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for 5G

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Lead editor	Benoit Miscopein (CEA-LETI)
Authors	Valerio Frascolla (Intel), Milon Gupta (Eurescom), Klaus Moessner (UNIS), Dimitrios Kritharidis (INTRA), Shahid Mumtaz (IT), Andreas Georgakopoulos (Wings), Óscar Carrasco (Sistel), Benoit Miscopein (CEA)
Reviewers	Bismark Okyere (Intel), Keith Briggs (BT)
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Abstract

This deliverable outlines the planned activities for fostering and capturing innovation in SPEED-5G as well as for disseminating the project results and vision. The innovation management involves both a project-wise governance body and a set of tools and methods, which are used to foster innovation, track its lifecycle as well as monitor the dissemination activity during the course of the project. The SPEED-5G results will be disseminated towards many different audiences, including the scientific and industrial communities via standardization and regulation actions. This document finally elaborates on additional dissemination options, which are envisioned in SPEED-5G such as focused events or summer schools.

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Executive Summary

This document presents the SPEED-5G strategy and plans for stimulating, managing and documenting innovation related activities worked on during the project lifetime. The consortium agreed on setting up an "Innovation Management Committee" (IMC) in order to handle in the most effective way all activities pertaining to innovation management. The IMC is responsible for fostering and steering innovation and ensuring a proper and timely exploitation by project partners of the project results. In addition to this project governance structure, SPEED-5G sets up several tools designed to log and track the production of knowledge, from the conceptual stage up to actual dissemination actions, under the form of either publications or patent applications. To that purpose, Eurescom Dissemination Tracker will be used together with a home-made project tool.

The project has also determined a list of dissemination targets, depending on the type of audience in focus. Actions toward standardisation and regulatory bodies are of prime importance for SPEED-5G. Jointly with other projects of the 5G PPP initiative SPEED-5G has already started to identify relevant standardization bodies, and to align with their roadmap and work programme, so to maximize the potential project impact on their work. Among the goals of this activity, a better understanding of technical challenges relevant to the project objectives and results is expected. This will also help to have a consolidated visibility on the respective timelines of SDOs, another key aspect for a successful impacting strategy. As a matter of fact, SPEED-5G has identified two standardisation targets since the beginning of the project which are at the heart of the project scope: IEEE 1900.7 and Small Cell Forum where partners of the consortium are key participants. The project has already taken an action in the IEEE 1900.7 working group.

Finally, this deliverable presents a practical list of targeted publication titles as well as scientific oriented communication activities like workshops, tutorials or panels organisation, indicating that several dissemination activities have already begun.

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Abbreviations

3GPP	3 rd Generation Partnership Project
5G PPP	The 5G Infrastructure Public Private Partnership
ANFR	Agence Nationale des Fréquences (French Regulation Administration)
CA	Consortium Agreement
CEPT	European Conference of Postal and Telecommunications Administrations
DSA	Dynamic Spectrum Access
EC	European Commission
ECO	European Communications Office
ETSI	European Telecommunication Standards Institute
FBMC	Filter Bank Multi Carrier
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineers
IMC	Innovation Management Committee
IPR	Intellectual Property Rights
ITU	International Telecommunication Union
MAC	Medium Access Control
NGMN	Next Generation Mobile Networks
Ofcom	Office of Communications (UK regulation Administration)
PAR	Project Authorisation Request
PHY	Physical layer
RAN	Radio Access Network
RAT	Radio Access Technology
RRM	Radio Resource Management
RRS	Reconfigurable Radio Systems (ETSI)
SA	(3GPP) Service and System Aspects
SCF	Small Cell Forum
SDOs	Standards Development Organisations
SMEs	Small and Medium-sized Enterprises
USPTO	United States Patent and Trademark Office
WPL	Work package leader
WRC	World Radiocommunication Conference
WWRF	Wireless World Research Forum

1 Introduction

The ambition of SPEED-5G is to shape the definition of the forthcoming 5G architecture when considering deployment of heterogeneous networks in very dense scenarios. In particular, SPEED-5G clearly identifies technical solutions, which leverage smart management of multiple radio access technologies (RATs) resources and dynamic spectrum access (DSA) enablers for a better use of many kinds of non-contiguous spectrum chunks under various licence regimes, so that typical 5G use-cases can be efficiently implemented. SPEED-5G has defined an innovation roadmap and a dissemination plan, which are designed to optimally spread the project vision and results towards many audiences such as standardisation and regulation bodies, scientific and industrial communities. The goal of this document is to present how this strategy will be implemented in the project.

