

Euro 5G

Cooperation with other European R&D Programmes

In order to grow the 5G PPP initiative, its impact and relevance for the whole Digital Society, cooperation with other European R&D programmes is a core objective of which the Euro 5G Project aims to provide support. The creation of European and international liaisons are a critical part of positioning the European leadership on 5G at a global scale.

In particular, it is important that the information collected by Euro 5G is made available for review, validation, further contribution and consensus building as a precursor to international standardization to all 5G PPP community players. In order to reach this goal, the first step has been to map the European Peer Research Initiatives in the 5G domain, in order to establish contacts for future interactions.

This objective has involved supporting as many relationships as possible to national programmes such as EUREKA Clusters (in particular the Celtic-Plus Cluster) and other objectives within Horizon 2020. In all cases, it needs to be ensured that such projects should be able to adopt the 5G-PPP results and be able to work with them in a simple and straightforward way.

1 Mapping the 5G R&D National Programs

As an important factor to implement a productive collaborative interaction, the following critical information to be gathered to map European 5G R&D initiatives has been defined.

1. The first step identified the **WHO**, as contact persons and/or institutions involved in 5G initiatives in Europe as follows:
 - a) 5G PPP projects
 - b) ICT National Contact Point Network through the cooperation with H2020 Future Internet Forum
 - c) Cooperation with the Idealist2014 project
 - d) Cooperation with Celtic-Plus Eureka Cluster
2. The second step identified the **WHAT** each research initiatives are focusing on and what is being developed at the national level in each EU country and affiliates.
3. The third step is to publish here (link to pdf) the results of this mapping for further beneficial usage by other 5G stakeholders.
4. The fourth and most important follow-up step would be to present this work and its initial outcomes at the next FIF meeting (most probably in April 2017 as indicated by Mario Scillia from the EC), to discuss how the mapped initiatives can be liaised with the 5G PPP initiative in the most effective manner.

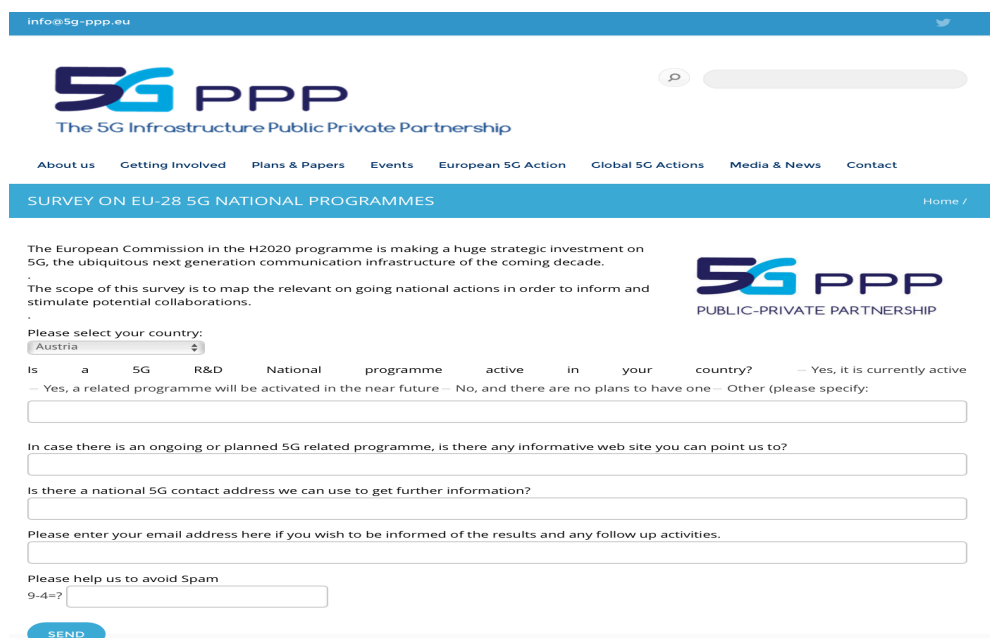
1.1 Reaching out – Online Questionnaire

We have reached out to over 200 contacts through an online questionnaire inviting them to provide inputs regarding 5G R&D initiatives. The questionnaire was sent twice (June 2016 and November 2016) to the 5G Projects (mailing list Comms@5g-ppp.eu) and sixty-nine National Contact Points emails (mailing list details were collected and merged between the Minutes of the First H2020 Future Internet Forum of Member States and Associated Countries, 21 April 2016, Brussels and the Future Internet Forum Commission Expert Groups published online

<http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3411&NewSearch=1&NewSearch=1>).

