



***VI Regional Workshop for Africa on "Standardization  
of future networks:  
What opportunities for Africa?"  
26-27 March 2018***

**March 26, Session 2: Standardization Hot Topics 1, IMT-2020**





GRUPPO TELECOM ITALIA

# TIM progress towards 5G

## A standards guided evolution

Luca Pesando, TIM  
WP1/13 co-chairman



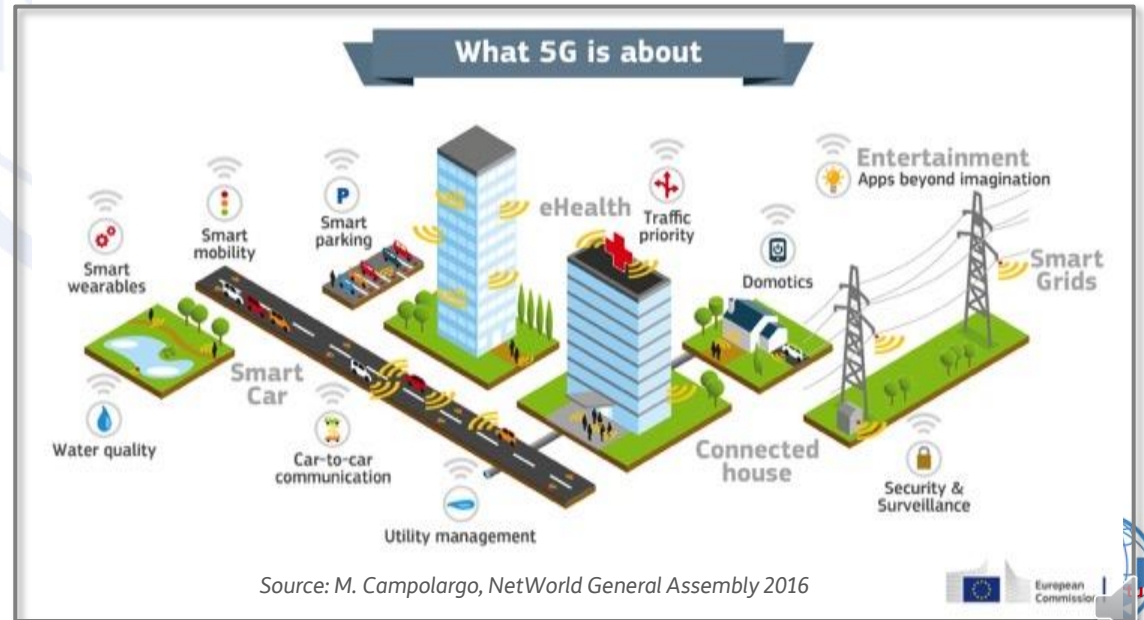
VI ITU-T Regional Workshop for Africa on "Standardization of future networks: What opportunities for Africa?"  
26 March 2018



# Towards a Digital Society



- ▶ Many initiative around the world are driving 5G development and deployment, both in standards and in cooperative projects
- ▶ e.g. Europe Digital Single Market
- ▶ 5G Manifesto and Action Plan in Europe
- ▶ 5G as a glue for Verticals
- ▶ Including human and 'smart' machine communications
- ▶ A complete new ecosystem



Source: M. Campolargo, NetWorld General Assembly 2016



## 5G for Italy

- ▶ Best service of **very diverse types of communications** (Human & Machine) with different performance attributes
- ▶ Developing an **E2E Technology** considering same relevance for *xMBB, mMTC and uMTC*
- ▶ Leveraging on **NFV & SDN** in Network Slicing architecture
- ▶ Extracting value from LTE-A and NB-IOT including them in 5G **MultiRAT**
- ▶ Reuse **existing bands** & identify new bands, especially **above 6 GHz**



- ▶ May 2016: cooperation with Ericsson to **create an ecosystem of Italian partners** engaged in 5G deployment
- ▶ International **Global players, 'local' industries/universities/public authorities** and **other stakeholders** to collaborate, explore and test applications, through dedicated PoC and pilots
- ▶ The project aims to **demonstrate benefits of 5G** enabling services for different industries /connected society
- ▶ To implement the new network **simultaneously to services and applications**



Create new business opportunities for the ecosystem  
Enable the New Digital Life

# 5G for Italy: Cloud robotics & Security

TIM leading 5G innovation



Flexible and optimized shuttling of materials between work cells in a manufacturing plant. Implementation of just in time delivery.

