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Abstract

This deliverable reports on the activities related to the creation and operation of the community working groups at the 5G PPP level in cooperation with the 5G Infrastructure Association, the 5G-Initiative projects, and the NetWorld 2020 ETP. A flexible Working group approach has been taken to allow uptake of other ideas, as identified by 5G community and other 5G initiatives, and support new working groups as needed.

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Acknowledgment

This report is based in parts on the 5G PPP Technology Board working documents and the terms of reference of the 5G PPP working groups.

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Executive Summary

The purpose of this deliverable is to give an impression of the degree of activity in the 5G PPP Working Groups that have been supported by the Euro-5G project. Euro-5G supported all of these WGs by providing the email exploders and document repositories to enable their work. Audio conference facilities and WEBEX tools were also provided.

In addition Euro-5G took actions to enable the publication and promotion for the results and these activities are visible under some of the other WPs of the project.

This involved such tasks as editorial work for White Papers, preparation of flyers for announcing significant results, use of social media to promote the same results and publishing these results on the web in a timely and efficient way.

Euro-5G was also active in helping organising cross project events and workshops - particularly if they involved external (non 5G PPP) participants. Here all services from organising the venue, through registrations and local liaison to assisting with the agenda preparation and the list of attendees were provided. For some events Euro-5G support has also included providing the on-site support at the event.

These working groups have the ambition to produce consolidate views and opinions from the 5G PPP as a whole and Euro-5G has done everything possible to facilitate this and publicise the results.

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Abbreviations

| | |
|--------------------|--|
| 3GPP | Third Generation Partnership Project |
| BSCW | Basic Support for Cooperative Work |
| CELTIC-Plus | Cooperation for a European sustained Leadership in Telecommunications - Plus |
| CEPT | European Conference of Postal and Telecommunications Administrations |
| DGs | Directorate-Generals |
| DoW | Description of Work |
| EBU | European Broadcasting Union |
| EC | European Commission |
| ECC | Electronic Communications Committee |
| EMEA | Europe, Middle East and Africa |
| ESA | European Space Agency |
| ESOA | EMEA Satellite Operator's Agency |
| ETNO | European Telecommunications Network Operators' Association |
| ETP | European Technology Platform |
| ETSI | European Telecommunications Standards Institute |
| EU | European Union |
| EuCNC | European Conference on Networks and Communications |
| F2F | Face to Face |
| FCC | Federal Communications Commission |
| GSMA | GSM Association |
| ICT | Information and Communication Technologies |
| IEEE | Institute of Electrical and Electronics Engineers |
| IETF | Internet Engineering Task Force |
| IMT2020 | International Mobile Telecommunications 2020 |
| ITS | Intelligent Transport Systems |
| ITU-R | International Telecommunication Union Radiocommunications Sector |
| ITU-T | International Telecommunication Union Telecom Sector |
| MWC | Mobile World Congress |
| NEM | New European Media Initiative |
| NFV | Network Function Virtualisation |
| NGMN | Next Generation Mobile Networks Alliance |
| NSF | National Science Foundation |
| PhC | Phone Conference |
| PIMRC | IEEE International Symposium on Personal, Indoor and Mobile Radio Communications |
| PPP | Public Private Partnership |

| | |
|----------------|-------------------------------------|
| R&D | Research and Development |
| RAN | Radio Access Network |
| SDN | Software Defined Networking |
| SME | Small and Medium-sized Enterprise |
| TBC | To Be Confirmed |
| VTC | Vehicular Technology Conference |
| WG | Working Group |
| WRC | World Radiocommunication Conference |

1 Introduction

The purpose of this deliverable is to give an impression of the degree of activity in the 5G PPP Working Groups, and to describe the support that was given by Euro-5G to them.

Within the 5G PPP there are a number of working groups where the work of projects and other stakeholders can be converged into identifying the shared issues and developing supported program level positions on technical and strategic items.

The currently active working groups have their origins mainly in both the 5G-Infrastructure Association and the projects of the 5G Initiative within the 5G PPP. There is one further WG – the SME WG – that has its origin in NetWorld2020 ETP but has extended its activities into 5G PPP.

