

# 5G and Beyond Activities Promoted by Member States



The voice of the European industry for the development and evolution of 5G

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Director R&D Programmes, CTTC



# Foreword



# GOALS AND TARGET OUTPUTS



## Goals of the Member State Initiatives SWG, as per workplan 2020:

- To raise awareness on 5G/B5G initiatives conducted at the national level (e.g., calls for R&D projects, events, pilots, deployment).
- To identify and liaise with National Authorities in relation with 5G/B5G activities at the national level.

## Target outputs, as per workplan 2020:

Type	Title	Date
Powerpoint presentation	5G and beyond related activities in Member States (calls for R&D proposals, events, pilots, deployments)	December
Word Document	Updated list of contacts at National Authorities	December



## GOAL OF THIS DOCUMENT



To report on various activities promoted by Member States which are relevant for the deployment of 5G communication networks and their evolution towards beyond 5G and 6G networks.

# RAPPORTEURS



The voice of the European industry for the development and evolution of 5G

- Austria: Thomas Zemen (AIT)
- Belgium: Sofie Pollin, Ingrid Moerman (KU Leuven)
- Finland: Jyrki Huusko (VTT)
- France: Didier Bourse (Nokia)
- Germany: Valerio Frascolla (Intel)
- Greece: Panagiotis Demestichas (WINGS ICT Solutions).
- Italy: Giovanna D'Aria (Telecom Italia), Nicola Ciulli (Nextworks)
- Latvia: Neils Kalniņš (Electronic Comms. Office)
- Luxembourg: Theodoros Rokkas, Ioannis Neokosmidis (inCITES)
- Netherlands: Toon Norp (TNO)
- Norway<sup>1</sup>: Hanne-Stinne Hallingby, Hakon Lonsethagen (Telenor)
- Serbia<sup>2</sup>: Lazar Berbakov (Pupin I.)
- Spain: Carles Antón-Haro (CTTC), Ignacio Berberana (IMDEA)
- Sweden: Erik Strom (Chalmers)

**MANY THANKS**

**for your support !!**

<sup>1</sup> Norway participates in EU's single market through the EEA agreement.

<sup>2</sup> As of December'20, Serbia holds a candidate state member status.

# 5G/B5G/6G Activities

## Promoted by Member States



# Austria

# 5G Frequency Auctions

- Description: Decision on the allocation of various frequency bands for the realization of 5G network.
  - 3.4-3.8 GHz band: [decision](#)
  - Multiband 800/900/1800 MHz: [auction](#)
  - 26 GHz consultation: [consultation](#)



- Public body in charge:
  - Rundfunk und Telekom iRegulierungs GmbH.
- Further information:
  - RTR [website](#)

# 5G Strategy Austria



The voice of the European industry for the development and evolution of 5G

- Description: This present strategy aims at achieving the rollout of the 5G mobile communications standard with optimized framework conditions, and aims at harnessing the associated opportunities for citizens, the economy, industry and science.
- Public bodies in charge:
  - Federal Ministry of Austria Agriculture, Regions and Tourism.
- Further information:
  - 5G strategy [website](#)
  - 5G strategy [document](#)





# Belgium



# Allocation of Frequency Bands and Norms

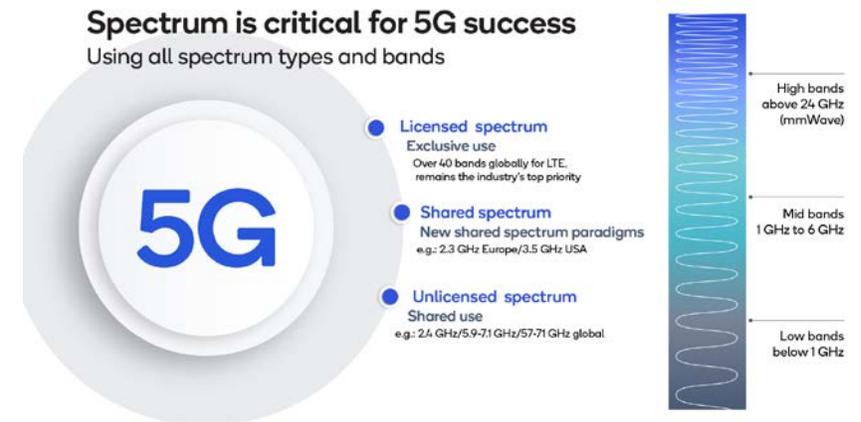
- Description: In general, the allocation of licenses for 5G is delayed due to disagreement between regional and federal governments [1]. In the meantime, 5 temporal licenses are given for frequencies in the range 3.6-3.8 GHz [2]. There was a consultation for the use of 26 GHz, but no plans yet [3]. No plans to update environment norms although the regulator calls higher norms of at least 14,5 V/m up to 41,25 V/m [4].
- Further information:
  - [1] Government: Another year until 5G frequencies are auctioned, [news](#)
  - [2] BIPT grants temporary 5G user rights to five operators, [BIPT website](#)
  - [3] Consultation on the use of the 26 GHz band for 5G, [BIPT website](#)
  - [4] Technical report on the impact of current radiation standards in Brussels on the deployment of radio networks, [report](#)



# Finland

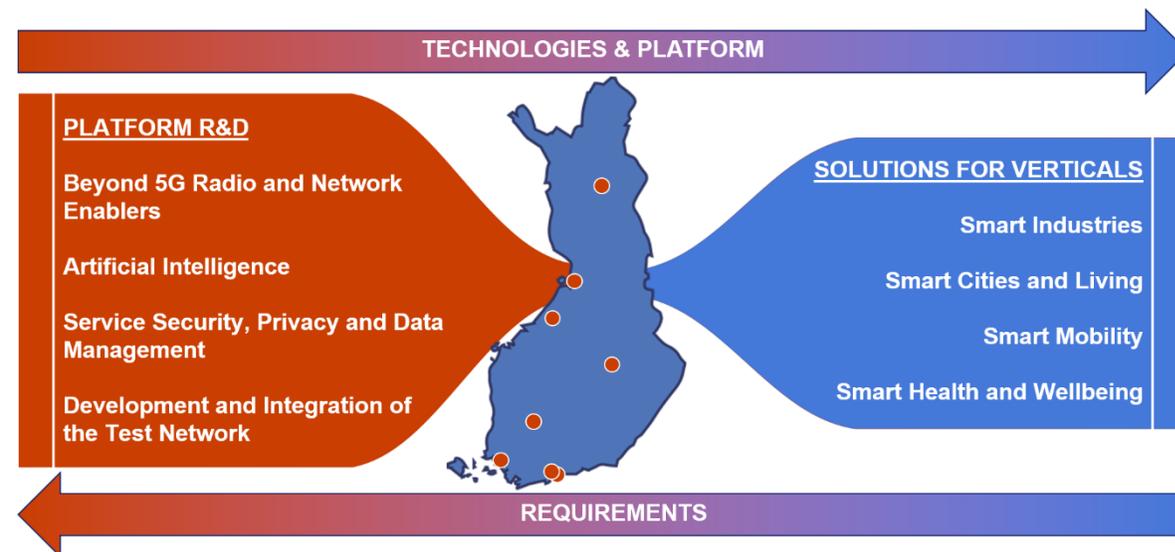
# Frequency bands for 5G use, trials and pilots

- Description: National regulatory body, Traficom, has allocated frequency bands for 5G networks including bands for private local radio networks as well as for testing and trialing purposes, e.g. 3400-3800 MHz and over 24 GHz millimeter wave bands. Stakeholders in testing, research and education can apply fixed term radio licenses for 5G frequencies from specific defined areas in Cities of Espoo, Oulu and Tampere.
- Public bodies in charge:
  - Finnish Transport and Communications Agency (Traficom)
- Further information:
  - Traficom [website](#)



# 5G Test Network Finland Ecosystem Initiative

- Description: 5G Test Network Finland (5GTNF) is an open innovation ecosystem supporting 5G and beyond technology research and validation, product developing, piloting and experiments. The ecosystem promotes the 5G technologies in vertical industry domains and support the activities for large scale trials and pre-commercial deployment of new communication technologies. The ecosystem partially funded by Finnish Government through Business Finland programmes.
  - Not-for-profit ecosystem
  - Over 40 industry and academic partner organizations
- Public body in charge:
  - VTT Ltd
- Further information:
  - 5GTNF [website](#)



# 5G Momentum



- Description: 5G Momentum is a ecosystem initiative driven by The Finnish Transport and Communications Agency Traficom. The main target of the initiative is to promote and boost new trials and solutions in 5G. The ecosystem arranges and host networking events and workshops for e.g. vertical industry stakeholders to promote benefits and opportunities on 5G, linking together also other 5G related ecosystems in Finland. 5G Momentum provides also channel for discussion on frequency allocations and regulatory issues for e.g. 5G testbeds stakeholders and developers and vertical stakeholders with Traficom as a national licensing and regulation authority.
- Public body in charge:
  - Finnish Transport and Communications Agency Tra
  - Finnish Meteorological Institute
  - Finnish Transport Infrastructure Agency
- Further information:
  - Traficom [website](#)





# Challenge Programs supporting 5G for verticals

- Description: Finnish Ministry of Employment and the Economy controlled Business Finland agency is supporting development of 5G technology and applications for vertical segments e.g. through its challenge driven programmes including Digital Trust Finland and New Space Economy. New Space Economy promotes e.g satellite, HAPS and ground station communications and solutions, and Digital Trust especially cybersecurity. In addition, different ecosystems supported by Business Finland have been established for example around logistics, harbour operations, mining, future city, autonomous vehicles and future factories.
- Public bodies in charge:
  - Business Finland
- Further information:
  - Business Finland [agency website](#)





