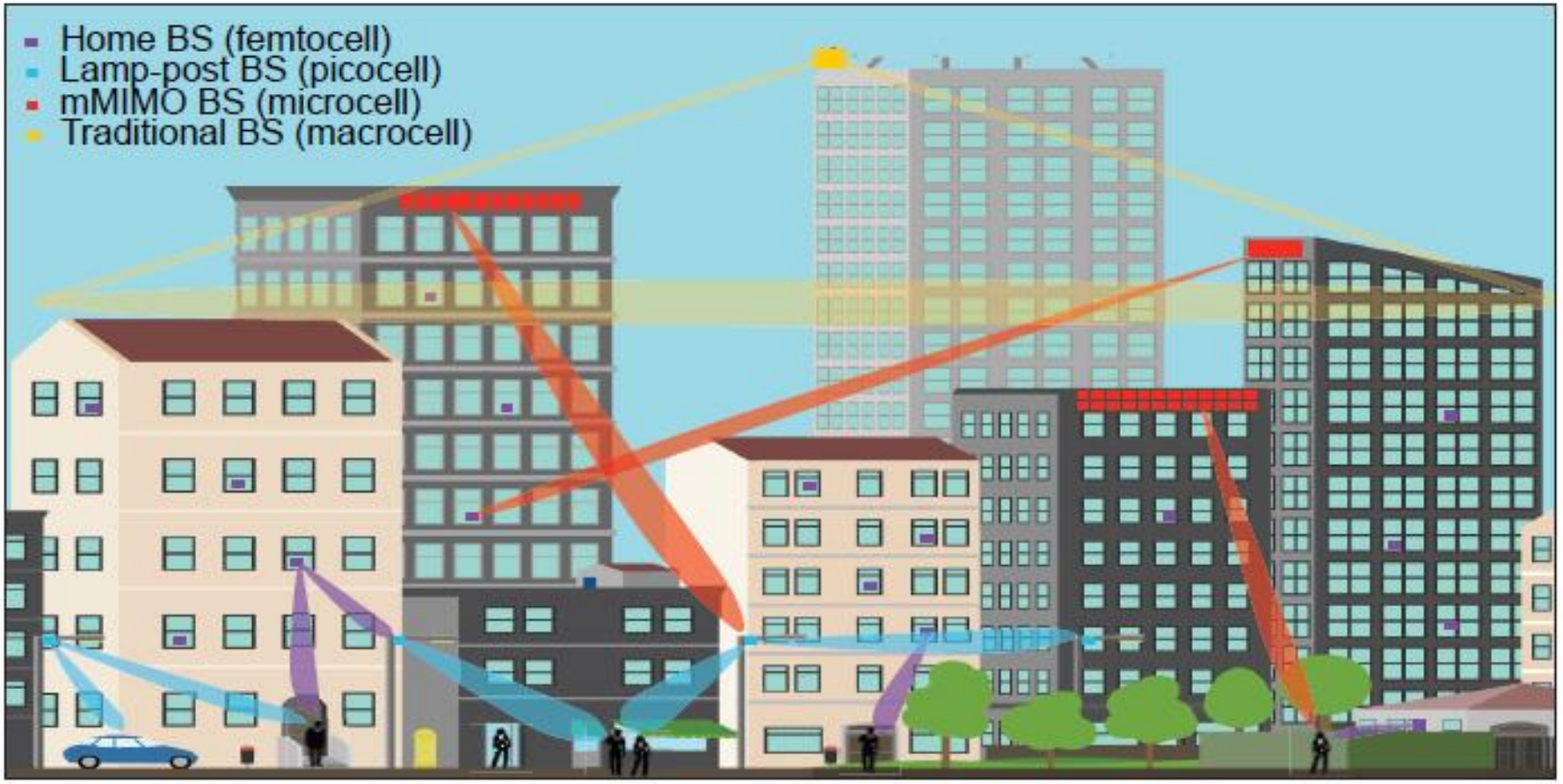
5G Field trials assigned by Ministry (free of charge) to three different subjects :

- **Vodafone Italy in Milano**
- **Wind-Tre-Open Fiber in Prato (Tuscany) & L'Aqu**ila
- **Telecom Italia- Fastweb-Huawei Technologies in Bari and Matera**