Questions were as follows:

1. Country
2. Is a 5G R&D National programme active in your country?
 - a. Yes, it is currently active
 - b. Yes, a related programme will be activated in the near future
 - c. No, and there are no plans to have one
 - d. Other (please specify:)
3. In case there is an ongoing or planned 5G related programme, is there any informative website you can point us to?
4. Is there a national 5G contact address we can use to get further information?
5. We will be happy to inform you of the results, are you interested in being involved in follow up activities?
 - a. Yes
 - b. No



The screenshot shows the online questionnaire for the 5G PPP Survey on EU-28 5G National Programmes. The header includes the 5G PPP logo and navigation links. The main content area contains the survey title, a brief introduction, and the questionnaire form. The form includes a dropdown menu for selecting a country (currently set to Austria), a question about the presence of a 5G R&D National programme, a question about an ongoing or planned 5G related programme, a question about a national 5G contact address, an email field for follow-up activities, and a CAPTCHA for spam prevention. A 'SEND' button is at the bottom.

Figure 1: Screenshot Online Questionnaire

1.2 Quantitative Results – Online Questionnaire

The consolidated results of the two waves of questionnaire among the NCP:

- 31 EU NCP contacted
- 15 NCP of associated countries have been contacted
- 30 replied

1.2.1 Is a 5G R&D National programme active in your country?

As shown in Figure 2, the results show a fragmented framework in which only 22% of the respondents confirmed the presence of an active 5G R&D national programme, while another 20% confirmed that there is a plan to launch a related program in the future. Over 50% of the

respondents highlighted that there is no active plan nor is it foreseen or suggested that 5G initiatives are included in wider ICT national programs.

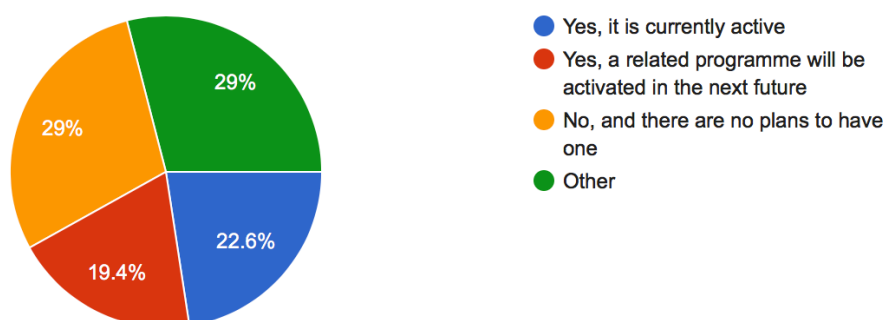


Figure 2: % National Program active/not active/planned/not planned

In detail:

- 9 countries have ongoing active 5G R&D National programme: Finland, Germany, Latvia, Lithuania, Luxembourg, Malta, Slovenia, Sweden, and United Kingdom.
- 7 countries are planning to initiate a 5G R&D National programme and/or cooperate on 5G initiatives through their ICT programs and through private initiatives: Cyprus, Netherlands, Moldova, Ireland, Israel, Poland, and the Former Yugoslav Republic of Macedonia.
- 8 countries have no plans to develop 5G National programme in the future: Albania, Belgium, Estonia, Iceland, Montenegro, Norway, Spain, and Switzerland.
- 1 country, Italy is not aware of any related future plans.

1.3 Qualitative Results – Online Questionnaire

The questionnaire also offered the opportunity to provide further details regarding public and private initiatives at the national level in which some of the responses were very extensive.