# France

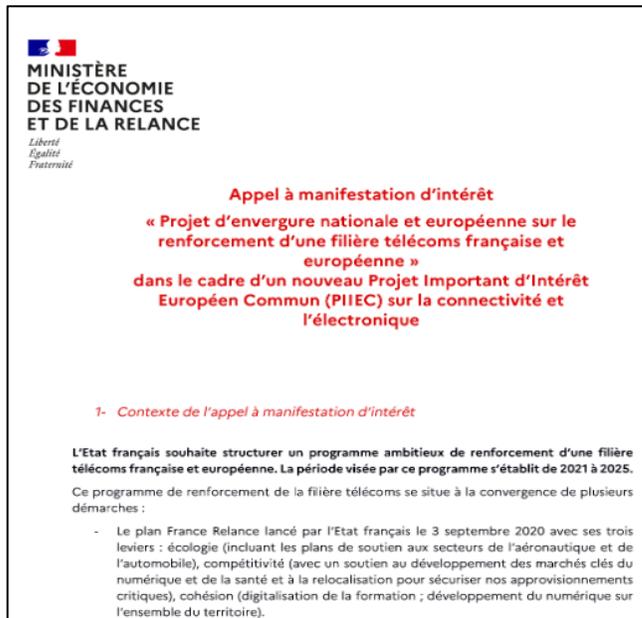
# Call for proposals on Telecom Networks Sovereignty

- Description: A French Call for proposals on *Telecommunication Networks Sovereignty* was opened in September 2020 with submission deadline on June 2021. In the context of the Recovery Plan, this calls is targeted to accelerate 5G industrial applications, projects to address 5G experimental platforms and 5G R&D to accelerate verticals sectors' applications.
- Public bodies in charge:
  - Ministère de l'Économie, des Finances et de la Relance (Direction Générale des Entreprises)
- Further information:
  - Telecom Networks Sovereignty: [Call for proposals](#)



# Call for Expression of Interest: Flagship Projects

- Description: An *Appel à Manifestation d'Intérêt* (AMI) to identify flagship projects to reinforce French and European Telecoms Sector was launched in Nov'20 with submission deadline in Jan'21. The program covers the 2021-2025 period and addresses Telecom Infrastructure, Software, Hardware and 5G/6G Services. It is aimed to identify potential participants to the forthcoming potential Important Project of Common European Interest (IPCEI) on Microelectronics and Connectivity.



- Public bodies in charge:
  - Ministère de l'Économie, des Finances et de la Relance (Direction Générale des Entreprises)
- Further information:
  - Expressions of Interest: [call](#)



## CSF Flagships Project on 5G



- Description: The *Comité Stratégique de Filière (CSF) Infrastructures Télécoms* (Telecom Infrastructure Sector Strategic Committee) launched a call in Dec'19 targeting to structure Telecom Infrastructure Sector around large Projects: 5G, Smart Territories, Export and Employment. One of the CSF flagships projects is related to 5G multi-site and multi-operator 5G experimental platforms, accessible to start-ups, SMEs and large organizations.
- Public bodies in charge:
  - Conseil National de l'Industrie.
- Further information:
  - Telecom Infrastructure Sector Strategic Committee: [website](#)



## French 5G Roadmap and ARCEP “Battle Plan”

- Description: A French 5G Roadmap was released in July 2018 which including 4 priorities: frequency (re)allocation, stimulation of new industrial use cases, infrastructure deployment, and smooth deployment. The latest updates in the ARCEP “Battle Plan” can be found in the link below. Besides, the French Government and ARCEP launched a Call for 5G Experimental Platforms in the 26 GHz band in Jan’19, and the first 11 selected projects kicked-off in Oct’19.
- Public bodies in charge:
  - Ministère de l’Économie, des Finances et de la Relance
  - Autorité de régulation des communications électroniques (ARCEP)
- Further information:
  - French 5G [roadmap](#)
  - [Dossier](#) on 5G
  - [Call](#) for the creation of 5G trial platforms in the 26 GHz band





# Germany

## 5G Spectrum allocation – Current Status

- Description: In Germany, 5G bands have been auctioned and are available for commercial use since several quarters. In particular:
  - **700 MHz band** (2x30 MHz). Auction happened back in 2015. Deutsche Telekom, Vodafone and Telefonica got 2x10 MHz each. Limited roll-out as of today due to the need to clear the band from broadcasting services
  - **3.5 GHz band** (400 MHz). The lower 300 MHz (3.4 - 3.7 GHz) were auctioned in 2019 (DT and Vodafone 90 MHz each, Telefonica 70 MHz, 1&1 Drillisch 50 MHz). The top 100 MHz(3.7 - 3.8 MHz) were put aside for local licensing for industrial and other vertical users. The procedure to assign to applicants is still ongoing.

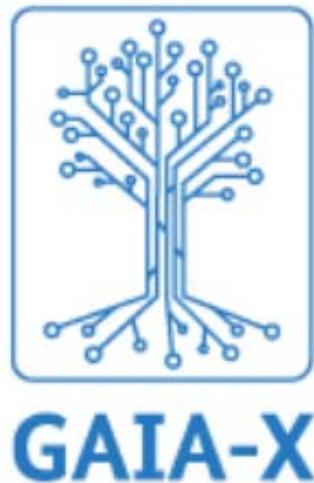
In Q2/2021, figures related to 2020 5G deployment will be reported by the BNetzA.

- Public body in charge:
  - Frequency regulatory body of Germany ([BNetzA](#))
- Further information:
  - 5G [Strategy](#) for Germany (2018)
  - News on 5G deployments by major mobile operators in Germany: [Deutsche Telekom](#), [Vodafone](#), [Telefonica](#), [1&1](#).

# GAIA-X: A Federated Data Infrastructure for Europe



- Description: The goal of the GAIA-X initiative is to create a proposal for the next generation of a data infrastructure for Europe: a secure, federated system that meets the highest standards of digital sovereignty while promoting innovation. Several Germany-based companies, supported by the German government, started the initiative some quarters ago. Then France joined the initiative as a second pillar of GAIA-X, which is currently extending its reach to all EU members.



- Public body in charge:
  - Under the GAIA-X umbrella, and with German national funds, a set of funded project call was issued earlier this year by the Federal Ministry of Economic Affairs and Energy ([BMW](#)i)
- Further information:
  - GAIA-X [webpage](#)

# German platform for Artificial Intelligence

- Description: Among the several initiatives aiming at fostering a thriving ecosystem for research in Germany, one of the most important is the German platform for Artificial Intelligence, called *Lernende Systeme*. Its goal is to help develop the field of AI for the benefit of both individuals and society as a whole. Several working groups focus on topics relevant for 5G and 6G systems, among which:
  - Mobility and Intelligent Transport Systems
  - Hostile-to-life Environments
  - Health Care, Medical Technology, Care
  - Technological Enablers and Data Science
- Public body in charge:
  - National Academy of Science and Engineering, with the support of the Federal Ministry for Education and Research (BMBWF)
- Further information:
  - Lernende Systeme [website](#)



# German Platform for Industry 4.0

- Description: Another important platform organized by the German government (BMBF and BFWi) is focusing on Industry 4.0, with the aim of shaping the digital transformation in manufacturing. This initiative fosters the applications of research proposals and is organized in six working groups, including those on ‘Technology and Application Scenarios’ and ‘Security of Networked Systems’. The project has created a position paper on Industry 4.0 vision in 2030.



- Public bodies in charge (as sponsors):
  - Federal Ministry for Education and Research (BMBF)
  - Federal Ministry of Economic Affairs and Energy (BMWi)
- Further information:
  - Industrie 4.0 [website](#)
  - 2030 Vision for Industrie 4.0: [position paper](#)