Particular attention along the lifetime of the project will be paid to make sure that innovation is properly captured and that industrial exploitation of results generated in the project is properly secured. Especially the Small and Medium Enterprises (SMEs) within the SPEED-5G consortium are supposed to benefit the most from these activities as it can empower their position in the market, allowing them gaining market share or influence. In this regards, this document discloses a practical innovation management scheme, which has been defined to maximise the impact of SPEED-5G in partners' future products roadmaps. In particular, the project innovation roadmap includes on the one hand a project-wise instance in charge of overseeing all the aspects related to innovation capture, management and exploitation. This instance will be chaired by the project coordinator and it will involve all the industrial partners. On the other hand, the consortium also identified and is actually already applying a group of novel methods and tools which will help in classifying innovation items and monitoring the process of transforming novel concepts into exploitable results as well as Intellectual Property Rights (IPR) and knowledge managements. Because the definition of 5G systems is just starting within standardisation bodies and industrial fora, it is particularly important to keep the door open to think out-of-the-box and consider disruptive technical approaches. To this end, the consortium relies on the expertise of an industrial partner who proposed and set up a framework of innovation fostering and creation based on agile methodologies, like Kanban [1], and techniques, like running World Cafés sessions among the project partners. This framework is particularly interesting as it can not only help in reducing the number of technical "un-knowns" that the project will face, but also drive the innovation process along identified technical results and finally open the door to the identification of unexpected research items.

Among other structuring aspects, SPEED-5G is part of the 5G PPP initiative. SPEED-5G will jointly formulate, together with the 15 other projects, a coherent vision on new communication network architecture and key technical enablers able to fulfil the requirements 5G networks, in terms of capacity and energy consumption improvements as well as supporting a massive number of connected devices in dense areas. Under the 5G PPP umbrella, SPEED-5G will contribute in giving European Industry in a driving role in the development of 5G standards and know-how. SPEED-5G has already contributed in a 5G PPP event and will keep on doing this in order to integrate SPEED-5G vision and results in broad communication occasions. Along the line of promoting project results, standardisation and pre-standardisation activities are considered as important objectives of the innovation roadmap of the project and in fact this document gives an overview of the identified standardisation targets. It also shows how the consortium will rely on key partners to identify and monitor the relevant working groups, as well as to work on the definition of study items in accordance with the project vision.

Because SPEED-5G is a genuine research project, communication of results in scientific audiences is another important part of the dissemination plan. In this regards, this document shows the different flavours of this dissemination activity the consortium will work on. In particular, SPEED-5G will take advantage of key academic partners to drive the scientifically oriented publications activity, either by identifying the most suitable events or publication titles or by proactively shaping technical

programme of key conferences in accordance with the SPEED-5G objectives. Also, organisation of events like workshops or panels with the objective of spreading innovative results of the project as well as confronting technical progress of the project with peers is considered in the SPEED-5G strategy. This deliverable shows with some examples how this dissemination track has already been set up. Finally, the project uses an on-line dissemination-tracking tool designed to log and monitor the status of dissemination activities. This document shows how this logging tool can be used as a facilitator of dissemination, shaped in a way to help partners to comply with dissemination rules as described in the Collaboration Agreement.

This document is composed of two further main sections. Section 2 gives details on the innovation roadmap of SPEED-5G, describing the chosen innovation capture process relying on innovation creation methods (section 2.2). It also elaborates on the objectives and key procedures of the Innovation Management Committee (section 2.3.2). Finally, an overview of the tools the project sets up for knowledge and IPR management is given (section 2.3.1). Section 3 is dedicated to the dissemination plan the project has established. In particular, targeted audiences are described as well as initial candidate lists for publication, standardisation and regulation bodies.

2 Innovation Roadmap

2.1 Innovation definition

According to the innovation definition provided by the EC [2], innovation is generated not only through research and technology development, but also through new marketing and management solutions. Essentially four types of innovation are defined:

- Product innovation - creation or improvement of a product or service;
- Process innovation - creation or improvement of production or delivery method;
- Marketing innovation - new marketing methods;
- Organisational innovation - introduce a new organisational method into the firm's business practices, workplace organisation or external relations.