# AGCOM Consultation for 5G frequency licenses (ongoing during 2018)

- Agcom approved public consultation concerning procedures for assignment and rules for the utilization of available frequencies in the **694-790** MHz, **3600-3800** MHz and **26.5- 27.5** GHz bandwidth for electronic communication systems with the scope of encourage the transition towards 5g.
- Decision for a joint assignment of all the 5G pioneer bandwidth
- For 700 bandwidth the Ministry have decided that TV Broadcasters have the obligation to release the frequencies within end of 2021.
- The other two bands have been released starting from 2018 and, in particular the **3700-3800** one is still used for test phase and trials
- Strong goal from the Ministry about the chance to promote social and economical development in order to assure to all the users the highest level of coverage and access towards innovative services based on 5G technology wherever in the national country.

# 26-28 GHz new radio: Radio beams:




Verizon solution: 0.8/1 Gb/s for user
FASTWEB-SAMSUNG tests in Milano

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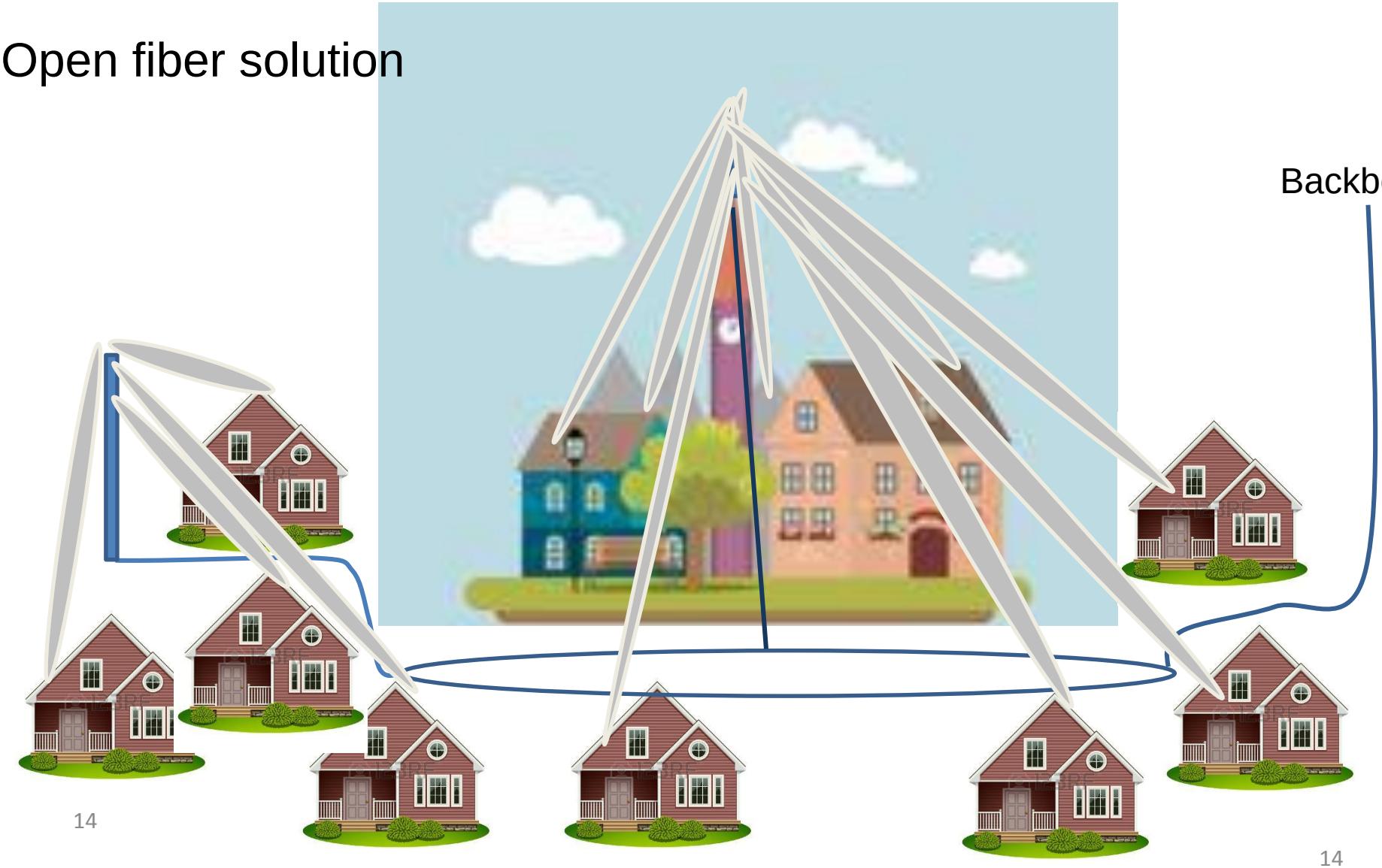
# 26-28 GHz for rural Areas