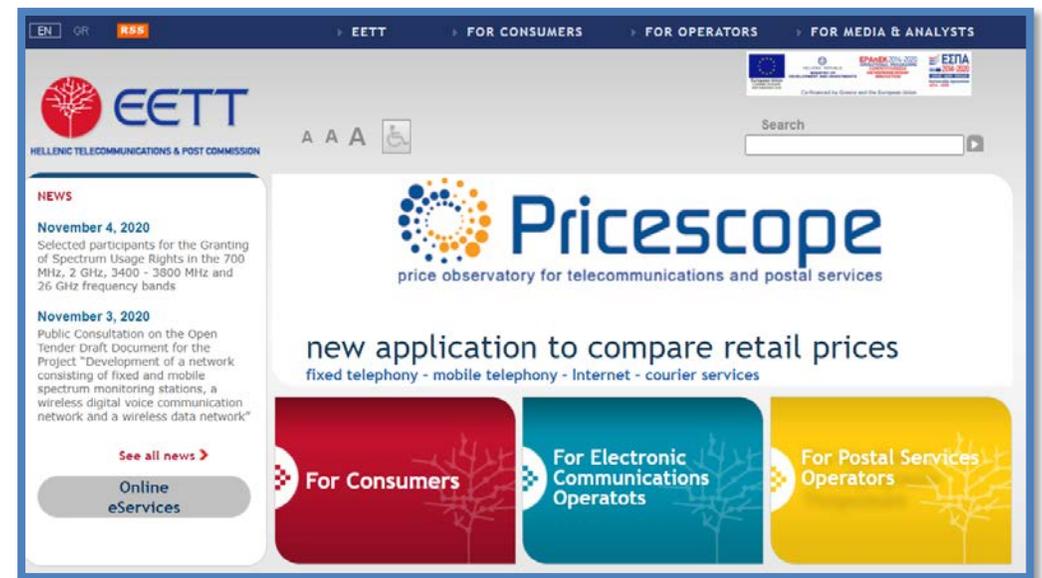


# Greece



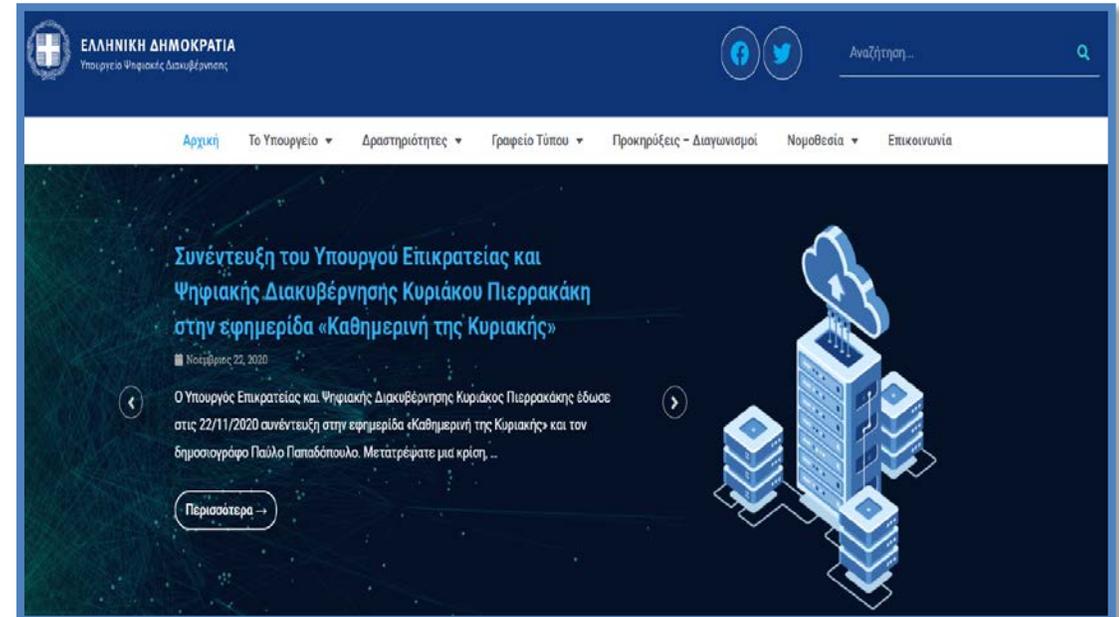
# Greece's plan on 5G

- The Hellenic Telecommunications & Post Commission (HTPC) will perform an auction in December for 5G mobile networks.
- All available frequencies will be auctioned so that telecommunications providers have a very clear picture of how they will develop their 5G infrastructure.
- Public bodies in charge:
  - Hellenic Telecommunications & Post Commission
- Further information:
  - HTPC [website](#)
  - Process for 5G licenses gets under way: [news](#)



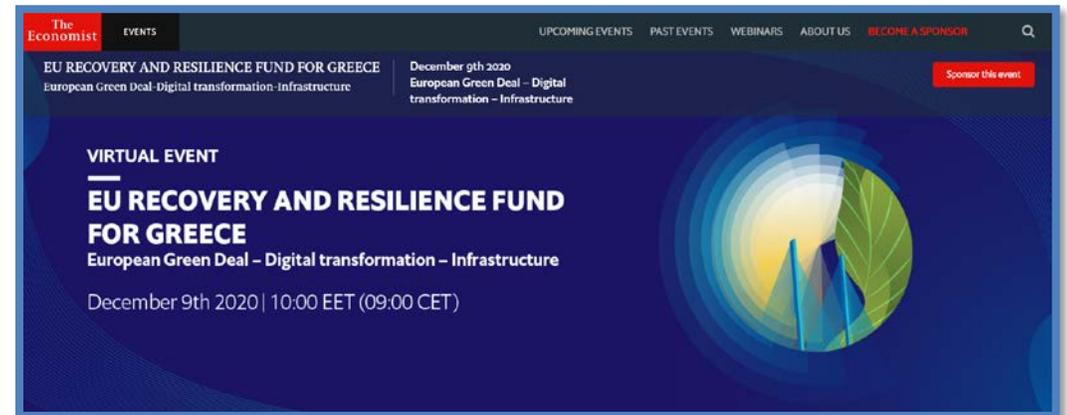
# Funding of 5G start-ups and services in Greece

- The "Festos" fund has reserved the 25% of the HTPC auction money for setting the foundation of the 5G ecosystem and stimulating startups, services and products
  - development of vertical industries in sectors such as transport, logistics and supply chain, manufacturing, transportation networks and health services
- Public bodies in charge:
  - Ministry of Digital Governance
- Further information:
  - Ministry of Digital Governance: [website](#)
  - Regulation of 5G Networks and the creation of “ Festos Fund” : [news](#)



# Funding of 5G start-ups and services in Greece

- Description: The “Resilience and Recovery Fund” (RRF) will also be part of the measures to strengthen the 5G ecosystem, but also the digital readiness of public organizations and companies.
- Public bodies in charge:
  - Ministry of Digital Governance
  - European Union
- Further information:
  - Recovery [Plan](#) Europe.
  - EU Recovery and Resilience [Fund](#) for Greece



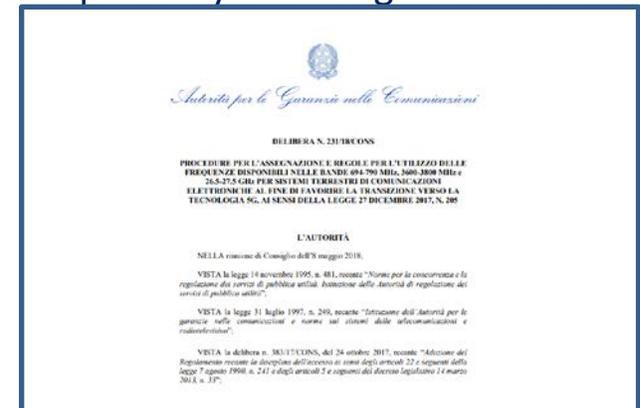


# Italy

# Cognitive Survey on 5G

## Assignment procedures and rules for 5G Spectrum use

- November 2016: AGCOM launched a Cognitive survey on 5G, concerning the development prospects of wireless and mobile systems towards the fifth generation (5G) and the use of new spectrum portions above 6 GHz. The Survey results, published in March 2018, confirmed the underway process to define the 5G spectrum assignments rules as its “natural spin-off”
- May 2018: Resolution No. 231/18/CONS “ Assignment procedures and rules for the use of the frequencies available in the 694-790 MHz, 3600-3800 MHz and 26.5-27.5 GHz bands for terrestrial systems of electronic communications in order to favor the transition to 5G, under the Law 27 December 2017, n. 205”
  - Follows Resolution no. 89/18 / CONS, of 26 February 2018, on "Public consultation on the allocation procedures and the rules for the use of the frequencies available in the bands 694-790 MHz, 3600-3800 MHz and 26.5-27.5 GHz for terrestrial systems of electronic communications in order to facilitate the transition to 5g technology, pursuant to Law December 27, 2017, n. 205 ", containing a settlement scheme with the allocation procedures and the rules for the use of available bands, as required by the Budget Law 2018
- Public body in charge:
  - Autorità per le Garanzie nelle Comunicazioni ([AGCOM](#))

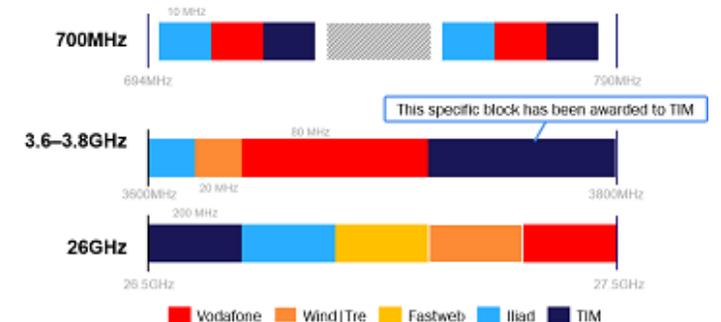




# 5G Frequency Bands Assignments



- Description: In September 2018, the 5G multi-band spectrum auctions included 1,275 MHz auctioned at 700 MHz, 3.6-3.8 GHz, and 26 GHz. Italy was the first Member State to make spectrum for 5G available in all the pioneer bands. Italy was the first European country to auction 1 GHz of the 26 GHz band (second, at world level, after South Korea). Final assignments:
  - TIM: 700 MHz (2x10 MHz), 3.7 GHz (80 MHz), 26 GHz (200 MHz)
  - Vodafone: 700 MHz (2x10 MHz), 3.7 GHz (80 MHz), 26 GHz (200 MHz)
  - Iliad: 700 MHz (2x10 MHz), 3.7 GHz (20 MHz), 26 GHz (200 MHz)
  - Wind Tre: TIM: 3.7 GHz (20 MHz), 26 GHz (200 MHz)
  - Fastweb: 26 GHz (200 MHz)
- 700 MHz available from July 1, 2022 (15.5-year license)
- Coverage obligations @700 MHz and 3.7 GHz (19-years)
- Club Use @26 GHz (19-years license).
- Public body in charge:
  - Ministry of Economic Development (MISE)



analysismason.com

# MISE Call for pre-commercial 5G experimental project proposals at 3.6-3.8 GHz



- March 2017: Public notice for the acquisition of project proposals for the realization of pre-commercial 5G experimental proposals in the 3.6-3.8 GHz spectrum portion, pursuant to the March 16 2017 Directive
- September 2017: Ministry's announcement of 20 September 2017 approving the final design proposals, following the ranking of the best project proposals for the implementation of pre-commercial 5G trials approved by Directorial Determination of the Ministry of 2 August 2017
  - Three winning for three geographical areas, namely:
    - 1) Metropolitan area of Milan assigned to Vodafone Italia
    - 2) Cities of Prato and L'Aquila assigned to Wind3 and Open Fiber
    - 3) Cities of Bari and Matera, assigned to Telecom Italia, Fastweb, and Huawei Technologies Italia
  - A 100 MHz bandwidth of 3.6-3.8 GHz spectrum is provisionally licenced in each geographical area, valid from September 2017 to 2020
- Public body in charge: Ministry of Economic Development (MISE)
- Further information:
  - [https://www.mise.gov.it/images/stories/documenti/Avviso\\_publico\\_16\\_marzo\\_2017\\_-\\_Sperimentazione\\_5G.pdf](https://www.mise.gov.it/images/stories/documenti/Avviso_publico_16_marzo_2017_-_Sperimentazione_5G.pdf)