SPEED-5G focuses most of its efforts on the first type of innovation (product/service innovation) as it is mainly committed to delivering novel technical solutions for smart medium access and radio resource management in dense heterogeneous 5G networks. As such, the proper coordination and management of the various technical innovations, worked on in the project by the different partners in the consortium, is one of the key parts of the project. Such coordination should enable a successful supervision of the work being done under the light of the market and the respective business cases which SPEED-5G defines and targets. Moreover, an effective coordination and handling of the technical innovations will target the maximization of the impact of the project and will ensure that project's concepts and approaches are updated to the latest outcomes of the innovation management domain and are aligned with the most promising innovation management approaches. In this direction, the project will start approaching potentially interested stakeholders in the telecommunication ecosystem, willing to gain knowledge about the project's solutions and at the same time share their views or feedback about the creation of value and exploitation of the project's results.

SPEED-5G will also spend part of its effort on the fourth type of innovation (organisational innovation). In essence, sharing among the partners in the consortium the best known methods in innovation management and introducing effective approaches for knowledge management are considered key winning factors for a successful introduction of new ideas into products. These aspects of innovations will mostly deal with how innovation is perceived by the different consortium partners, as academia or industry will certainly have different approaches to both knowledge sharing and making product out of new ideas. SPEED-5G will use each partner's specific knowledge and method, leveraging new innovation management methods from the industry and adopting an open knowledge-sharing mechanism from academia.

Moreover, the SPEED-5G consortium is closely monitoring European and global workshops and fora, in order to be able to disseminate the main project's findings and identify the potential impact of its main solutions on Medium Access Control (MAC) and Radio Resource Management (RRM) layers. An important goal of the project is the stimulation of positive feedback from the different industries interested to innovative wireless solutions (e.g., the telecom industry and the automotive industry) which will take into account the project outcomes and will enable the full exploitation of SPEED-5G results. Such positive feedback from the industry may involve the creation of added-value products from major vendors, added value and improved services from operators, potential start-ups from academic partners and/or SMEs. As a result, strong links with business development will be encouraged.

In general, innovation delivery from SPEED-5G is very important in order to maximise the impact of its novel solutions, ringing them to the market, and proceed further to the development of added value to main involved stakeholders, as also documented in the project Deliverable 3.1 "Value chain analysis and system design" [3].

2.2 Methods for innovation stimulation, generation and capture

2.2.1 Innovation stimulation

Working on research and innovation topics certainly requires a high level of inventiveness, mental freedom, capacity to think-out-of-the-box, and establishing an error-friendly culture, i.e. errors are to be seen as part of the game and are to be taken as a stimulating result that might spin out a better solution in the future, rather than a failure to be avoided at all costs. Another important aspect of innovation is also the attitude to taking risks, which rather often comes with errors and non-working solutions. Therefore, to stimulate researchers to move further and learn from their errors there must be a working environment open to the culture of trial-and-error and proper methods to better handle and guide such innovation streams.

In fact, it is exactly these last aspects that suggest and foster the introduction of methods, techniques and related framework to better stimulate, handle and guide towards a successful implementation of the innovation process.

Moreover, such methods have to stimulate innovation creation along the expected outcomes as well as open the door to unexpected new streams of activities coming out of the research and innovation process.

SPEED-5G therefore will also concentrate on knowledge- and best-known-method-sharing focusing on the most proficient possible implementations of the innovation worked on in the project. That will be managed via the introduction of promising known strategies as:

- *Non-waterfall processes for innovation and project handling:* Kanban, Agile and Lean methodologies. For example Intel is working internally in SPEED-5G adopting the Kanban approach, a very lean method to track in a very light way project advancements that is very flexible in the way it adapts to unplanned or unknown change of direction. Having a method that helps in handling unplanned events is a sure advantage for a research projects like SPEED-5G;
- *World Café:* in meetings organized on purpose or during one of the SPEED-5G project consortium meetings one or more “World Café” events can be organized to better identify and try to solve the most outstanding issues and to better phrase the biggest problem statements that hinder the most the project;
- *Innovation workshops:* in order to educate partners in the consortium who are not familiar with agile methods, Intel is willing to organize a dedicated workshop, potentially also open to externals, where Agile management methods will be explained, discussed, analysed, compared using live and interactive but simple examples. Intel’s is experienced in this domain and can very willingly drive such events.

Other approaches can be identified along the lifetime of the project, but the ones mentioned above should be more than efficient enough to establish in the consortium the mentioned think-out-of-the-box and error-friendly cultures that are so key for being able to bring to a successful market entry the most promising research ideas and innovations.

2.2.2 Innovation Generation

During the project lifetime, brainstorming sessions will be organised in order to maximise the chances of coming up with novel and optimal solutions to the identified problems in domains relevant for SPEED-5G.