1.3.1 Is a 5G R&D National programme active in your country?

National Contact Points active in 5G R&D initiatives have pointed to relevant websites where more details on each initiative is available. They are:

- Finland <http://www.5gtnf.fi/>
- Germany <https://www.bmbf.de/foerderungen/bekanntmachung-1044.html>
- Ireland
 - www.connectcentre.ie
 - www.ipic.ie
 - www.tssg.org
- Latvia <http://www.lmt.lv/lv/preses-relizes?pid=755&g=2015>
- Luxembourg <http://www.digital-luxembourg.public.lu/en/index.html>
- Moldova www.orange.md, www.moldcell.md
- Netherlands
 - <http://www.economicboardgroningen.nl/programmas/digitale-bereikbaarheid>
 - [http://www.economicboardgroningen.nl/downloads/\\$447/\\$448](http://www.economicboardgroningen.nl/downloads/$447/$448)
 - <https://www.surf.nl/innovatieprojecten/het-open-programmeerbare-netwerk/nieuwe-draadvrije-technologie-en-dienstideeen.html> and
 - <http://www.5groningen.nl/>

- Slovenia <http://e6.ijs.si>
http://www.sicris.si/public/jqm/rsr.aspx?lang=eng&opdescr=search&opt=2&subopt=304&code1=cmn&code2=auto&psize=10&hits=1&page=1&count=&search_term=maha mohor?i?&id=8640&sing=&order_by=
- Sweden (There are several Swedish national programmes related to 5G)
 - 5GEM – 5G enabled manufacturing – Strategic Innovation Program
<https://www.chalmers.se/en/projects/Pages/5GEM.aspx>
 - Drive Sweden – Strategic Innovation Program
<http://www.drivesweden.net/en>
 - Electronic Components and Systems – Strategic Innovation Program
<http://www.smartareelektroniksystem.se/>
 - PIMM, pilot for industrial mobile communication in mining – Strategic Innovation Program <https://www.sics.se/projects/pimm>
 - 5G Transport Lab
<https://www.acreo.se/projects/kista-5g-transport-lab>
 - Wireless@kth <https://wireless.kth.se/>
 - Urban ICT Arena <http://www.urbanictarena.se>
 - Massive MIMO test bed (MATE)
<https://www.chalmers.se/en/projects/Pages/Massive-MIMO-test-bed.aspx>
 - The GigaHertz Centre
<http://www.chalmers.se/en/centres/ghz/Pages/default.aspx>
 - MAPCI (Mobile and Pervasive Computing Institute)
<http://mapci.lu.se/>
 - Massive MIMO @ EIT
<http://www.eit.lth.se/mamitheme>
 - First European field tests of 5G trial systems have been completed in Stockholm 2016
<http://www.zdnet.com/article/if-you-think-4gs-quick-telia-ericssons-5g-field-tests-show-speeds-40-times-faster/>
 - 5G for Sweden <https://www.ericsson.com/news/1898640>
- United Kingdom <https://www.gov.uk/government/organisations/national-infrastructure-commission>

1.3.2 Would you like to be involved in the follow up initiatives?

It is to be noted that 13% of the respondents are not willing to be involved in the follow up activities. Most likely they are not directly involved in 5G initiatives although some of them suggested alternative point of contacts for further communication.

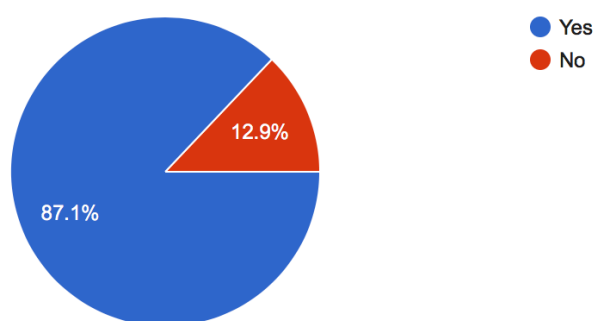


Figure 3: % of respondents interested in being involved in follow up activities

2. What National Initiatives are developing and how

How is each National programme working? How is it structured? In which areas is it focusing its efforts?