The table below lists the nine current Working Groups: Their name, chairperson, and origin (i.e. by which body it was setup and is controlled).

| Working Group | Chairpersons | Origin |
|--|---|-------------------------------|
| Pre-Standardization WG | Olav Queseth, Ericsson | 5G Infrastructure Association |
| Spectrum WG | Terje Tjelta, Telenor | 5G Infrastructure Association |
| 5G Architecture WG | Simone Redana, Nokia | 5G-Initiative Projects |
| SDN / NFV WG | Josep Martrat, ATOS / Carlos Jesus Bernardos, UCIII | 5G-Initiative Projects |
| Network Management / Quality of Service WG | Kieran Sullivan, TSSG | 5G-Initiative Projects |
| Vision/Societal Challenges WG | Salah-Eddine El Ayoubi, Orange | 5G Infrastructure Association |
| Security WG | Jean-Philippe Wary, Orange / Pascal Bisson, Thales | 5G-Initiative Projects |
| SME WG | Jacques Magen, InterInnov | NetWorld2020 ETP |
| Trials WG | Werner Mohr, Nokia / Didier Bourse, Nokia | 5G Infrastructure Association |

The 5G-Initiative Steering Board and the 5G Infrastructure Association Board review the activities and the mandates of the groups within their scope (see column “Origin”) at regular intervals and decide on their status. The 5G PPP Technology Board reviews the progress within the 5G-I initiated Working groups and discusses any possible interactions as well as the commitment of the running projects to the WGs.

2 Working Groups

The 5G Infrastructure PPP uses specific Working Groups (WGs) to achieve consistency and harmony on the technical results being achieved within the projects, and regarding strategic positions and plans of the stakeholders involved.

There are basically two types of Working Groups and special cases of two further types, which are categorised depending on which body has set them up and is controlling them:

- Working Groups between projects of the 5G-Initiative (5G-I)
- Working Groups of the 5G Infrastructure Association
- One Working Group under NetWorld2020 ETP.
- One Activity (rather than a Working Group in the sense of the 5G PPP governance), controlled by Phase 1 project METIS-II

Working Groups of the 5G-Initiative

The Technology Board (TB), as the body responsible for technical consistency across the projects, monitors the ongoing activities of the cross project working groups and highlights where actions need to be taken. All projects participate in the TB and thereby are informed about the status of the WGs even if they do not participate in each one.

The cross project WGs plans and achievements are discussed at TB level and TB members provide feedback and recommendations to the WGs to ensure the WGs plans are complementary and avoid duplications. Particular care is taken to ensure the working groups build on the project work and keep extra work for projects at a limited and efficient level.

The TB may propose to SB the creation of a WG when a technology discussion cannot be resolved solely by the TB participants. TB may also propose to SB the closure of a WG.

The 5G-I WGs include:

- 5G Architecture WG
- SDN/NFV WG
- Network Management & Quality of Service WG
- Security WG

Working Groups of the 5G Infrastructure Association

The Board of the Association has the powers to establish Working Groups. These groups shall provide a forum for discussing and developing joint strategic positions and plans primarily of the members of the 5G Infrastructure Association. However, any of the projects of the 5G-Initiative is welcome to join these Working Groups.

The Infrastructure Association WGs include:

- Vision & Societal Challenges WG.
- Pre-standardization WG.
- Spectrum WG.
- (Experimentation and) Trials WG.

Working Group of NetWorld2020 ETP

There is an SME WG coming from the NetWorld 2020 background.

- SME WG

It had been setup by NetWorld2020 with the original (and still existing) mandate to help and support SMEs participation in EU R&D projects. Extending the WG reach into 5G PPP, the mandate has been extended to specifically support SMEs participation in 5G PPP.

Cross-project activity coordinated by METIS-II

One additional cross-Projects action has been working but it is not organised as a WG (in the classical sense as defined in the 5G PPP governance):

- Cross-project activity on 5G PPP use case and performance evaluation, coordinated by METIS-II

The METIS-II coordination work stems from the description of work (Annex I to the GA) of METIS-II where they have committed to lead and coordinate an activity on use case and performance evaluation among the 5G-I Phase 1 projects. The work is organised through regular dedicated PhCs and specific 5G PPP cross-projects Workshops along the lines of the DoW of METIS-II.