# Further 5G Policy Headings



- Networks Security – Golden Power

- Decreto legge 25 marzo 2019, n. 22 (convertito with modifications into the law “ Legge 20 maggio 2019, n. 41 intriduces a new article, namely art. 1-bis nella normativa “golden power” (as referred to in Decreto legge 15 marzo 2012, n. 21)
- It specifically regulates national special powers related to 5G networks implementations in order to prevent national security risks

- 700 MHz frequency band clearance process

- August 2018: the institutional group «Tavolo TV 4.0» promoted by MISE was established to harmonise the migration of DTT from the 700 MHz
- June 2019: the roadmap to the frequency band clearance was defined (Decreto Ministeriale 19/06/2019)
- Four geographical areas are defined
- DVBT/MPEG-4 coding to be implemented by 3Q2021
- DVBT-2 standard to be implemented in the whole country by 21-30 June 2022 at the latest

- Public bodies in charge: Italy, MISE

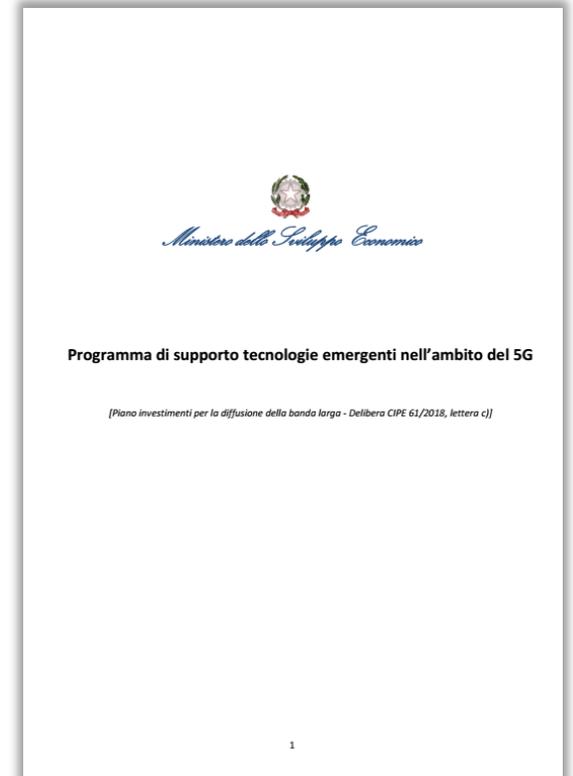
Tema  
 Il seguente decreto-legge:  
 ART. 1  
 Modifica al decreto-legge 15 marzo 2012, n. 21, convertito, con modificazioni, dalla legge 11 maggio 2012, n. 56, recante "Misure in materia di poteri speciali sugli assetti societari nei settori della difesa e della sicurezza nazionale, nonché per le attività di rilevanza strategica nei settori dell'energia, dei trasporti e delle comunicazioni."  
 1. Al fine di un aggiornamento della normativa in materia di poteri speciali in conseguenza dell'evoluzione tecnologica intercorra, con particolare riferimento alla tecnologia 5G e ai contenuti (includi di un suo appropriato uso, reti con implicazioni sulla sicurezza nazionale, al decreto-legge 15 marzo 2012, n. 21, convertito, con modificazioni, dalla legge 11 maggio 2012, n. 56, dopo l'articolo 1 e' inserito il seguente:  
 «Art. 1-Qua (Poteri speciali inerenti le reti di telecomunicazione elettronica a banda larga con tecnologia 5G). - 1. Costituiscono, ai fini dell'esercizio dei poteri di cui al comma 2, attività di rilevanza strategica per il sistema di difesa e sicurezza nazionale i servizi di comunicazione elettronica a banda larga basati sulla tecnologia 5G.  
 2. La stipula di contratti o accordi aventi ad oggetto l'acquisto di beni o servizi relativi alla progettazione, alla realizzazione, alla manutenzione o alla gestione delle reti inerenti i servizi di cui al comma 1, ovvero l'acquisizione di componenti ad alta





# Support program for emerging technologies

- Description:
  - “Programme to support emerging technologies”
  - Scope: blockchain, AI, IoT, 5G
  - 2 “Axes”:
    - a) “Houses of Emerging Technologies” (30 MEUR); i.e. city/municipality hubs for tech transfer [still not selected]
    - b) R&D projects (15 MEUR), for consortia made by PAs, universities and research institutes, along with operators owning 5G freqs [6 projects selected]
  - The focus is mostly on verticals
- Public body in charge:
  - MISE (Ministry for Economic Development)
- Further information:
  - [Call](#) for proposals





# Latvia



# First 5G Military Test Site in Europe



- Description: The test site is located at the Ādaži Military Base where the Canadian-led NATO battlegroup sits. It comprises a functioning 5G base station and 5G coverage throughout the site, making it possible to test and create new generation mobile technologies.
- Public bodies in charge:
  - Latvian National Armed Forces (in collaboration with Mobile Network LMT)
- Further information:
  - First 5G Military Test Site in Europe: [news](#)





# Luxembourg

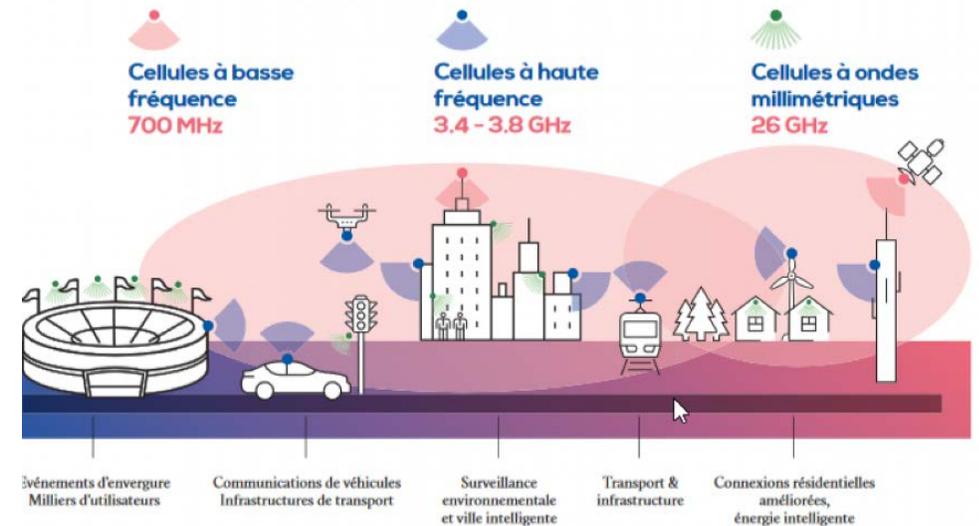


# Luxembourg's 5G strategy



- Description: Luxembourg's 5G strategy was published at the end of 2018. It presents the importance of 5G, the role of public authorities, the plan for frequency auctions, regulatory aspects and the areas of importance for Luxembourg. Finally, it presents the roadmap for 5G deployment in Luxembourg.

- Public bodies in charge:
  - Department of Media, Telecommunications and Digital Policy (SMC) Luxembourg
  - Regulatory Institute (ILR)



- Further information:
  - Luxembourg's 5G strategy: [website](#), [document](#), [experts report](#)

# 5G call for projects



- Description: In June 2019, the Department of Media, Telecommunications and Digital Policy (SMC) launched a call for projects within the framework of the national 5G strategy. The aim of the call for projects is to facilitate the emergence of innovative technologies and services based on the 5th generation (5G) mobile communication network or of technologies with certain comparable characteristics. Any type of establishment (private or public legal entity) was eligible to submit a project and projects could be proposed by individual actors or by actors grouped within a consortium. A total of 29 projects were submitted for evaluation.
- Public body in charge:
  - Department of Media, Telecommunications and Digital Policy (SMC)
- Further information:
  - [Call](#) for proposals



# 5G Spectrum auctions



- Description: In July 2020 Luxembourg Regulatory Institute (ILR) has allocated frequency bands for 5G networks in the 700Mhz and 3600Mhz bands. The licenses provide for a deployment schedule as well as coverage obligations which aim in particular to offer 5G services in the territory of the municipality of Luxembourg towards the end of 2020 and national 5G coverage no later than 2025. In October 2020 a public consultation was launched to detect the needs, applications or possible constraints of the deployment of 26 GHz
- Public bodies in charge:
  - Luxembourg Regulatory Institute (ILR)
- Further information:
  - Frequency bands 700 MHz and 3.6 GHz: [description](#)
  - Frequency bands 26 GHz: [description](#)