Part of the strategies listed above, e.g. organizing World Café events, will indeed be beneficial in this scope.

2.2.3 Innovation Capture

According to the U.S. Patent and Trademark Office (USPTO) and the World Intellectual Property Organization, in 2013 the amount of patents issued only in the US was around 280,000 and almost a million worldwide. But statistics indicate that only about 10% of these patents will eventually yield commercial benefits. For SPEED-5G to be able to exploit its innovative contributions to 5G technology development and consequently to society as a whole, it is not enough to just create innovation. Capturing the value created by innovation is an equally important factor that is often overlooked, both at corporate and academic level. Furthermore, innovation may prove important not only at the creation, but also at the capture phase. An innovative approach to market entry might determine (or not) the success of an innovative technology.

In SPEED-5G, IMC will monitor innovation creation and will consult partners for determining the best way to secure it and consequently exploit it. Particular attention will be placed on potential traps existing at each phase of the development of a new idea. A list of such risks and respective potential mitigation measures follows:

Phase 1: Concept

Public Disclosure:

Inventors may have disclosed information on their invention in scientific publications, which prevents from patent applications. Therefore it is important to ensure that partial results and not the full solution is published at the time of filing for patent protection. Also, in the case of USPTO, a safe option would be to file a provisional patent application before any disclosure. A provisional patent application preserves the inventor while allowing time to further develop the innovation. Then, a full patent application must be filed within one year.

Another measure to protect the invention is to have all contributors signing a non-disclosure agreement.

Phase 2: Development

Lack of "inventive step":

As most inventions are based on reuse of current knowledge, it is usually the case that an invention is evaluated as not sufficiently inventive, i.e. non-obvious. It should therefore be possible to demonstrate that the invention is a novel application of known science. One way to achieve this is by building additional proprietary features into the innovation.

Capability to monitor and enforce protection:

If the invention concerns a process or a method, it is hard to protect it and usually easy to be copied without the inventor being able to prove it. Ways to protect from this risk are to build markers for a production technology or method, into the product itself, to turn the process into a product or to see if the process can be embedded under licence into an existing tool or platform of another company that would be more capable to enforce the protection.

Phase 3: Market Entry

Secure the best applications of the invention:

In many cases, competitors manage to come up with attractive applications of a breakthrough idea, based on public knowledge or patents publications. To prevent this, inventors should carefully identify the most profitable potential applications of their invention and focus resources on developing them, so they could improve their exploitation. A provisional patent application is again a useful tool, taking advantage of the one-year period to complete the work and exploit the most beneficial applications of the invention.

2.3 Management and documentation of innovation

2.3.1 Knowledge and IPR management

It is of prime importance to make sure that SPEED-5G manages to maximise the impact of knowledge creation, either through of publications or patent applications procedures. Because of the collaborative nature of the project, procedures on information-sharing prior to results dissemination have to be properly set up. The Consortium Agreement clearly defines the rules the partners have to comply with when a publication is being prepared. In advance with this, an IPR management procedure is required to make sure that innovative foreground can be properly secured so that its exploitation by the partners is facilitated.

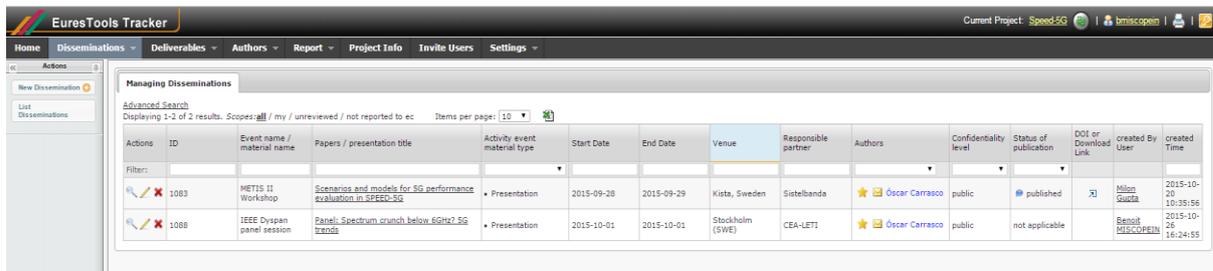
CEA LETI has taken the role of driving the IPR management in the project. In that regard, CEA LETI will set up and maintain an innovation documentation tool, able to track the foreground results generated in the project. In coordination with the work packages leaders (WPLs), CEA LETI will log the production of technological results in order to track, for each result:

- What is the object of the result?
- In which task it has been developed?
- Which partner(s) has produced the result?
- When it has been disclosed (date and event)?