Open fiber solution



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# Use case : TIM (1)

TIM 5G is now active in test phase with 100 end-users in Genova with a coverage which already involves some areas of the city and it is planned to be completely extended  by 2020 1Q

# USE Case : TIM (2)

- 5 Big cities to be covered with 5G within 2020 2Q up to 2GBit/s:
  - **Genova, Roma, Torino, Firenze and Napoli**
- 4 big cities, 30 turistic destinations, 50 industrial areas and 30 special national projects to be covered with TIM 5G between 2020 2Q and the end of 2020 up to 2GBit/s
- 120 cities, 245 turistic areas and 200 specific projects for most of the main companies in Italy within 2021 up to 10GBit/s
- Local areas and distributed locations will be connected with FWA solution (Fixed Wireless Access)
- TIM commercial offers for business and consumers :
  - Partnership with Samsung, Xiaomi and Oppo
  - Availability of Samsung Galaxy S10 5G, Xiaomi Mix3 5G and Oppo Reno 5G

# Use Case TIM (3)

- Offers for family :
  - TIM Advance 5G, 39€/m with 50 GB, unlimitred calls and Sms, included HD and Ultra HD video
  - TIM Advance 5G Top, with 100GB, unlimited calls and SMS, included HD and Ultra HD video, roaming with USA, Switzerland, Canada and Monaco. New Samsung S10 5G at 10€/m
- Offers for business
  - TIM Business 5G, 60€/m for new customers, unlimited calls and sms, also from Italy to Europe and 16 extra-UE destinations, 100 GB, unlimited mail and chat, international roaming with unlimited calls and sms and 5GB in the extra-UE destinations
- Added features
  - Roaming in 3 countries : South Corea, Emirati Arabi and Monaco by the end of 2019, UK, Switzerland, Spain, Portugal,Germany and Austria by 1Q 2020
  - Customized services towards industrial subjects in order to improve the production processes, within the usage of MIMO technology

# Use Case TIM (4)

- Added features
  - Roaming in 3 countries : South Corea, Emirati Arabi and Monaco by the end of 2019, UK, Switzerland, Spain, Portugal,Germany and Austria by 1Q 2020
  - Customized services towards industrial subjects in order to improve the production processes, within the usage of MIMO technology
  - Industry 4.0 applications in robotics and industrial automation areas. Via the mobile connection it is possible to control robotic arms within le functions that 5G service offers in tems of bandwith and latency. From remote laptop and tablet it is possible to handle production chains allocated in different locations with a real-time control system
  - Cloud gaming : playing in streaming in mobility, following event live in e-Sport, changing in real-time the screen point of view, thanks to the multiview function, with contemporary flows
  - Smart Mobile : **TIM Smart City Control Room** analizes, wit data live stored on the dashboard, data coming from sensors connected to TIM mobile network for the intelligent management of the traffic, of parking, of lighting, of rubbish collection