2.1 Finland, 5GTNF - A joint public-private initiative

5G Test Network Finland (5GTNF) coordinates and combines the research and technology development activities from the 5G infrastructures built under Tekes which is the Finnish Funding Agency for Innovation – 5thGear programme (www.tekes.fi/5thGear). By taking advantage of the synergies between the topics of the 5thGear projects, 5GTNF creates a single coherent entity from the numerous smaller test networks around Finland and represents them as an integrated innovation platform to the research community, industry and other interested parties on both the national and international level.

With this approach, the 5GTNF covers all relevant 5G research areas ranging from the programmable core network infrastructures (including the utilization of the Software Defined Networking and Network Functions Virtualization concepts) to dense and heterogeneous access network configurations (including small cells and Internet of Things use cases).

More efficient and intelligent use of the available spectrum (including different spectrum sharing techniques and utilization of the Ultra-High Frequency band in cellular communications) is also covered together with the related business and regulation issues in collaboration with FICORA, the Finnish Communications Regulatory Authority.

The overall aim of the 5GTNF is to enable Finland to provide the best and most appealing 5G test network environment and ecosystem in the world for research and business development purposes. 5GTNF is a joint effort from industry, academia and the Finnish government with global manufacturers such as Nokia, Ericsson, Huawei, Coriant and Intel as well as internationally recognized research organizations like VTT, University of Oulu, University of Helsinki, Tampere University of Technology and Aalto University.

2.2 Luxembourg, Digital Letzebuerg, A joint public-private initiative

The government of Luxembourg sought to provide a common umbrella for the numerous public and private initiatives that make up the country's digital economy and society. Thus, in autumn of 2014, the Digital Letzebuerg initiative was launched.

2.3 Ireland, CONNECT, A joint public-EU co-funded initiative

CONNECT is the world leading Science Foundation Ireland Research Centre for Future

Networks and Communications. CONNECT is funded under the Science Foundation Ireland Research Centres Programme and is co-funded under the European Regional Development Fund. We engage with over 35 companies including large multinationals, SMEs and start-ups. CONNECT brings together world-class expertise from ten Irish academic institutes to create a one-stop-shop for telecommunications research, development and innovation.

2.4 United Kingdom, National Infrastructure Commission

The National Infrastructure Commission recently published a Commission report on 5G and the UK approach to maintain digital leadership.

2.4.1 United Kingdom, The 5G Innovation Centre (5GIC), A public-private initiative

The 5G Innovation Centre (5GIC) at the University of Surrey is the largest UK academic research centre dedicated to the development of the next generation of mobile and wireless communications. Bringing together leading academic expertise and key industry partners in a shared vision, the 5GIC will help to define and develop the 5G infrastructure that will underpin the way we communicate, work and live our daily lives in the future.

3. What Private Initiatives are developing and how?

3.1 Ericsson, 5G for Europe

Ericsson activated the 5G for Europe programme in late 2015 and kept its expansion in Hungary, Switzerland, Germany and Spain in 2016 <https://www.ericsson.com/news/1952645>.

Ericsson has established a cross-industry 5G research and development (R&D) programme involving a range of European markets. Ericsson will drive the research, which will focus on delivering research, innovation and industrial pilots that use next-generation 5G networks as an enabler. The programme's academic and research partners include major technical universities such as Scuola Superiore Sant'Anna in Pisa, Italy, Technische Universität in Dresden, Germany, Universidad Carlos III of Madrid, Spain, IMDEA Networks Institute in Madrid, Spain, and King's College in London, United Kingdom. Among the industry partners are enterprises such as wiseSense, Weiss Robotics and MyOmega System Technology in Germany and Zucchetti Centro Sistemi in Italy.

3.2 Telefonica and IMDEA Networks, 5TONIC

The 5TONIC initiative (<https://www.5tonic.org>) is an Open Research and Innovation laboratory based in Madrid focusing on 5G technologies.

The objective of 5TONIC is to create a global open environment where members from industry and academia work together in specific research and innovation projects related to 5G technologies with a view to boost technology and business innovative ventures. The laboratory will promote joint project developments and entrepreneurial ventures, discussion fora, events and conferences in an international environment.