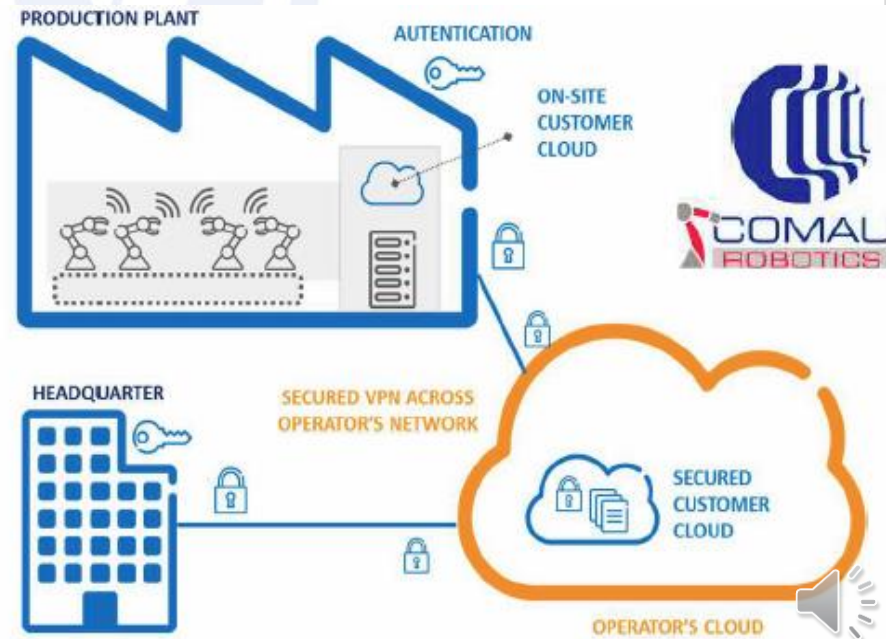


Coordination in cloud of operations between working areas and robots, exploiting mobile connectivity to integrate sensors and robots.