# Use Case TIM (5)

- E-Health : within TIM platform Home Doctor and special viewer,the patient can be guided in the 'self monitioring & remote assistance' and get a real-time diagnosis at home.
- Customized services towards industrial subjects in order to improve the production processes, within the usage of MIMO technology
- For Industry 4.0 applications in robotics and industrial automation areas. Via the mobile connection it is possible to control robotic arms within le functions that 5G service offers in tems of bandwith and latency. From remote laptop and tablet it is possible to handle production chains allocated in different locations with a real-time control system
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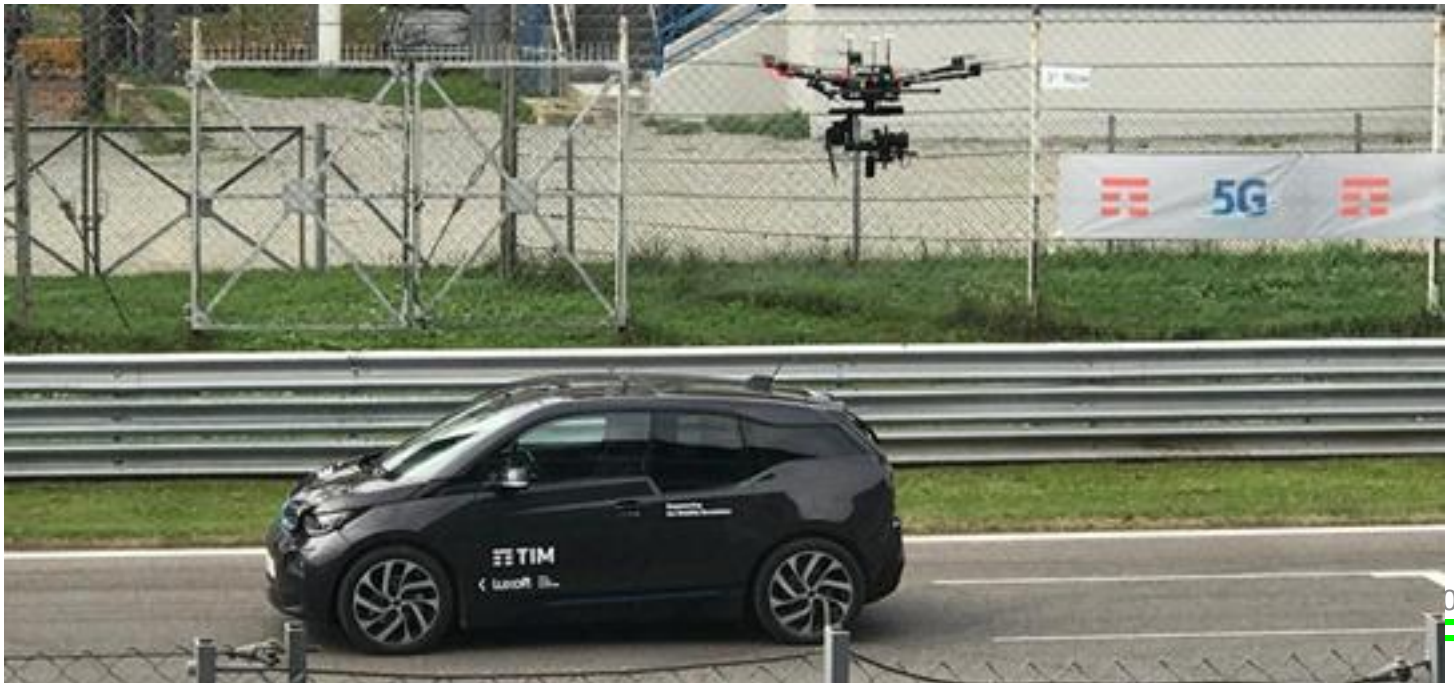
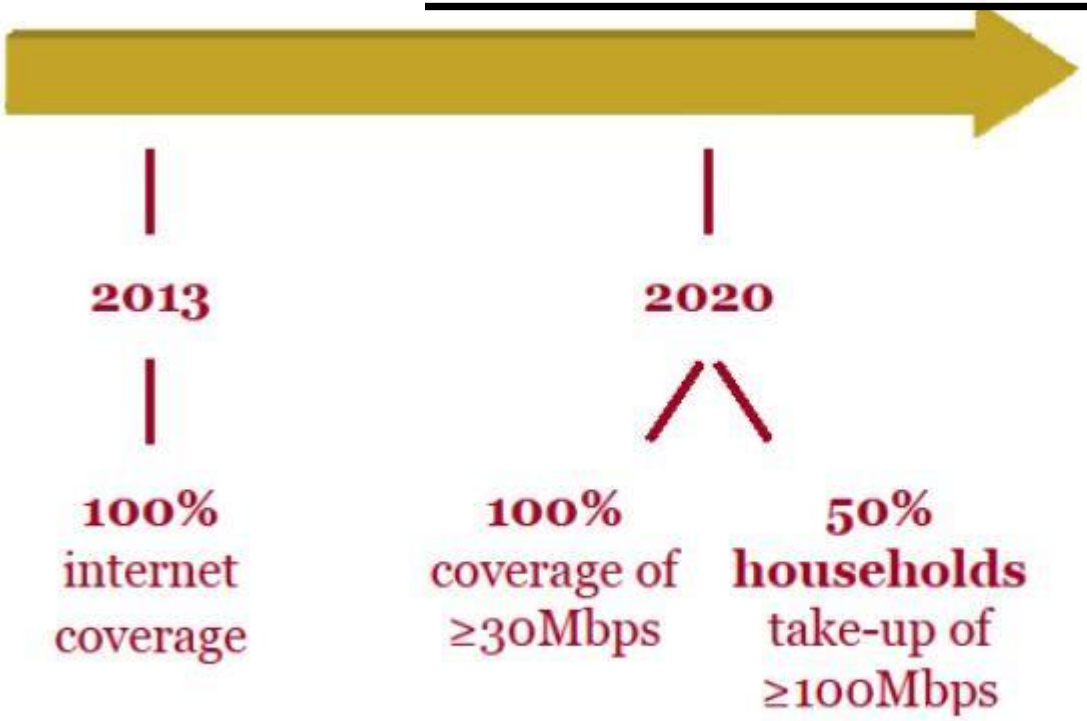
# Use Case TIM (6)