# Luxembourg 5G conference



- Description: Luxembourg organizes an annual “Luxembourg 5G conference”. The first one was organized in 29/11/2018 at the European Convention Centre Luxembourg. The second was organized from December 11 to 12, 2019 at the European Convention Center Luxembourg (ECCL) by the Media and Communications Service of ministry of state.
- Public bodies in charge:
  - Department of Media, Telecommunications and Digital Policy (SMC)
- Further information:
  - Edition 2018: [website](#)
  - Edition 2019: [website](#)

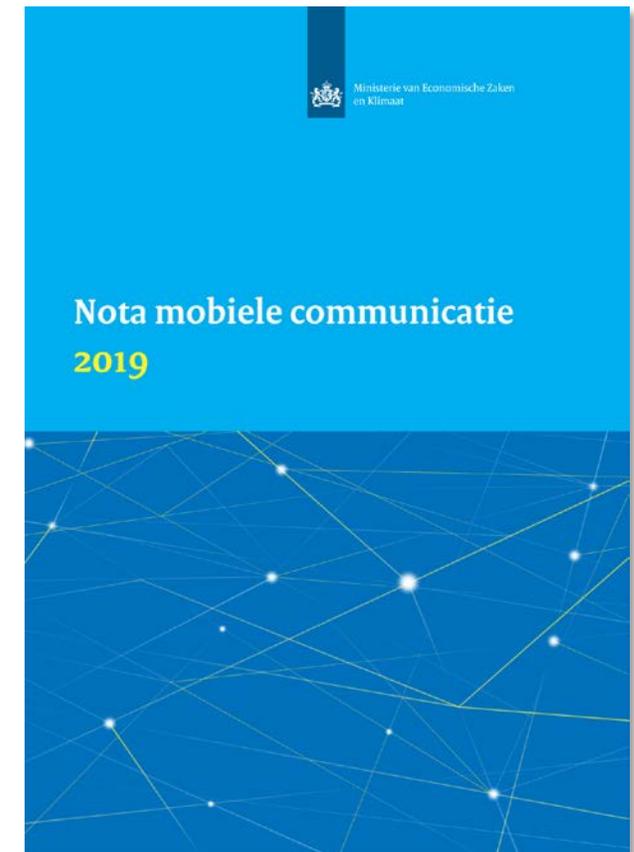




# The Netherlands

# Memorandum Mobile Communication

- Description: Dutch policy document on mobile communication. Specific plans related to 5G:
  - 700 MHz auction in 2020 (done)
  - 3,5 GHz first part in 2022
  - 3,5 GHz second part in 2026 (including 100 MHz for local use)
- Public bodies in charge:
  - Dutch Ministry of Economic Affairs and Climate
- Further information:
  - De Nota [Frequentiebeleid](#)





# 5Groningen



- Description: The Economic Board Groningen initiated the 5Groningen programme to explore how 5G could create and accelerate new innovations. One of the main goals is to help SMEs in the north and center of the Groningen province to become leaders in their respective sectors by harnessing the potential of 5G. At the 5G Field Lab, entrepreneurs and non-profit organizations collaborate with experts from the telecom industry, knowledge institutes and government agencies to test applications of 5G.
- Public bodies in charge:
  - Economic Board Groningen
- Further information:
  - 5Groningen [website](#)
  - In 2018, 5Groningen embarked upon a close collaboration with the European Space Agency's (ESA) Business Applications unit. The partners are working together to test how 5G and satellite information can complement and enhance each other.





## Do IoT FieldLab



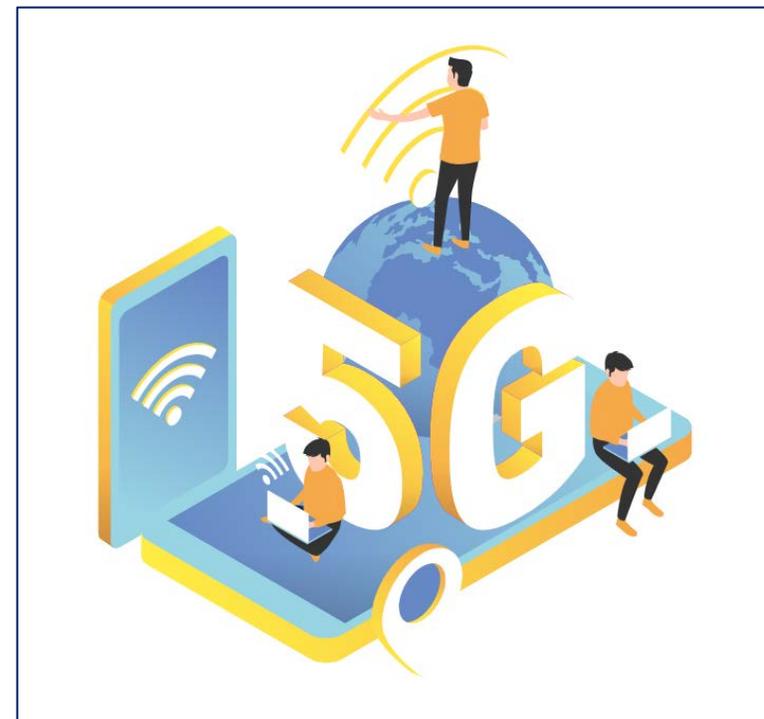
- Description: Do IoT Fieldlab drives the acceleration of innovation in the field of Internet of Things (IoT). 5G mobile communication offers a great opportunity for the large-scale introduction of the Internet of Things. The fast connections, high reliability and short response times of 5G make it possible to bring new applications to the market in the areas of mobility, logistics, agriculture, health and safety. The Fieldlab supports the development of these new applications.
- Public bodies in charge:
  - Province of Zuid Holland
  - Metropool Region Rotterdam-The Hague
  - Holland Rijnland Region
  - Municipalities of Delft and Katwijk
- Further information:
  - Do IoT FieldLab [website](#)



# 5GHub



- Description: 5G Hub in Brainport Eindhoven is a collaboration between Brainport Development, High Tech Campus, Ericsson, and VodafoneZiggo. They research and test the possibilities of new technologies. And they stimulate their innovative applications. This not only concerns 5G, but also, for example, artificial intelligence, virtual reality, augmented reality, blockchain and photonics.
- Public bodies in charge:
  - Brainport Development is the economic development company that stimulates innovation and growth in the region on behalf of the 21 municipalities in Southeast Brabant
- Further information:
  - 5G Hub [website](#)





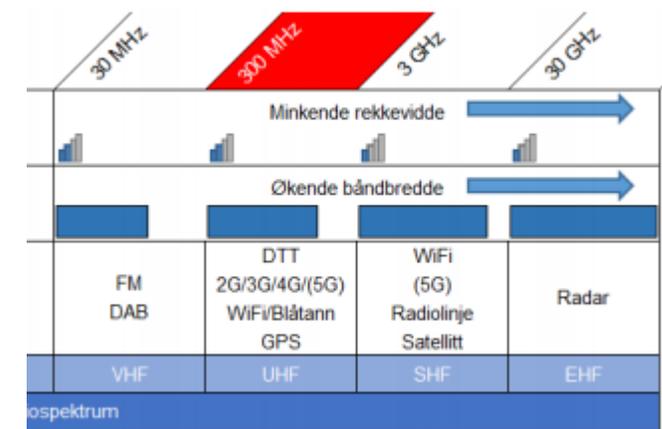
# Norway



# 5G spectrum auctions, Norway



- Description: In general frequency bands are auctioned for nationwide coverage purposes. The demand for private/local frequencies is considered consecutively, and the public is inquired about the need. For 2021, it is considered arranging for private (regional/local) use of 2.6 GHz (2500-2690 MHz) and 3.6 GHz (3400-3800 MHz). On demand, temporary frequency allowances for non-commercial purposes can be allocated, normally for free. Of the 2.3 frequency, 2301-2323 MHz is allocated for tests, till 31 December 2022. Testing can be allowed in 3.6GHz and 2.6GHz.
- Public body in charge:
  - Norwegian Communication Authority (Nkom)
- Further information (in Norwegian):
  - [Allocation of 5G frequency bands](#)
  - [Frequency resources for regional/local/private networks](#)
  - [Testing](#) of frequency bands



Nkom, 2019, Frekvenskompass for mobil

# Initiatives for Transnational Collaboration, Norway

## Description:

- In 2018, the [Nordic prime ministers signed](#) a 5G Letter of Intent
- In 2019, [Nordic and Baltic ministers reinforced](#) the initiative with another a Nordic-Baltic 5G strategy.
- Topics for collaboration:
  - Enable 5G testing
  - Coordinate 5G frequency bands
  - Remove obstacles
  - Encourage certain sectors, e.g. transport and emergency



[Foto: Statsministerens kontor](#)

## Further information:

- [Letter of Intent](#) - Development of 5G in the Nordic countries, 2018
- Nordic- Baltic [5G Strategy](#), 2019

# Public funding 5G research and innovation

Description: Two publicly-funded research calls have led to 5G relevant research in Norway.