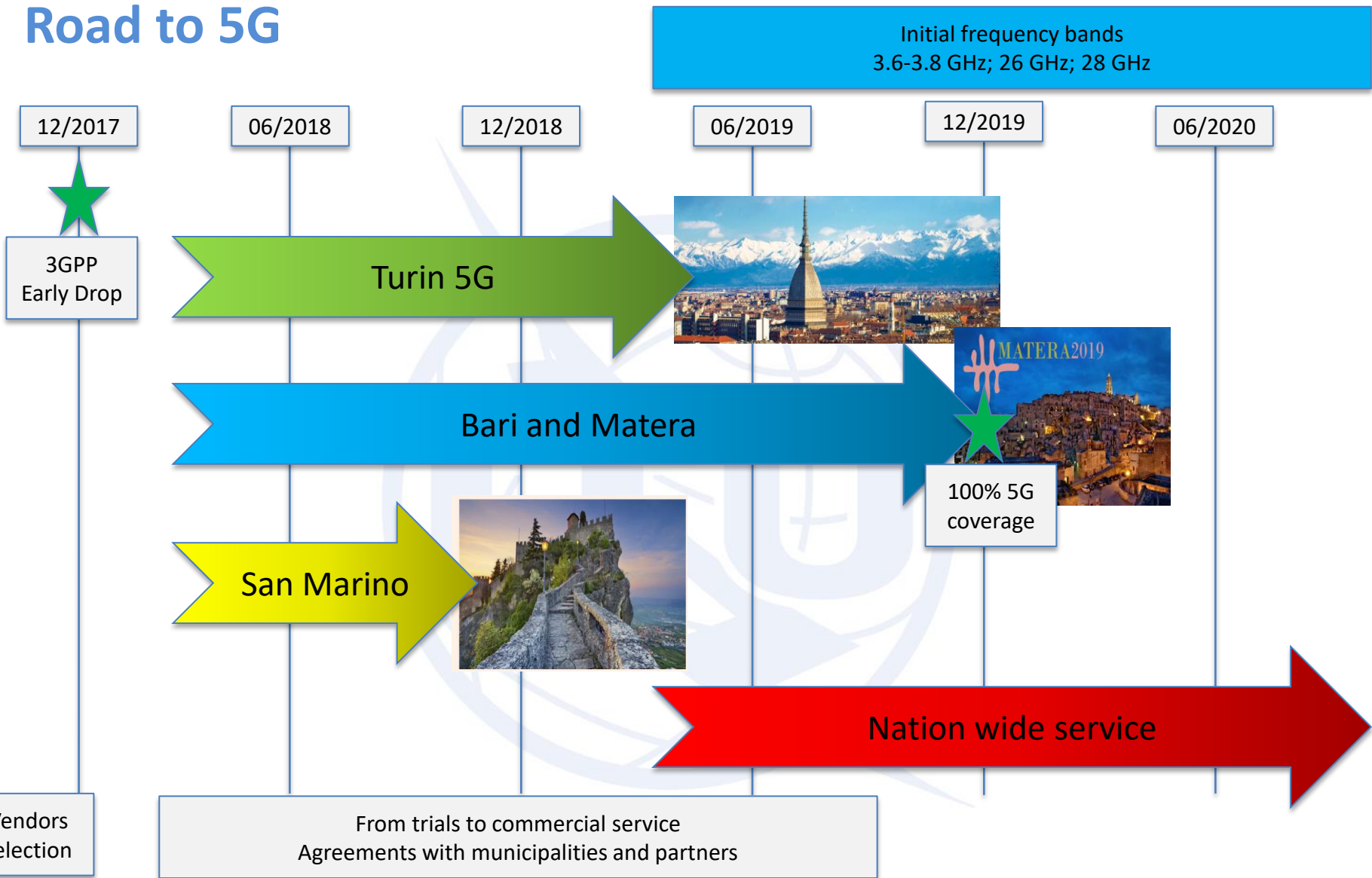


Real time remote processing: pattern recognition, sensory fusion, navigation, collision avoidance, arms motion and doors opening.

- **Use case: 5G Production Plant coverage and process control / robot automation**
- Continuous production monitoring with remote quality inspections
- Measurements on the production chain for fault diagnosis and prevention
- Analytics for anomalies detection and fault prevention
- Guaranteed secure storage of data and secure processing



# Road to 5G



<http://www.telecomitalia.com/tit/en/archivio/media/note-stampa/market/2016/TIM-Ericsson-5G-06-06-2016.html>

<http://www.telecomitalia.com/tit/en/archivio/media/comunicati-stampa/telecom-italia/mercato/business/2017/10-03-17CS-TIM-Comune-di-Torino-5G.html>

<http://www.telecomitalia.com/tit/en/archivio/media/note-stampa/market/2017/NS-5G-Bari-e-Matera.html>

<http://www.telecomitalia.com/tit/en/archivio/media/note-stampa/corporate/2017/TIM-Repubblica-San-Marino-MoU-5G-ENG.html>