- Digital literacy and training. In order to accompany the digital transformation TIM started specific training and digital literacy initiatives aimed at citizens and businesses located throughout the national territory The training paths are free of chargea and kept either in TIM locations or in locations owned by Public Institutions in order to give to the citizens and companies a strong support and intruments for the diffusion of new digital technologies and their usage during the daily life.
- Connected car: test made in Torino all together with FCA, Ericsson and Polytecnic school within the usage of 5G mobile connections between vehicles and between a vehicle and the support center.  The car was completely guided remotely



# Test on field

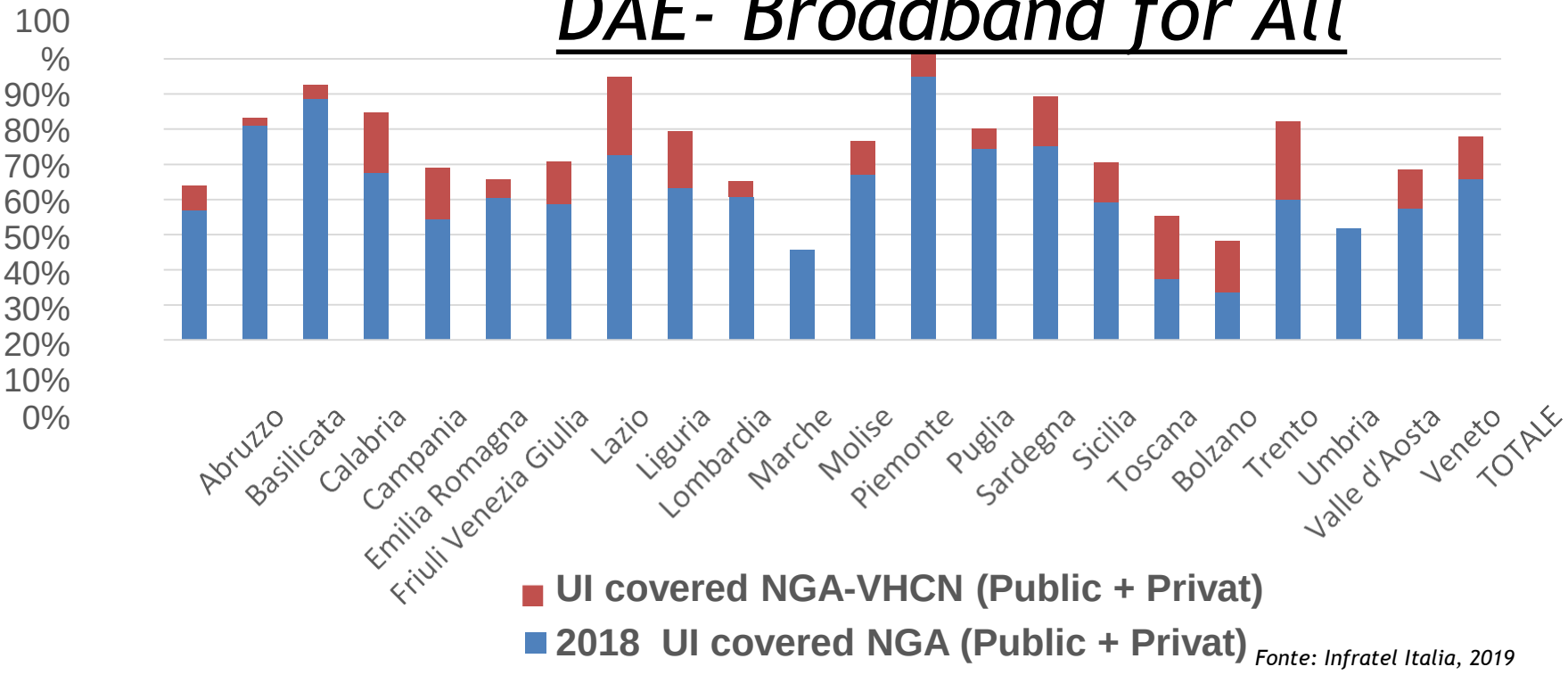
# European Digital Agenda
# DAE- Broadband for All