Scope of this Deliverable

The WGs were introduced in [1], which gave details of the WG organisation, scope, plans and intermediate results. Since that time, one new WG has been defined, addressing the topic of Experimentation and Trials, which will become increasingly important as we move closer to design and deployment of real 5G systems.

Given that this deliverable focusses on the closure of Phase 1 WG activities, we do not present their plans, but give a brief reminder of the WGs in this chapter, before highlighting their key outputs in chapter 3.

2.1 Pre-Standardization WG

2.1.1 WG organisation

- Chair: Olav Queseth (Ericsson).
- Tools: WG email-reflector and dedicated BSCW work space

2.1.2 Objectives

Identify standardisation and regulatory bodies to align with e.g. ETSI, 3GPP, IEEE and other relevant standards bodies, & ITU-R (incl. WPs) and WRC (including e.g. ECC PT1). Develop a roadmap of relevant standardisation and regulatory topics for 5G: Evaluate existing roadmaps at international level; Propose own roadmap for 5G being aligned at international level. Influencing pre-standardisation on 5G and related R&D: Potentially propose where topics should be standardised; Influence timing on R&D work programs (e.g. EC WPs).

2.2 Spectrum WG

2.2.1 WG organisation

- Chair: Terje Tjelta (Telenor).
- Tools: WG email-reflector and dedicated BSCW work space

2.2.2 Objectives

Promote research results in the spectrum area obtained by 5G PPP/H2020 projects as well as relevant FP7 projects, Setting up of a dialogue between 5G PPP projects concerning potential synergies and common interests across projects in spectrum related issues, Pursue the convergence of results on spectrum topics from the different projects to maximise the achievable outcome towards relevant technical bodies, Establish a knowledge base from European and other Global project results concerning advances in spectrum research, Liaise with spectrum groups or entities in regulatory bodies and industry associations, Work for improved understanding of collaborative spectrum research importance.

2.3 5G Architecture WG

2.3.1 WG organisation

- Chair: Simone Redana (Nokia). Vice-Chair: Oemer Bulakci (Huawei).
- Tools: WG email-reflector and dedicated BSCW work space

2.3.2 Objectives

The goal of this Working Group is to serve as a common platform to facilitate the discussion between 5G PPP projects developing architectural concepts and components and foster the discussions on the basis of the KPIs described in the 5G PPP contract. The group could also facilitate consensus building on the 5G architecture.

2.4 SDN / NFV WG

2.4.1 WG organisation

- Chair: Josep Martrat (Atos). Co-Chair: Carlos Jesus Bernardos (UC3M).

- Tools: WG email-reflector and dedicated BSCW work space

2.4.2 Objectives

The purpose of this WG is to analyse and address unification and applicability of key research topics related to Software Networking including software defined concepts, infrastructures, systems and components for Wire and Wireless Networks, including Networked Clouds, IoT and Services, i.e. Software Defined Networks (SDN) and Network Function Virtualization (NFV) as developed and promoted by the 5G PPP projects.

2.5 Network Management/QoS WG

2.5.1 WG organisation

- Chair: Kieran Sullivan (TSSG).
- Tools: WG email-reflector

2.5.2 Objectives

Network Management and Quality of Service are closely correlated themes:

Network Management aims to maintain the operations of the network in a manner that ensures that the required services are properly delivered to the users, that an expected quality of service is enforced for delivering such services to the end user and that security is maintained. To do so, network management is mainly focused on the control plane of the network to make sure all the services and operations running in the data plane are working properly.

Quality of Service covers areas such as networking, packet scheduling, traffic adaption and any other technique implemented in both data and control plane to make sure an expected quality of service is implemented for the delivery of services to the end user (bandwidth, low latency, mobility and availability)

2.6 Vision and Societal Challenges WG

2.6.1 WG organisation

- Chair: Salah-Eddine El Ayoubi (Orange).
- Tools: WG email-reflector and dedicated BSCW work space

2.6.2 Objectives

To develop a consensus in Europe on 5G systems / infrastructures / services, Identify vertical application domains which would benefit from 5G (views of other sectors on 5G requirements) and associated challenges, Identify the societal, economic, environmental, business and technological benefits obtainable from the realisation of 5G main concepts, Collect publicly available visions and major technical trends from industry, research community and available information from other regions, Identify commonalities, bottlenecks and differences in visions and technical trends, Prepare input documents for Pre-Standardization and Spectrum Working Groups and International Cooperation Activity, Develop H2020 call proposals for 5G PPP in partnership with the EC

2.7 Security WG

2.7.1 WG organisation

- Chairs: Jean-Philippe Wary (Orange) and Pascal Bisson (Thales).