Depending on the nature of the result, a decision of disseminating via either a publication or a patent application will have to be made. WPLs will have to make a recommendation on the choice for disseminating the result, identifying the co-authors, on a consensus-based model. This choice will be reported in the tool and the recommendation will be assessed by the Innovation Management Committee (see next section), either during an IMC regular meeting or on an off-line basis. IMC will take the final decision to opt for one or the other dissemination option with a list of contributing partners. Again, this decision will be indicated in the innovation management tool.

Also, the consortium will make use of the Eurescom Dissemination Tracker tool, able to make the inventory of completed or on-going dissemination actions (<http://tracker.eurescom.eu/site/index>). As shown in Figure 1, this user-friendly tool integrates all the required functionalities to manage and document dissemination outputs, for instance in cases IMC has decided that a given result will be published in a conference, a journal or presented during a workshop (public disclosure). In the case of patent application, the Eurescom tool is not very suitable and the internal tool will be used instead.

An interesting feature of the Eurescom Dissemination tracking tool is the possibility to configure it to facilitate the support of rules set up in the CA for sharing papers before submitting them in conferences. For instance, automated notifications can be sent by the Eurescom tool when new items are created and reminders can be added with a defined number of days, after which a dissemination item is automatically set to the status 'project-internal approval', if there have been no objections. Configuring this notification feature in accordance with internal rules for publication (time required for consortium review, time required for feedback integration, for instance) will help us to comply with the Consortium Agreement rules.



The screenshot shows the EuresTools Tracker interface. The main window displays a table titled 'Managing Disseminations' with the following data:

Actions	ID	Event name / material name	Papers / presentation title	Activity event material type	Start Date	End Date	Venue	Responsible partner	Authors	Confidentiality level	Status of publication	DOI or Download Link	created By	created Time
	1083	METIS II Workshop	Scenarios and models for 5G performance evaluation in SPEED-5G	• Presentation	2015-09-28	2015-09-29	Kista, Sweden	Sistelbanda	★ Oscar Carrasco	public	published	✗	Milou Guada	2015-10-28 10:25:56
	1088	IEEE DySPAN panel session	Panel: Spectrum crunch below 6GHz 5G trends	• Presentation	2015-10-01	2015-10-01	Stockholm (SWE)	CEA-LETI	★ Oscar Carrasco	public	not applicable		Benoit MIEGOWSKI	2015-10-28 16:24:55

Figure 1: Screenshot of Eurescom Dissemination Tracking Tool

To conclude, we will make use of two complementary tools. The SPEED-5G internal tool will be used to log the production of results (knowledge management). If a result is deemed as to be published in publicly available resources, an item will be created in the Eurescom tool and the lifetime management of this item until publication will be done on Eurescom Dissemination Tool. If the result is considered as a possible patent application, the management of the procedure will be tracked on the internal tool, under the maintenance of CEA-LETI.

2.3.2 Innovation Management Committee

Innovation management is a process that requires an understanding of both markets and technologies. Both competences are needed if creative ideas should be transformed successfully into new products. Fostering innovation in a coordinated and structured way will have high priority in SPEED-5G. In order to facilitate a structured process, with clear responsibility, a dedicated Innovation Management Committee has been setup. Its main goal is to foster and steer innovation and exploitation of project results, ensuring their application e.g. for launching new products. As innovation management is a key task, the IMC is chaired by the Project Coordinator, with participation from all industry and SME partners but also academic partners. The activities will be performed in WP2, more specifically by T2.1 and T2.2. The respective task leaders will work in close cooperation with the IMC.

The IMC will meet at least quarterly (physical meetings or teleconference) to review the exploitation potential of the technologies, based on the market opportunities, individual partner plans and technical progress achieved by each of the partners.

In more detail, the IMC will also be responsible for:

- The management of all IPR whether Foreground or Background IPR. This responsibility includes overseeing the commercial assessment and protection of any Foreground IP generated by the project and negotiation of licence agreements to enable the transfer of technology also outside the consortium. External services e.g. IPR helpdesk or a European Patent Attorney might be recruited.
- Generation and management of the exploitation plan, IPR strategy, commercial approach, and will consider the business plan and the market evaluation analysis developed.
- Negotiation and co-ordination of Exploitation Agreements in a manner to satisfy the interest of all the members of the consortium. The agreement will formalise exploitation restrictions, licensing arrangements, protection of IPR.