**BroadbandPlan**

**Ultra-Broadband Plan (Next Generation Access Network)**

# European Digital Agenda
# DAE- Broadband for All




*Fonte: Infratel Italia, 2019*

•**NGA (Next Generation Access)** addresses a download capability of at least 30 Mbps.

•**NGA-VHCN (Very High Capacity Networks)** addresses a download capability of at least 100 Mbps up to 1 Gbps.

# Broadband and Ultra-Broadband

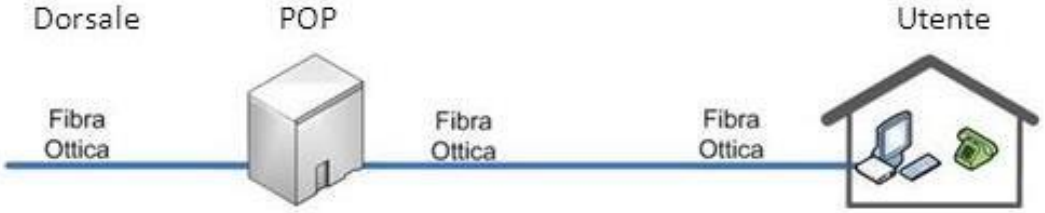
**Connection speed**

## Banda Larga


(≈ 7-20 Mbit/s)

## Banda Ultra Larga


(≈ 30-50 Mbit/s)




(> 100 Mbit/s)

# Broadband and Ultra-broadband Plans

- **Black Areas** : **where there is a return of the market and more than 1 Oprtaor abling to invest**
- **Grey Areas** : **where only 1 Operator is interested to invest because there is no room availabe for other ones**
- **White Areas** : **Digital devide areas, where no Operator is able to invest for the highest costs. Need for Public initiatives**

# Ultra Broadband Plan in Italy

- **BLACK Areas** :
  - TIM FTTC vs FTTH
  - Fastweb FTTH
  - FlashFiber (joint venture 50% TIM & 50% Fastweb) FTTH
  - OpenFiber (Joint venture 50% ENEL, 50% Metroweb) FTTH
  - Specific local & Regional Operators
- **Grey Areas** :
  - TIM or Fastweb or FlashFiber depending on the specific area
  - Ongoing plan from the Ministry in order to cover the residual
- **White Areas** : open to public investments via specific tenders
  - Open Fiber the winner of the first two tenders
  - The third tender is going to be assigned (OF in the pool position)

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# Broadband and Ultra-broadband Plans (2)

- **Broadband Plan**
  - More than 8.000 località in digital divide activated with the broadband service
  - Investments already done : 540 M.euro
  - Lengh of the fiber Optical Network : 15.494 KM
  - Digital divide less than 0,5% on national basis