# Torino 5G

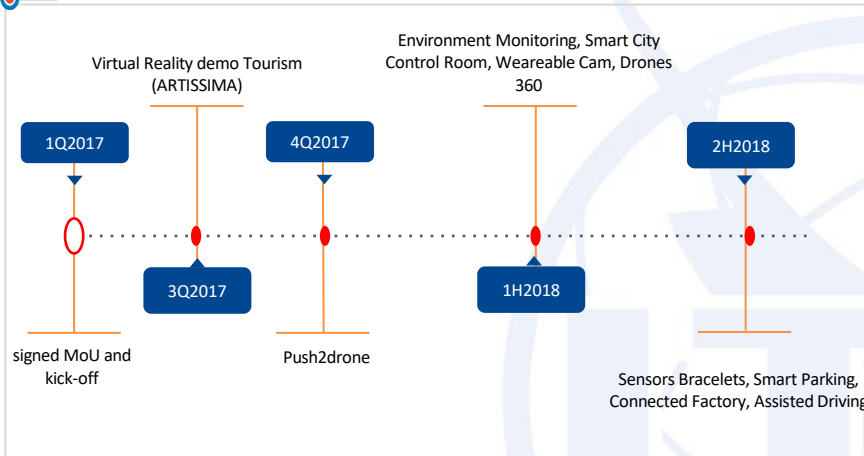
TIM leading 5G innovation



TORINO



## ROADMAP



- **Frequencies:** B42 (3400 – 3600 MHz); 28GHz



## USE CASES

- **Virtual Reality:** experience visiting interesting-areas of Torino through full-immersive virtual reality technology and interacting with other people
- **Public Safety Push-to-drone:** real time (ie: video) streaming of information gathered by drones and elaboration in the cloud to help citizen in real time
- **Environment monitoring:** a distributed and capillary way to monitor environmental parameters, i.e. Bus as a Sensor: creation of a “smart box” for cars/buses to enable city sensing
- **Smart City Control Room:** IoT platform and control center to visualize and elaborate information from different sensors around the city
- **Public Safety wearable CAM & Bracelets:** wearable CAM and IoT sensors (i.e. bracelets) to collect and elaborate real time information to support police
- **Virtual Reality Live Streaming:** 360° full-immersive live streaming of specific areas of Torino, from ground and drones managed from the Control Room
- **Smart Parking:** sensors and applications to intelligently manage parking lots
- **Connected Factory:** wireless remote sensors for industrial monitoring and control in cloud
- **Assisted Driving:** a way to facilitate circulation providing users smartphones with local information

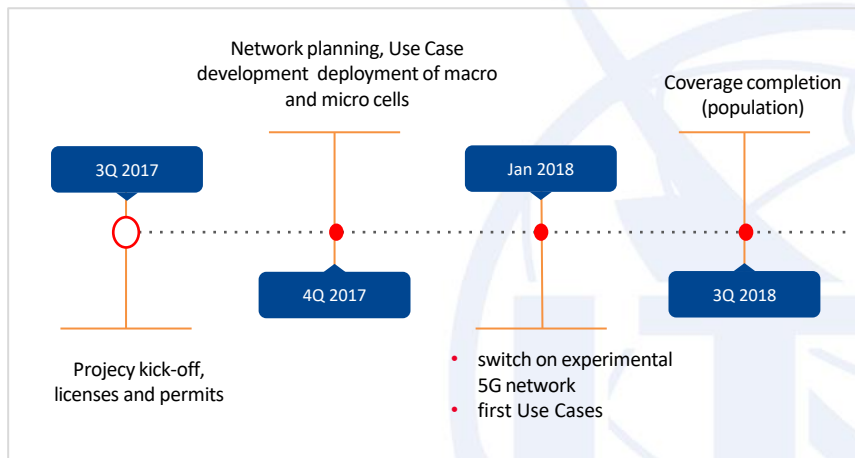


# San Marino 5G

TIM leading 5G innovation



## ROADMAP



- Frequencies:** B42 (3400 – 3600 ) or B43 (3600 – 3800): 200 MHz + 26 / 28GHz: up to 800 MHz



## USE CASES



### Public safety

Security enhancements to support citizen and assist police, using wearable cam, sensors, drones.



### eTourism

Virtual Reality City Tour with guides, multimedia info point with real time and HD infotainment contents



### Smart City

Environment monitoring and city sensors data collection in a Smart City Control Room



### Traffic manag.

Sensors and applications to intelligently manage in/out traffic and parking lots



### eHealth

Remote monitoring and remote assistance of patients



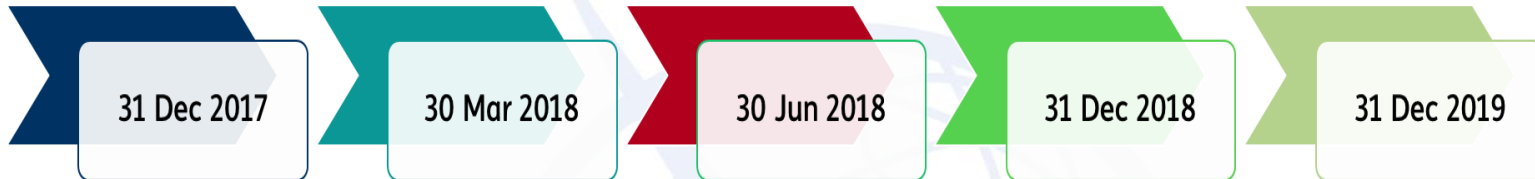
### Smart retail

Vertical solution for fashion brands (i.e. Internet of Products)

# Bari – Matera 5G

1/2

Government led 5G pre-commercial trials (Gara Mise 5G)



