

# 5G Trials in Italy

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**Abstract** In March 2017 the Italian Ministry of Economic Development (MISE) issued a public notice to open the procedure for the acquisition of project proposals for the realization of pre-commercial trial programs in the frequency spectrum of 3.6 - 3.8 Ghz. Since then, many 5G trial programs have been launched in Italy involving several operators, private companies, research centers, and public institutions. In this chapter, after an introduction that highlight the importance of 5G trials for boosting the interest of all potential stakeholders in 5G, we describe the different actions that followed the MISE public notice in the cities of Milan, Prato-L'Aquila and Bari-Matera and in other Cities not directly involved in the MISE pre-commercial trial program.

## 1 Introduction

### 1.1 5G: a new paradigm shift

The concept of a fifth generation of mobile telecommunications (5G) has attracted a growing interest at all levels, to such an extend that everyone is being talking about 5G far long before commercial 5G services are available.

The reason for such an interest resides mainly in the high expectations generated by 5G, not only on the telecommunications industry, but also on a vast range of different industrial areas. As an example, a survey conducted by Ericsson [1] on 900 decision makers in large companies across 10 key industries, reveals that

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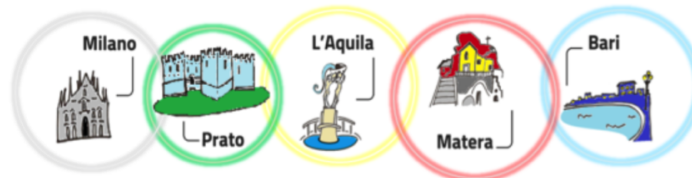
On the other hand, the forthcoming 5G mobile networks are expected to bear a multitude of new technologies such as (i) the use of mmWaves, (ii) massive use of SDN and NFV to make the network more flexible and adaptive, (iii) the introduction of computational elements close to the users (in the edge) regulated by network slicing techniques to support specialized services, (iv) the adoption of multiple and heterogeneous connectivity techniques, including (v) unconventional connectivity schemes, e.g., the use of D2D communications, and (vi) the support for IoT architectures.

Moreover, since one of the main targets of 5G is the possibility of enabling vertical sectors such as e-Health, factories of the future, energy and automotive, the trial activity must also be intended to prove the attainability of such an ambitious goal through the implementation of a variety of use cases covering different sectors. Eventually, one of the ultimate purposes of 5G trials is that of boosting the interest of industry and public administration in 5G as an enabler of new business and new services to citizens, as well.

To sum up, the 5G trial activities require a continuous experimental validation, which is a hard achievement considering the heterogeneity of the 5G scenarios. As a matter of fact, the validation of the ambitious network-oriented 5G targets in real operational systems and the impact on end-user performance remains an open issue. For this reason, the experiences matured during experimental results, and the correspondent dissemination of the results, both in terms of measurement methodologies and testbed deployments is a fundamental enabler for the development and deployment of 5G networks.

## 2 The Italian scenario

On the 14th of September 2016 the European Commission called on Member States to identify by 2018 at least a city where start testing of 5G (Action Plan for the 5G). Hence, the 5G trial process started in Italy at the beginning of 2017 with the goal of going further the EU guidelines: the 16th of March 2017 the Italian Ministry of Economic Development (MISE) [4] published a public notice to open the procedure for the acquisition of project proposals for the realization of pre-commercial trail



**Fig. 2** The five cities involved in the MISE 5G testing activities

programs in the frequency spectrum of 3.6 - 3.8 Ghz. The projects should have been completed in four years in the following geographical areas:

- Milan
- Prato-L' Aquila
- Bari-Matera

From that point on, the journey to provide Italy with the technology for fifth generation mobile networks, begins. The cities of Milan, Prato and Bari have been selected through the following criteria: geographic distribution, capillary action of ultra-fast connectivity, availability of frequencies in the band from 3.7 to 3.8 GHz, proximity the European corridors. In addition to these cities, L' Aquila and Matera were also included: the first because of its post-earthquake reconstruction phase, the second thanks to the prevision (that came true) to be the next European Capital of Culture in 2019. After the publication of the public notice, several applications have been received by the MISE and three project proposals were elected to start the 5G testing activities in 2018 in the three areas:

- Metropolitan area of Milan, assigned to Vodafone Italia S.p.A.
- Prato-L' Aquila, assigned to Wind Tre S.p.A. and Open Fiber S.p.A.
- Bari-Matera, assigned to Telecom Italia S.p.A., Fastweb and Huawei Technologies Italia S.r.L.

At the same time, the following 5G testing activities have been launched in Italy involving different geographical areas.

March 2017: TIM announces the realization of the first 5G urban network in Torino.

June 2017: The 5GCity project, involving the cities of Lucca, Barcelona and Bristol, is granted with 8 million of euros within the H2020 framework. In this context, Lucca is selected as ideal scenario for representing the nearly 1400 small cities in Europe counting 40000-200000 residents.

September 2017: Roma Capitale and Fastweb sign an agreement for the launch of 5G testing in Rome involving Ericsson and ZTE.

March 2018: The municipality of Genova, the Liguria Region, Liguria Digitale, Ericsson and TIM sign an agreement for the creation of the *Digital Lab 5G* at Great Campus Erxelli specifically aimed at the realization of the new mobile wireless network in Genova for fostering new Internet of Things scenarios.

Finally, in 2016 TIM and Ericsson launched the project *5G for Italy* having the Port of Livorno as an industrial testbed for the implementation of a General Cargo Management System using 5G technologies.

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