Public body in charge:

- The Norwegian Research [Council](#)

- ICTplus (Norwegian).
  - [Sequences and Their Applications](#), U. Bergen
  - [5G Management and Orchestration for Data and Network Integration](#), U. Stavanger
  - [Cooperative Human Activity Recognition and Localization for Healthcare and Wellbeing](#), U. Agder
  - [Lightweight Cryptography for Future Smart Networks](#), NTNU, Gjøvik
- National research infrastructure
  - [Reconfigurable Radio Network Platform](#)
  - [Norwegian Infrastructure for drone-based research, mapping and monitoring in the coastal zone \(5G-relevant\)](#)
  - [Norwegian centre for Minimally invasive Image guided Therapy and medical technologies](#)

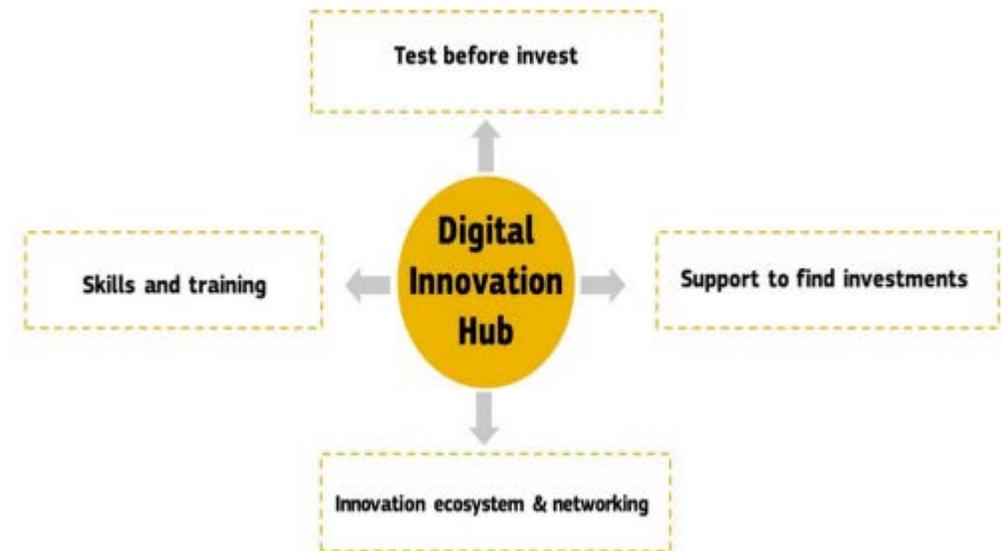


[Foto: Jonas Bendiksen](#)



# Innovation Norway

- Description: As of November 2020, eight groups are competing for being a Norwegian hub in the initiative European Digital innovation Hub. As a rule, the initiatives are building on already existing initiatives local/regional/national funding. The hubs and initiatives belong to the backbone for Norwegian 5G development.
- Public body in charge:
  - [Innovation Norway](#)
- Further information:
  - [Eight potential Norwegian hubs](#)



[EU, European Digital Innovation hubs](#)



# Serbia



# Strategy for Development of New Generation Networks by 2023

- Description: It defines the measures for providing infrastructure for the development of the Digital Single Market in Serbia, in accordance with the EU strategic framework in this area.
  - Published in Official Gazette of RS 2018.
- Public bodies in charge:
  - Ministry of Trade, Tourism and Telecommunications
- Further information:
  - <http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2018/33/1>

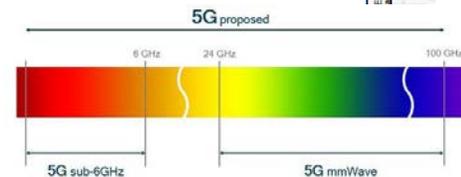
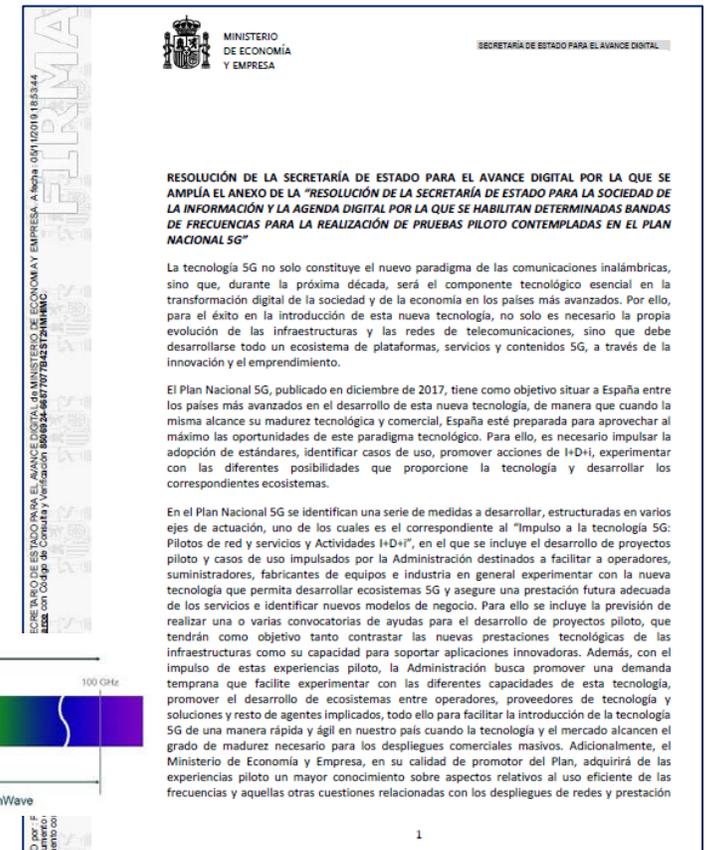




# Spain

# Allocation of Frequency Bands for Trials and Pilots

- Description: Decision on the allocation of various frequency bands for the realization of 5G trials and pilots. Specifically, for each pilot it includes up to 1 GHz in the 26 GHz (mmW) band, up to 100 MHz in the 3.6-3.8 GHz band, and 2x10 MHz in the 700 MHz band.
- Public body in charge:
  - Ministry of Economy and Enterprises
  - State Secretary for Digital Transformation
- Further information:
  - [Resolution](#) on band allocation



# Spain's 5G National Plan (2021-25), Preparatory Work

The voice of the European industry for the development and evolution of 5G



- Description: Leveraging on the very successful 'Plan Nacional 2017-2020', the Spanish Government is currently (Q4/2020) preparing its follow up. Main expected action lines: spectrum management & regulation, support to R&D&I and pilot activities, regulatory aspects, int'l cooperation and collaboration, etc.
- Public body in charge:
  - State Secretary Telecomm. and Digital infrastructures
- Further information:
  - National [Plan](#) 2017-20



# Strategic Agenda: Digital Spain 2025



- Description: Measures, reforms and planned investments to achieve the following strategic goals: foster deployment of 5G technology (100% spectrum allocated), guaranteed digital connectivity/ bridge digital divide (100 Mbps for 100% pop.), strengthen digital competences (80% pop. basic), reinforce cybersecurity (+20.000 cybersec/AI/data experts), accelerate digital transformation public admin. & companies, launch of tractor projects for digital transformation (-10% emissions), etc.



- Public body in charge:
  - Ministry of Economic Affairs and Digital Transformation
- Further information:
  - Strategic Agenda: [full document](#)
  - Strategic Agenda: [summary](#) by COIT



# Creation of 5G National Observatory



- Description: Initiative aimed to
  - identify main (inter)national actors and ongoing initiatives in 5G
  - share knowledge by means of the elaboration of reports, best practices documents, and the organization of events
  - foster the creation of a 5G ecosystem in Spain.
- Public body in charge:
  - State Secretary of Telecommunications and Digital infrastructures
  - Red.es (also Mobile World Capital)
- Further information:
  - ON5G [website](#),
  - ON5G [reports](#)
  - ON5G [publications](#)
  - ON5G [directory](#)





# Funding of 5G Trials and Pilots



- Description: Projects are aimed to underpin the deployment of first 5G networks, to experiment with novel network management techniques and to develop novel use cases with the involvement of all stakeholders, including final users. To date, two calls (Nov'19, July'20) have been launched, resulting into 10 trials and pilots funded (+80 M€ budget).
- Public body in charge:
  - Red.es
  - Ministry of Economic Affairs and Digital Transformation
- Further information:
  - [Call](#) for Pilots and Trials
  - [Press release](#)

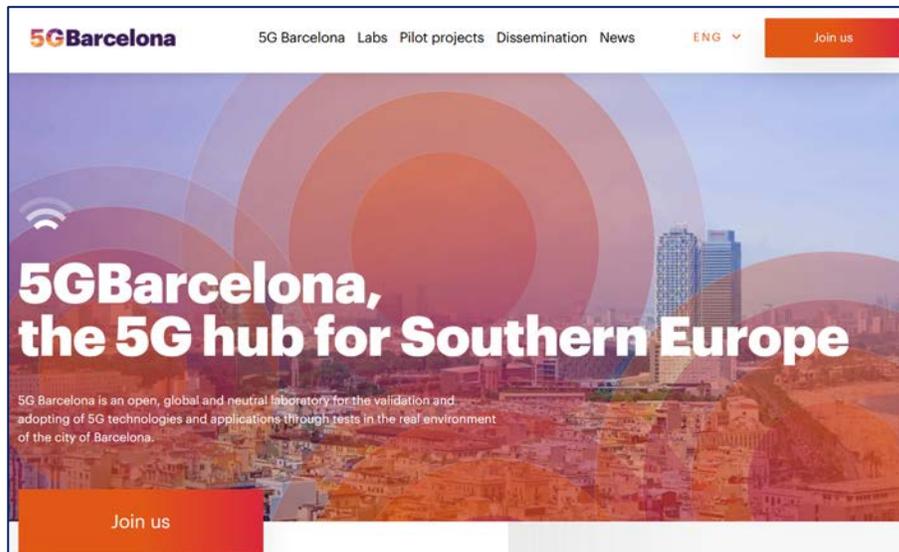




# 5G Barcelona Initiative



- Description: 5G Barcelona is a public-private initiative aimed to position Barcelona and Catalonia as an innovative and open environment for the validation and adoption of 5G technologies and applications in a real-life environment. The initiative will create synergies within the 5G ecosystem and offer an experimental infrastructure to test, prototype and implement new digital solutions.