- **Ultra-Broadband Plan**
  - 560 Municipalities reached from Ultra-broadband service
  - Effettuati i controlli sul beneficiario per oltre 500 M.ni di spese comunitarie della programmazione 2007-20013
  - Direct build of access infrastructures in 668 Municipalities in 8 italian regions wich 506 completed
  - BUL plan defined in the 'white areas' with national & community resources
  - Three public tenders have been published and awarded for about 2,8 M€ of public investments
  - Started works on about 1900 Municipalities

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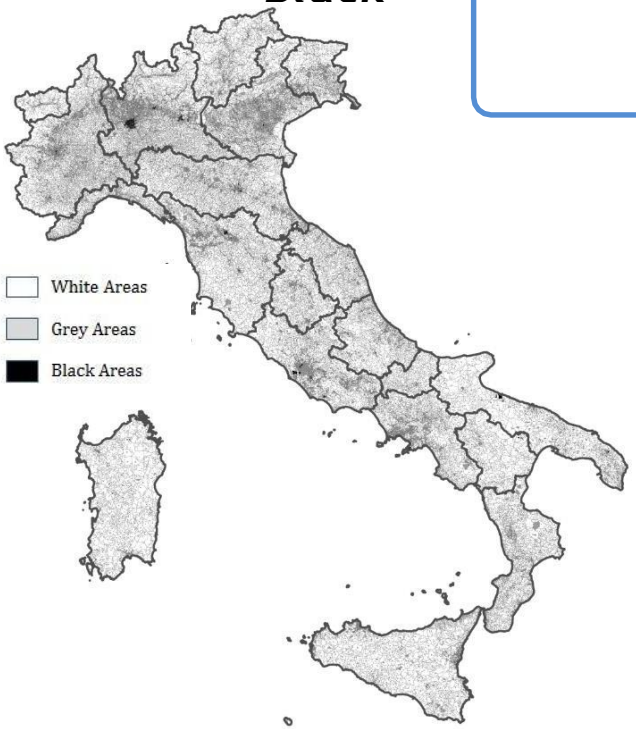
# Goals and implementation of the BUL strategy

- Connectivity of at leat **100 Mbps up to 85%** of italian population, allowing a coverage of at least **30 Mbps** in download to **all the people** up to **2020**
- Coverage of **at least 100 Mbps of public locations** (schools and Hospitals in particular)
- BUL in the **industrial areas**

**Regulation & Market**

**Public investment**

***Black***




***"White areas plan "* (2,8 Mld€)-** *with public funds*

- More than 7600 Municipalities
- 14,3 millions of inhabitans
- 9,6 millions of real estate units
- More than 30.000 Public Institutions locations

**"Fase 2 Plan"** - *under definition*

- *Interventions to stimulate demand (voucher)*
- *Completion nelle of infrastructures in the 'Grey Areas and in the residual areas for reaching BUL Plan goals*

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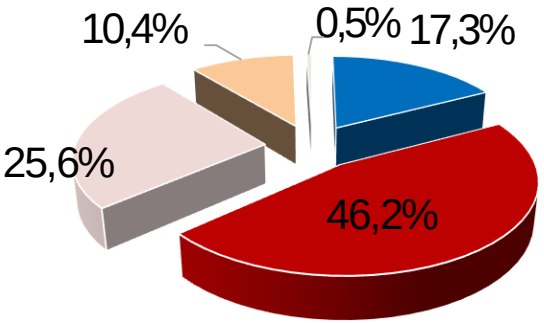
# Prospect of Italian situation vs 2021

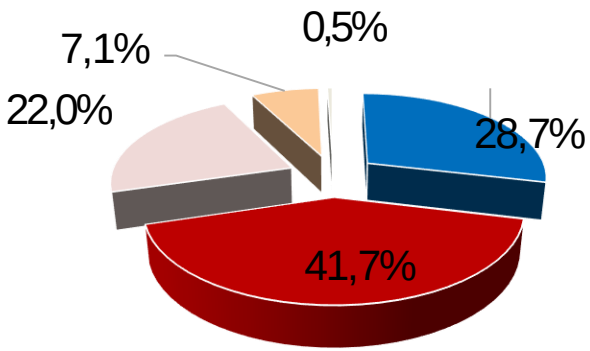
## Houses - 32 millions




- Over 100 Mbps for private houses in FTTH/B
- Over 30 Mbps for private houses in FTTN
- Over 100 Mbps for public buildings
- Over 30 Mbps for public buildings
- Not covered (new white areas