Starting network installation activity

- kick-off
- Radio planning for NR in B43

Activation of the first site with NR in B43 for field measurements

Activation of the first node(s) to implement service use cases

Target coverage: 75% of the population

Complete network rollout:  
- 100% of the population

- **Frequencies:** band 43

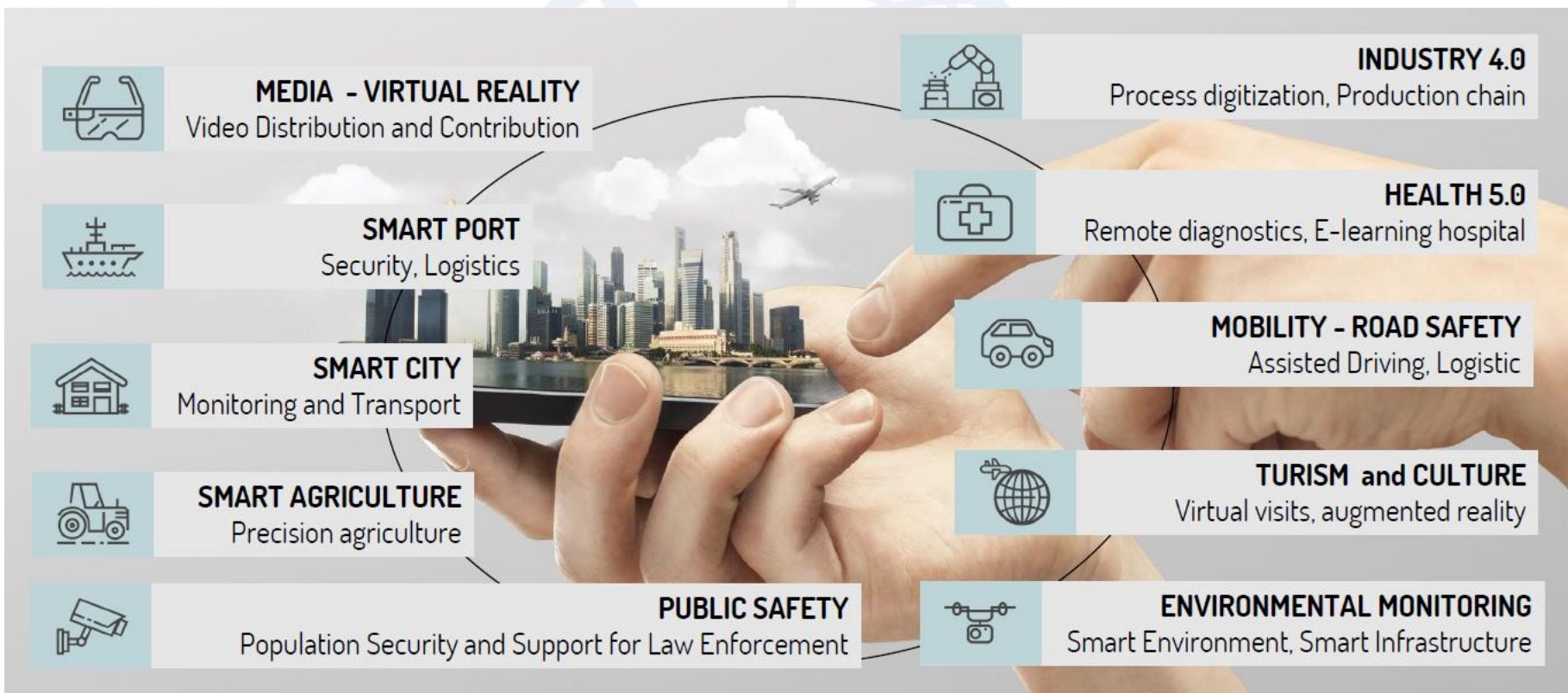
- **Partners:**

- Leading: TIM, Fastweb, Huawei
- Academia
- Industry: Ducati Motor, Bosch, Leonardo, local companies, ...
- Public Administrations, healthcare, port authority



Government led 5G pre-commercial trials (Gara Mise 5G)

The systemic revolution of 5G in more than 70 use cases to be deployed by 2020



# Health 5.0: to the advantage of citizens and NHS

Essential in public health system future sustainability in Italian territory, with a very distributed population and significant presence in rural areas