- Tools: WG email-reflector and dedicated BSCW work space

2.7.2 Objectives

The purpose of the group is to bring together the projects within the 5G PPP that have common interest in the development and progression of topics related to security. The group will ensure, to as great extent as possible, that the projects are working in a complimentary manner towards consistent goals, exchanging ideas, minimising the duplication of effort, contributing towards relevant standards and where possible cooperating on the development of compatible components, demonstrators, the exchange of data and results and the interworking of communication layers, where applicable.

2.8 SME WG

2.8.1 WG organisation

This Working group has its background in the NetWorld2020 ETP community and takes a keen interest in ensuring SME involvement in the 5G PPP projects and activities.

- Chair: Jacques Magen, InterInnov
- Tools: WG email-reflector and dedicated ftp space

2.8.2 Objectives

The main objectives of the SME Working Group are:

Help and support SMEs participation in the 5G PPP and more generally in EU R&D projects, including (but not limited to) reaching the target of at least 20% of the 5G PPP funding going to SMEs.

Improve visibility of SMEs in the 5G PPP and in general in EU R&D programmes, and ease/promote participation in NetWorld2020. Activate channels that may enable, facilitate and promote SME contribution into the NetWorld2020 SRIA and research topics, and SME involvement through other strategic documents related to NetWorld2020 and to the 5G PPP.

Ensure that the interests of SMEs, a key player in the EU economy, are adequately taken into account, more particularly in NetWorld2020 and in the 5G PPP.

Act as representative/interlocutor of SMEs in the telecom domain, more particularly in NetWorld2020 and in the 5G PPP.

Help SMEs access European funds, in the 5G PPP and beyond. The WG could e.g. “pre-digest” material and help SMEs find their way into 5G PPP related funding and beyond.

Analyse the participation of SMEs in projects, potentially prepare questionnaire and transmit the conclusions and results to European Commission, for the 5G PPP in particular.

2.9 METIS-II Cross-Projects Work

2.9.1 WG organisation

- Leaders: Patrick Marsch (Nokia) and Olav Queseth (Ericsson).
- Tools: Dedicated BSCW work space. No reflector.

2.9.2 Objectives

The objectives are defined in the METIS-II DoW. The main goal is to provide a 5G collaboration framework within 5G-PPP for a common evaluation of 5G radio access network concepts. This

should, among others, continue the work from METIS on 5G scenarios and requirements, and KPI definition.

2.10 Trials WG

2.10.1 WG organisation

- Leaders: Werner Mohr (Nokia) and Didier Bourse (Nokia).
- Tools: WG email-reflector and dedicated BSCW work space

2.10.2 Objectives

The Trials WG has two main objectives:

- to generate and maintain a strategy for developing a Pan-European 5G Trials Roadmap
- to prepare and maintain the comprehensive Trials Roadmap

The main objectives of developing the Strategy and Roadmap for 5G Trials are to:

- Support global European leadership in 5G technology, 5G networks deployment and profitable 5G business.
- Validate benefits of 5G to vertical sectors, public sector, businesses and consumers.
- Initiate a clear path to successful and timely 5G deployment.
- Expand commercial trials and demonstrations as well as national initiatives.

And the Trials themselves need to be designed to answer these questions:

- Why 5G is good for me?
- How do I prove that 5G is good for me?
- Why cannot this be achieved already now?
- What is 5G bringing that makes this possible?
- How do I transition from 4G to 5G?

3 Key Outputs of Working Groups

As the Final report on support to the working groups we want to highlight the impactful outputs of the WGs, rather than just list activities. These outputs are the results of discussions and collaboration taking place by email, phone conferences, document sharing and physical workshops many of which have been supported and/or facilitated by Euro-5G.