4. How to provide further input

To provide further input or contribute to the mapping of the European 5G R&D initiatives, please do not hesitate to:

- Answer the questionnaire online <https://5g-ppp.eu/survey-5g-national-programmes/>

Annex 1 List of National Contact Points

COUNTRY	PUBLIC AUTHORITY
Austria	Bundesministerium Verkehr, Innovation und Technologie - BMVIT (Federal Ministry for Transport, Innovation and Technology) Institut bruxellois pour la Recherche et l'Innovation - INNOVIRIS
Belgium	Vlaams Agentschap voor Internationaal Ondernemen - VLAIO Union Wallonne des Entreprises - UWE
Bulgaria	Ministry of Education and Science
Croatia	Croatian Regulatory Authority for Network Industries University of Zagreb, University Computing Centre (SRCE)
Cyprus	Research Promotion Foundation
Czech Republic	Ministry of Education, Youth and Sports
Denmark	Danish Ministry of Science, Innovation and Higher Education. Agency for Science, Technology and Innovation
Estonia	Tallinn University of Technology Ministry of Economic Affairs and Communication of Estonia
Finland	DIGILE Oy
France	Ministère de l'Education nationale, de l'Enseignement supérieur et de la Recherche Ministère de l'Economie, de l'Industrie et du Numérique
Germany	Bundesministerium für Bildung und Forschung DLR Projektträger (DLR-PT)
Greece	Greek Research and Technology Network - GRNET SA
Hungary	National Research, Development and Innovation Office
Ireland	Waterford Institute of Technology (WIT) Industrial Development Authority (IDA)
Italy	Fondazione Ugo Bordon Fondazione Ugo Bordon Ministero dello Sviluppo Economico - Istituto Superiore delle Comunicazioni e delle Tecnologie dell'Informazione
Latvia	Latvian Information and Communications Technology Association Latvian Academy of Sciences
Lithuania	Agency for Science, Innovation and Technology (MITA)
Luxembourg	Université du Luxembourg
Malta	Malta Communications Authority
Netherlands	SURF Ministry of Economic Affairs
Poland	Ministry of Science and Higher Education Poznan Supercomputing and Networking Center Poznan Supercomputing and Networking Center
Portugal	Fundação para a Ciência e a Tecnologia (FCT)/MCTES Direcção-Geral das Actividades Económicas (DGAE) - Ministry of Economy
Romania	Ministry of Communications and for Information Society Romanian Digital Agenda Agency Institutul Național de Cercetare Dezvoltare în Informatică
Slovakia	IT Asociácia Slovenska
Slovenia	Ministry of Education, Science and Sport Ministry of Education, Science and Sport
Spain	Ministerio de Industria, Energía y Turismo Ministerio de Economía y Competitividad Centro para el Desarrollo Tecnológico Industrial - CDTI
Sweden	VINNOVA - The Swedish Agency for Innovation Systems Ministry of Enterprise and Innovation
UK	INNOVATE UK INNOVATE UK
Moldova	Academy of Science of Moldova Ministry of Information Technology and Communications
The former Yugoslav Republic of Macedonia	Macedonian Chamber of Information and Communication Technology- MASIT
Albania	National Agency for Information Society National Agency for Information Society
Switzerland	Federal Office of Communications OFCOM SWITCH
Israel	ISERD - The Israel-Europe R&D Directorate
Bosnia and Herzegovina	Tuzla Canton Government
The former Yugoslav Republic of Macedonia	Ministry of Information Society and Administration
Montenegro	University of Mediterranean
Norway	The Research Council of Norway
Serbia	Ministry of Education, Science and Technological Development Ministry of Trade, Tourism and Telecommunications
Iceland	The Icelandic Centre for Research (RANNIS)
Turkey	TUBITAK (The Scientific and Technological Research Council of Turkey)
Faroe Islands	The Faroese Research Council
Ukraine	NGO Agency Of European Innovations

Table 1: List of National Contact Points