## Health 5.0

### • Hospital healthcare and remote diagnostics

Remote diagnosis, remote monitoring of vital parameters  
Home telemedicine and mobile remote diagnosis  
Medical assets tracking

### • Hospital E-learning

Smart-education for hospitalized children



- TIM
- Fastweb

- ASL Bari
- ASL Matera
- IRCCS Bari
- Policlinico Bari
- Medea
- AMTAB
- Item Oxygen
- Digital Magic
- UNIBA
- POLIBA
- NTTData
- GSI
- ITEL
- Openet
- Digimat

Partner

Potential Beneficiaries

- Partner of healthcare institutions
- Regional school departments
- Involved hospitals
- Private and public health centres
- Patients
- Doctors and paramedics
- Hospitalized children



# Virtual reality: personal guide

- Virtual visit of museums
- Live interaction with a human guide and other VR visitors
- “visit” different VR rooms, interact with objects and people

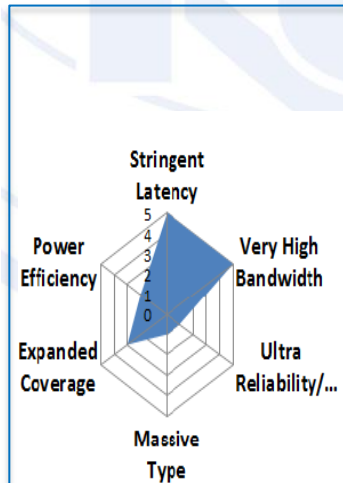
## users

- Tourists
- Citizens
- Teachers/students
- Tourist guides

## stakeholders

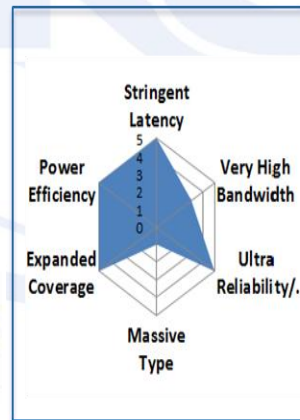
- Owners of private households, arts, castles (usually not open to the public)
- Museums
- Municipalities
- Tourism promotion
- Preservation of monuments

Concept



# Public safety: push-to-drone

- Use of drones to investigate emergency calls areas prior to sending rescue forces on site
- App to contact 112/911 control room. The officer can then dispatch a drone to investigate the scene and send the required rescue teams (police, ambulance, ...)
- App to provide live feeds of the scene to public safety officials



## Users / stakeholders

- Citizens
- Public safety officials (police, firebrigade, paramedics)