- Public bodies in charge:
  - Generalitat de Catalunya
  - Barcelona City Hall
  - (also MWCB, CTTC, UPC, I2CAT, ATOS)
- Further information:
  - 5G Barcelona: [website](#)



# Sweden

# Allocation of Frequency Bands for Trials and Tests

- Description: PTS has decided on a spectrum plan for 5G tests based on international documents, e.g., the EU Commission 5G Action Plan with timelines, Radio Spectrum Policy Group (RSPG) Opinion Strategic roadmap towards 5G for Europe, and ITU World Radio Conference (WRC-19) identification of frequency bands for IMT. PTS wants that it should be easy to continue trials at 3.4–3.6 GHz and 26,5–27,5 GHz, and to initiate tests at 3.6–4.2 GHz, 40.5–43.5 GHz, 45.5–47.0 GHz, 47.2–48.2 GHz and 66–71 GHz.
- Public body in charge:
  - Post- and telestyrelsen (PTS), PTS is a public authority reporting to the Ministry of Infrastructure, Energy and Digital Development
- Further information
  - Allocation of frequency bands

# Allocation of Commercial Frequency Bands

- Description: Decision on allocation the 2.3 and 3.5 GHz bands was expected during 2020. The process has been delayed due to legal challenges by Huawei and Hi3G to appeal the PTS decision to ban Huawei and ZTE equipment in Sweden's 5G networks.
- Public body in charge:
  - Post- and telestyrelsen (PTS), PTS is a public authority reporting to the Ministry of Infrastructure, Energy and Digital Development
- Further information:
  - Four companies approved for participation in 3.5 GHz and 2.3 GHz auctions: [press release](#).
  - Public invitation to auction in the 3.5 GHz band: [press release](#)
  - Decision to limit the number of licenses in the 3.5 GHz and 2.3 GHz bands: [decision](#)

# Umeå 5G Initiative



- Description: Umeå 5G is a venture to establish Umeå as Sweden's first 5G city. Umeå city as a whole will form a test environment for the development of new digital products and services to benefit society and citizens. Unclear if this initiative is still active.
- Public bodies in charge:
  - Umeå municipality
  - Umeå University
  - Umeå Energi
  - Västerbotten County Council
  - Umeå Science Park
- Further information:
  - [Press release](#)



Photo: Johan Gunseus



# **5G/B5G/6G Activities conducted by Private Companies and Other Public Bodies**



# Belgium: 5G deployments



- First 5G light network launched in 30 municipalities by Proximus
  - Refarming of 2.1 GHz bands
- Private & public 5G deployment in Brussels Airport
  - By CityMesh and Proximus
- 5G for the port of Antwerp
  - For drones, autonomous ships
  - By Orange



# Belgium: 5G for vehicular and drone comms

- Description: Vehicular communication (EU and national funds). Various funded projects related to vehicular and drone communication use cases for 5G.

- Public body in charge: national funding agencies

- FWO: [www.fwo.be](http://www.fwo.be)
- VLAIO: [www.vlaio.be](http://www.vlaio.be)



- Smart Highway
- SErVO

- More information: Drone communication (national funds):

- Omnidrone, [website](#)
- HAI-SCS, [website](#)
- ICON 5GUARDS, [website](#)



## Belgium: 5G H2020 projects awarded



- Description: Universities and research centra quite active in beyond 5G research: DEDICAT 6G; VITAL-5G; DAEMON; MARSAL; REINDEER; HERMES. Imec's research programme on 'above 100 GHz' [1]
- Public body in charge:
  - H2020
  - Imec.be
- More information:
  - [1] Scalable and energy-efficient 6G devices, [research program](#)





## Finland: 6G Flagship Ecosystem

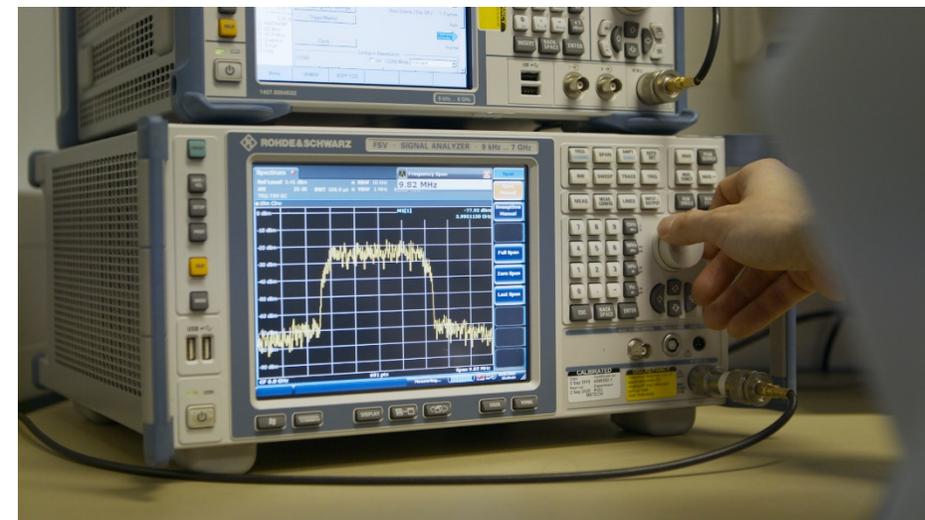


- Description: The Academy of Finland funded 6G Flagship project is part of Finnish Flagship Programme. The 6G Flagship is focusing on development of wireless technologies, exploring the implementation 5G and development of the technologies to enable 6G and 6G standard. The Flagship goals include to support speeding up the digitalization in society and industry in bringing the 5G standard to the commercialisation stage by carrying out large pilots with a test network. The 6G Flagship is led by University of Oulu and public ecosystem partners include Aalto University, BusinessOulu, Oulu University of Applied Sciences and VTT Ltd.
- Public bodies in charge:
  - Finnish Academy
  - University of Oulu
- Further information:
  - 6G Flagship initiative, [website](#)



# Finland: Future Wireless Research Infra Initiative

- Description: FUWIRI (FUture Wireless Research Infrastructure) is research infrastructure development initiative for Beyond 5G and 6G research. The funded development project support investments for education, research and development platform for future wireless technologies, and is partially funded by the Academy of Finland together with participating organizations, Aalto University, Tampere University, University of Oulu and VTT Ltd.
- Public bodies in charge:
  - Aalto University
  - Tampere University
  - University of Oulu
  - VTT Ltd
- Further information:
  - Research Infrastructures [programme](#)





## Germany: B5G / 6G Initiatives

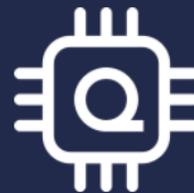


- On **B5G** there are lots of ongoing initiatives driven by industry, and especially universities and research centers, with trials and proof-of-concepts. The most numerous are the ones driven on different topics by the Fraunhofer network of research centers.
- Very few entities are claiming to work on **toward 6G** topics, the most known of which is the one driven by Prof. Fettweis in the 5G+Lab at Technische Universität Dresden (TUD) under the Vodafone chair.
- Further information:
  - Fraunhofer network, [website](#)
  - TUD 5G+Lab, [website](#)

# Germany: BQCX initiative on Quantum Computing



- Focusing on **Regional initiatives** with international reach, one of the most important is the Bavarian Quantum Computing eXchange (**BQCX**).
- Meetings are held each month, during which entities working in the Quantum ecosystem can share interests and research topics, raise the attention of potential customers, and exchange latest research result.
- The set goal of the initiative are “understanding current and coming technological capabilities, assessing the needs of our state’s academic and industrial researchers, and facilitating delivery and development of innovative resources, services, and training.
- Further information:
  - BQCX [website](#)



**Bavarian Quantum Computing eXchange**  
Where Quantum Computing and Supercomputing Meet

# Italy: 5G commercial launches and agreements



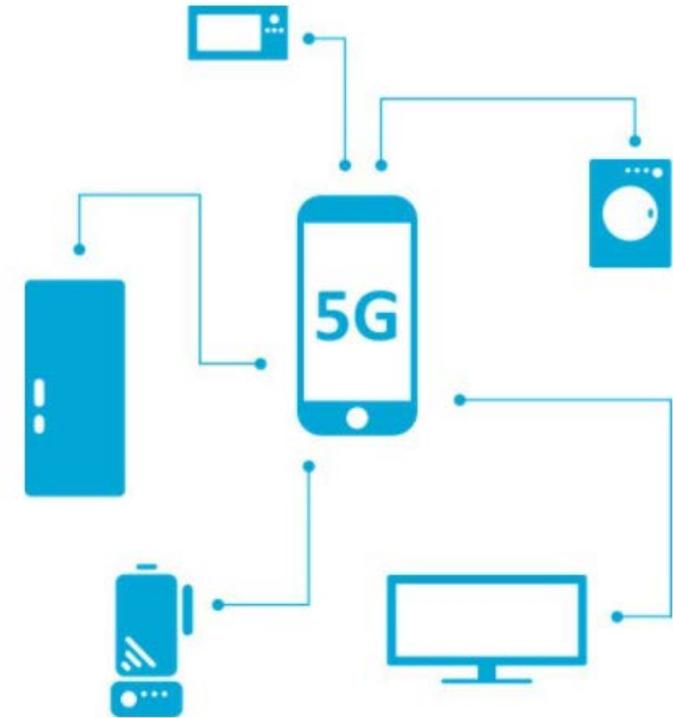
- Commercial launches:
  - June 2019: TIM, Vodafone
  - April 2020: Wind Tre
  - by end 2020: Iliad (announced)
- Commercial agreements:
  - February 2019: TIM and Vodafone agree on a passive network sharing deal for 5G including all 22,000 antenna sites controlled by the operators

# Norway: NTNU

- Description: The university NTNU hosts four Norwegian 5G related initiatives.
  - Smart Wireless Systems researches into the applied wireless communications systems and their components in general.
  - Next generation Internet in Norway supports the development of a Norwegian NGI strategic research and innovation agenda
  - Smart Grid Lab Laboratory provides infrastructure for R&D, demonstration, verification, and testing for Smart grid use cases
  - Norwegian Open AI-lab brings together research, education and innovation within AI. Connectivity is one area of application.

and two projects funded by the Norwegian Research Council (see previous slide) .