At least **50%** of UIs will be reached with fiber
Goal of BUL Plan : **85%**

## UI - 36 Millions

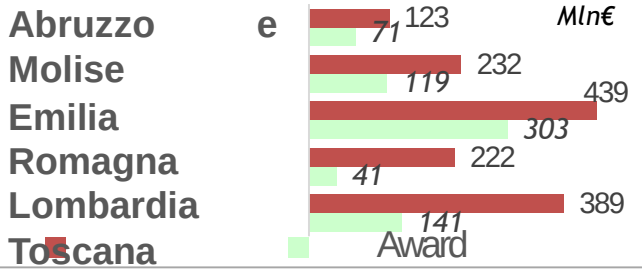



- Over 100 Mbps for private houses in FTTH/B
- Over 30 Mbps for private houses in FTTN
- Over 100 Mbps for public buildings
- Over 30 Mbps for public buildings
- Not covered (new white areas

# White Areas BUL Plan -Tenders

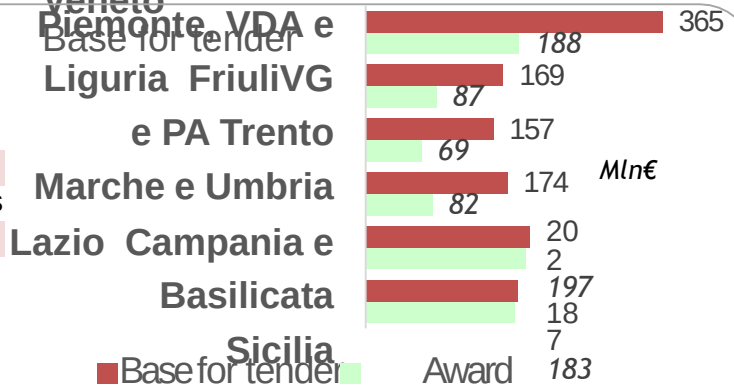
## Gara 1

**1,4 Mld€** base for tender
**7,2** milions of inhabitants
**3.043**
**Award : 675 Mln€**



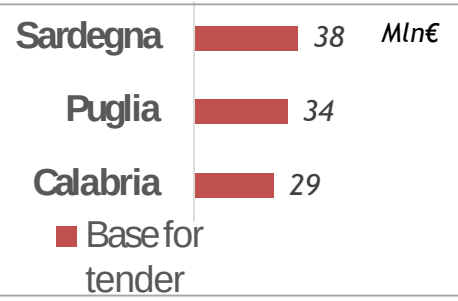

## Gara 2

**1,3 Mld€** base for tender
**6,7 milions of** inhabitants
**3.710 Municipalities**
**4,7 millions of** UI
**Award : 806 Mln€**




## Gara 3

**Tender 3 - Planned**
**103 Mln€** base for tender
**0,4 millions of inhabitants**
**879 Municipalities**
**0,3 millions of** UI
**Award :**





**ITALIA**

**2,8 Mld€** base for tender
**14,3 millions of inhabitants**
**7.632 Municipalities**
**9,6 millions of** UI

# Conclusions (1)

- Towards the Mobile Next Generation Networks
- Towards FTTH e Fiber to the Antenna
- The role of  Radio Access with 5G
- New architectures (FOG, EDGE) and data management (blockchain)
- Explosion of IP traffic worldwide
- Main applications are video → Grow-up of  mobile TV with 4K and enhancements

# Conclusions (2)

- Strong need to follow the technology evolution of Internet applications (mainly these bandwidth-consuming ones) → Great attention to the QoE: from network performance to **application performance**
- Reduction of the latency → bring content closer to users → usage of Edge Cloud Computing
- Efficient managment of data → Decision Support System (DSS)
- With the virtualization of the devices there has been the swap from the **security of the devices** to **the security of process and information (information-centric approach)**

# Conclusions (3)

- The fiber follows the evolution of last generation mobile networks → From easy connection of mobile backchauling, optical fiber plays an important role also for fronthauling (network densification)
- Telco Operators consider the utilization of the fiber as a crucial item for backhauling and fronthauling
- Connection paths are mainly based on GPON and further evolutions

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