## KEY FEATURES

Related to 5G

**Latency requirement:** Stringent (<10ms)

**Bandwidth requirement:** Low for only remote control

**Massive Type Communication:** NO

**Level of Reliability/Availability:** HIGH

**Sensors Networks:** No

**Coverage Scenario:** smart city in primis, solutions for out of coverage required, coverage at altitude study needed

**Device Direct:** NO

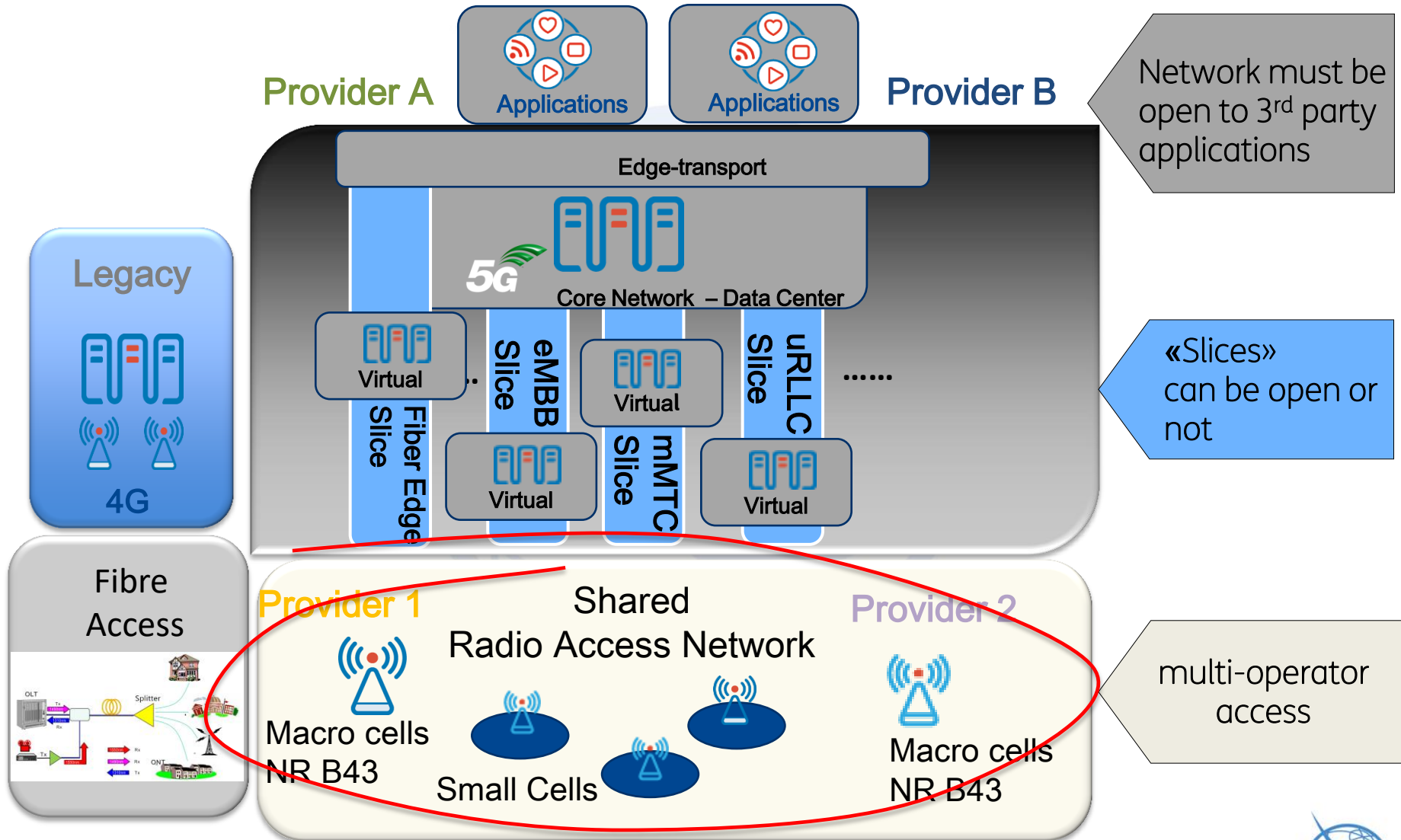
**Mobility:** Yes up to 60/70 km/h

**Energy Consumption:** Drone are usually battery powered (rarely fuel)

**Type of UEs:** drone, payload



# We are at the startpoint on the path to a softwarized and convergent multi-slice network



Present 5G (radio) implementations are just a startpoint. Full change will require a much higher degree of virtualisation than at present

# NFV/SDN: key to 5G

## TIM position

### Requirements

- End-2-End Network automation is a key aspect of 5G network
- TIM is engaged in a multi-year program of Network Transformation to pursue a flexible, programmable and disaggregated infrastructure
  - Network automation/orchestration & OSS evolution
  - NFV/SDN&cloud-scale architectures, Virtualization & SW-ization

### Concerns

- Ecosystem complexity is growing
- Need of
  - Cloud Native and interoperable VNFs with independently developed management and orchestration systems
  - Interoperable MANO components
- ETSI NFV is working on this in its Release 3, it has to be considered the NFV reference framework

### Gaps

- To accelerate NFV/SDN deployments, it is important to have strong coordination among the main stakeholders (SDOs, Open Communities) to avoid overlapping and fragmentation

### Proposed ITU-T activity in NFV/SDN

- Many initiatives working on Architectures and APIs are in place (i.e. ETSI NFV, TM Forum, ONF and Open Communities like ONAP, OSM, OPNFV,..)
- 3GPP SA5 and NGMN projects (i.e. NMWO, SBA) are working on virtualization related aspects
- ITU-T SG13 has started addressing the aspects of softwarization and slicing (see [here](#) for a list of relevant documents) and will continue maintaining the correct alignment with 3GPP, ETSI NFV, ONAP, BBF and other relevant organisations to produce specifications with relevant market impact