For WGs in general, the main outputs are in the form of White Papers, which are hosted on the 5G PPP website². Currently the following WG developed White Papers are available on the website:

- From the Vision and Societal Challenges WG
 - 5G Innovations for new Business Opportunities (March 2017)
 - 5G empowering vertical industries (February 2016)
 - These White Papers are available at <https://5g-ppp.eu/roadmaps/>
 - Due to the importance of the Vision White Papers, these have been separately discussed in [2] and [3]
- From the Pre-Standardization WG
 - 5G-PPP Pre-standards-WG Issues Paper (October 2015)
- From the 5G Architecture WG
 - 5G PPP Revised Architecture paper for Public consultation (July 2017)
 - 5G PPP 5G Architecture (Updated July 2016)
- From the SDN / NFV WG
 - 5G-PPP Vision on Software Networks (January 2017)
- From the Network Management/QoS WG
 - 5G-PPP Cognitive Network Management for 5G (March 2017)
- From the Security WG
 - 5G PPP Security Landscape (June 2017)
- From the METIS-II Cross-Projects Work
 - 5G-PPP use cases and performance evaluation modeling_v1.0 (April 2016)
 - As of July 2017 an updated v2.0 of this document is available internally to the 5G PPP, but has not yet been published
- From the Trials WG
 - Trials Roadmap Strategy
 - 5G PPP Trials Roadmap Version-1 (May 2017)
 - These documents are available at <https://5g-ppp.eu/5g-trials-roadmap/>

Except where otherwise indicated, White Papers are available at <https://5g-ppp.eu/white-papers/>

There have been over 10,000 unique downloads of these documents from the website in the last year alone, in addition to printed copies which have been distributed at key events such as Mobile World Congress and the Global 5G Events.

As well as publishing impactful White Papers, some WGs are directly interacting with their

² <https://5g-ppp.eu/white-papers/>

stakeholders. In particular we wish to highlight:

- the Pre-Standardization WG
 - The pre-standardization WG has been coordinating and tracking 5G PPP inputs to relevant standards bodies, most notably 3GPP, but also ETSI, ITU-T, IEEE and IETF. As of 4 July 2017, submission of 292 contributions to SDOs have been recorded in the tracking tool of the Pre-Standardization WG.
- the Spectrum WG
 - The spectrum WG has been directly participating in and contributing to CEPT and the RSPG, and was instrumental in the definition and identification of the 5G Pioneer bands in Europe.
- the SME WG
 - The SME WG works directly with the SME community to ensure their involvement and integration into the 5G PPP activities. In particular the “Find your SME” website (<https://www.networld2020.eu/find-the-sme-you-need/>) and the brochure “SME Expertise and Skills in the 5G domain” (<https://bscw.5g-ppp.eu/pub/bscw.cgi/d119698/SME-A5-brochure-final-web.pdf>) have been very valuable, alongside specific events.

4 Conclusions

Euro-5G has supported all of the WGs by providing the email exploders and document repositories to enable their work. Audio conference facilities and WEBEX tools have also been provided.

In addition, Euro-5G has taken actions to enable the publication and promotion of the results, and these activities are visible under some of the other WPs of the project. This involved such tasks as editorial work for whitepapers, preparation of flyers for announcing significant results, use of social media to promote the same results, and publishing these results on the web in a timely and efficient way.

Euro-5G has also been active in helping organise cross project events and workshops - particularly if they involve external (non 5G PPP) participants. Here all services from organising the venue, through registrations and local liaison, to assisting with the agenda preparation and the list of attendees. For some events, Euro-5G-support also included providing the on-site support at the event.

The METIS-II cross project activities were supported by METIS-II.

The key outputs of the Working Groups are available on the 5G PPP website at the following places:

- <https://5g-ppp.eu/white-papers/>
- <https://5g-ppp.eu/roadmaps/>
- <https://5g-ppp.eu/5g-trials-roadmap/>.

Several direct impact activities have also been undertaken.

Through the support of Euro-5G we can see that these documents have been downloaded over 10,000 times in the last year alone.

This indicates that the Euro-5G support has been key in assisting preparation, publication and dissemination of the results of the 5G PPP Phase 1 work.

References

- [1] Intermediate report on support to the working groups, Euro-5G Deliverable D5.2, July 2016
- [2] Final 5G vision, and roadmap for 2017/18, Euro-5G Deliverable D5.6, July 2017
- [3] Intermediate 5G vision and roadmap, Euro-5G Deliverable D5.1, January 2016