- Reconfigurable Radio Network Platform
- Lightweight Cryptography for Future Smart Networks



<https://www.ntnu.edu/ies/smart-wireless-systems>

- Public body in charge:
  - NTNU

# Norway: OsloMET

- Description: The university OsloMet hosts two groups fronting Norwegian based 5G initiatives.
  - SimulaMet Interoperability lab is an experimental environment for research and innovation related to wireless technologies in a multi-vendor environment with focus on 5G and IoT. It has been granted dedicated wireless spectrum for 5G testing
  - Secured 5G 4IoT lab. This is a lab which experiment with mobile networks and communication systems, paving the way towards 5G for Internet of Things and Smart Infrastructure.



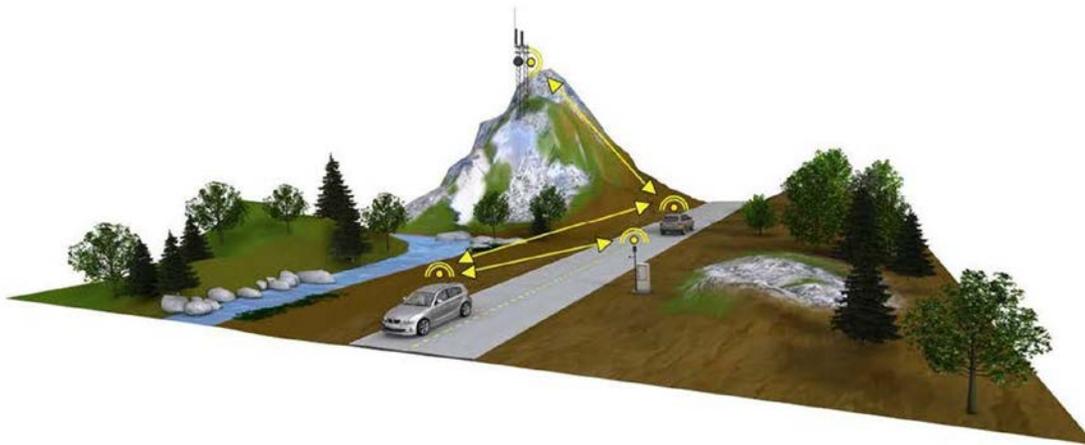
<https://www.simula.no/news/launch-simulammet-interoperability-lab>

- Public body in charge:
  - OsloMet



# Norway: Sintef

- Description: SINTEF is an independent, not-for-profit organisation, and one of Europe's largest independent research organisations. It describes intelligent connectivity as a fusion of 5G, AI, and IoT. Current 5G-related initiatives includes:
  - Oceanlab supports autonomous ships, remote maritime operations, and high-capacity buoy networks.
  - Maritime 5G supports communication ship-to-shore, ship-to-ship, and onboard
  - λRoad supports communication infrastructures for future roads and traffic



- Public body in charge:
  - SINTEF

<https://www.sintef.no/prosjekter/road/>

## Norway: Telenor, hub in 5G development

- Description: Telenor is the incumbent mobile operator in Norway, and a driving force and contributor to most national 5G pilot/initiatives. Telenor heads the ICT-17 project 5G-VINNI and also participate in many local and European projects and initiatives which apply and test 5G.

Together with national partners, Telenor arranged the [3rd Nordic Conference on ICT: 5G for Industry&Society](#). The conference got financial support from Norwegian Research Council to re-inforce 5G-VINNI.

- Further information:
  - Telenor [pilot initiatives](#)



<https://www.telenor.com/how-about-a-slice-of-5g-to-boost-your-business/>



## Spain: 5TONIC Open 5G Lab



- Description: 5TONIC is a co-creation laboratory, initiated in 2015 by Telefónica and IMDEA Networks Institute with a clear vision to create an open research and innovation ecosystem laboratory in which industry and academia come together to boost 5G and beyond technologies and business innovative ventures. The laboratory promotes joint project development, joint entrepreneurial ventures, discussion fora, events and conference sites, all in an international environment of the highest impact.
- Members:
  - Telefónica, IMDEA Networks, UC3M, Ericsson, Intel, InterDigital, Altran, and Commscope
- Further information:
  - <https://www.5tonic.org/>



**5TONIC**

[www.5tonic.org](http://www.5tonic.org)

## Sweden: 5G Testbed at Luleå University



- Description: Luleå University of Technology's indoor system for 5G is developed by Ericsson. The 5G Radio Dot System is primarily installed in research laboratories, but the student associations also have access to the 5G network for student- and education-related projects. The network operator is Telia. The 5G initiative is funded by Labbfonden at Luleå University of Technology and Kempestiftelserna
- Public bodies in charge:
  - Luleå University of Technology
- Further information:
  - [Testbed](#)

# Serbia: Telenor launches first 5G BS for tests

- Description: Test 5G Base stations launched in Science and Technology Park Belgrade to enable the members of scientific community, startups and other interested companies to perform test and develop solutions. Initially, 3.8 GHz will be used. 700 MHz will be available later, when neighboring countries leave this part of the spectrum free.
- Public bodies in charge:
  - Mobile operator Telenor
- Further information:
  - Telenor rolled out first 5G base station in Serbia, [press release](#)



## Serbia: Surveillance drone over 5G network demo

- Description: For the first time in Serbia, the work of surveillance drones of start-up Easy Aerial d.o.o. Serbia, was demonstrated on 5G network. The demonstration was held in the Science-Technology Park Belgrade, within Telenor test 5G environment.
- Bodies in charge:
  - Easy Aerial d.o.o. Serbia
- Further information:
  - Surveillance drones for the first time over Telenor 5G test network, [news](#)



## Sweden: 5G Testbed at Mid Sweden University



- Description: Telia and Mid Sweden University inaugurated the first 5G network in Northern of Sweden in May 2019. At the same time, RISE (Research Institute of Sweden) is launching a new office in Sundsvall. The parties will now collaborate to explore industrial applications of 5G, AI and the Internet of Things - IoT.
- Public bodies in charge:
  - Mid Sweden University
- Further information:
  - Inauguration of Miun 5G, [press release](#)



Photo: Olle Melkerhed

# Sweden: Stena Industry Innovation Laboratory

- Description: The Stena Industry Innovation Lab offers opportunities for the Swedish industry to test digitalized production of the future. The lab offers fast communication systems with 5G, collaborative robots as well as virtual and augmented reality techniques for assembly. The is a national resource that is also part of the EU Commission's network of test beds.

- Public bodies in charge:
  - Chalmers Univ. of Technology
- Further information:
  - The Stena Industry Innovation Lab, [website](#)





## Sweden: Telia's 5G Partner Program



- Description: The operator Telia started a 5G partner program in the summer of 2018. To date, Volvo Construction Equipment, Einride, Tieto and Mid Sweden University have joined the partner program, where Ericsson is the main technology partner. Telia also works with the Royal Institute of Technology, the Umeå 5G initiative, Luleå University of Technology and the Swedish Olympic Academy on 5G.
- Further information:
  - Telia and mid-Sweden University switch on first 5G network in Norrland, [press release](#)



# Conclusions



## Highlights and Key Takeaways



- Frequency auctions mostly finalized in Member States for the 3.6-3.8 GHz and 700 MHz bands, for commercial use. Consultations on-going for 26-28 GHz bands and some allocations already (e.g., Finland, Italy).
- Temporary licenses for non-commercial use, pilots, trials, and R&D activities often available free-of-charge. Spectrum auctions for private networks have also taken place/are being considered (e.g., Germany, Norway).
- All Member States have developed strategies/roadmaps for 5G deployment, and their evolution towards B5G/6G networks in the 2020-2025 timeframe. In some cases (e.g., Nordic countries), transnational collaboration is envisaged.
- 5G open innovation ecosystems, technological clusters, platforms 5G cities and digital innovation hubs supported by/planned in many countries (e.g., Finland, Spain, France, Norway, Germany, Netherlands), with strong participation of vertical industries.



## Highlights and Key Takeaways

- Initial Calls for Proposals aimed to strengthen telecom network sovereignty and synergies with microelectronics sector already launched (e.g., in France).
- High number of Calls for Proposals aimed to conduct trials & pilots and beyond 5G R&D activities (e.g., Spain, Norway, France, Luxembourg,...).
- Funding aimed to support 5G start-ups and services available in some countries (e.g. Greece, also with EU Recovery Funds).
- New 5G test sites for military use (Latvia).
- National 5G Observatories have been created in some countries (e.g., Spain).
- Very high number of R&D projects, testbeds, and labs addressing beyond 5G networks in combination with AI, and IoT supported national/EU funding. Large involvement of both private companies and public bodies.

**Thank you for your attention!**



**The voice of the European industry for the  
development and evolution of 5G**