The IMC will monitor the progress and status of the innovations generated by the SPEED-5G project, providing the guidance for aligning the innovations declared at the project proposal and fine-tuned during the project execution with the main interest areas of the 5G market and standardization activities around the world.

As has been stated before, the IMC is the forum to research and discuss the innovation management goals, processes and structures that are needed to support innovation within the SPEED-5G

Consortium. In that sense, the working group will manage the strategy for innovation proposals in accordance with the policy and procedures agreed amongst the different partners, with the aim of identifying and reviewing SPEED-5G outputs and impacts and examining the factors influencing the project performance.

The evaluation findings will help the partners to decide the best approach in coordinating the exploitation, IPR strategy or commercial agreements to be made between the partners for linking the SPEED-5G with the 5G standardization path and the future market needs. The evaluation will use a multi-method approach, including an IPR analysis and a focused review of background information from other 5G PPP projects, from the 5G PPP working groups, international standardization bodies, 5G standards associations and scoping interviews with key proponents of the diverse solutions and technologies of SPEED-5G inside the consortium for properly defining the perceived value, the potential impact and the strategy related with this specific shared outcome of the project.

The IMC will collect information on the state-of-the-art of the different technologies related or developed within the project, enabling internal dissemination of knowledge, interoperability between SPEED-5G new products and services, and providing a powerful platform for further innovation inside the project consortium.

In essence, the IMC will provide the collaborative framework for organising the project innovation, empowering the collaboration amongst partners, developing a knowledge-base and building capacity for innovative thinking, developing mechanisms to stimulate and harvest innovative ideas and developing processes and structures for effectively managing innovative ideas.

But the IMC also has to aim at achieving the research objectives with the expected and required quality, analysing the overall innovation work progress, so the group will generate an internal report every six months, which will be delivered to the Project Management Team for analysis. In that sense, the IMC will provide tools for benchmarking the innovations of SPEED-5G in order to implement the specific strategy in terms of standardization and exploitation related with every shared project outcome.

3 Dissemination Plan

3.1 Dissemination objectives and approach

SPEED-5G has conducted a detailed plan for achieving a number of dissemination objectives and as such, it will use a wide spectrum of dissemination ways and channels, as described in more details below. Part of our strategy is to have a clear focus on the different audiences we are targeting.

Besides dissemination to the scientific community, SPEED-5G has planned a number of activities to also reach the standardisation organisations as well as industry. This should prepare the ground for adoption of the SPEED-5G results in standardisation bodies and their final uptake by industry and SMEs.

The planned dissemination activities include:

- Setting up a project website that will act as an information and service portal, disseminating project results and providing access to standards, reference implementations, demonstration software, reference implementations and material explaining SPEED-5G innovation.
- Organising tutorials within the consortium member organisations, with the aim of educating a wider range of engineers and decision makers on the technology outcomes of the project, as well as giving public tutorials at conferences.
- Use of local networks and associations: We also plan to use local networks and associations where project partners are involved, in order to ensure a wide dissemination also on regional level.
- Publication of scientific results and of practical experiences to the largest scientific and industrial communities, high profile conferences and journals as mentioned in the subsections which follow.
- Participation in program committees and editorial boards: This is important for team members who can, play a role in setting the agenda (e.g., defining special conference sessions), and defining key areas of interest for the research community.
- Organisation of a summer school together with other EU-funded projects, in topics relevant to SPEED-5G focus, e.g. Dynamic Spectrum Allocation (DSA).
- Publication of white papers, book chapters or editorship of books on topics related to SPEED-5G research as mentioned in the subsections that follow.

3.2 Target audiences

SPEED-5G's dissemination objectives are closely related to the target audiences who will be reached via dissemination activities. In order to achieve maximum impact with the given resources, SPEED-5G is focusing its dissemination activities on five main target audiences:

1. Standards developing organisations (SDOs)
2. Regulators
3. Large companies in the ICT industry and in vertical sectors
4. Small and medium-sized enterprises (SMEs) in the ICT industry and in vertical sectors
5. Scientific community in the 5G/ICT domain

3.2.1 Standards-developing organisations

SDOs are important targets for spreading the technical results of the project, so to have an impact on the ongoing standardization effort in the field of 5G wireless technologies.

SPEED-5G aims to monitor and impact the following SDOs:

- Next Generation Mobile Networks (NGMN) Alliance [5]
- ETSI [6]
- 3GPP [7]
- ITU [8]
- IEEE [9]
- Small Cell Forum - 5G working group [10]
- WWRF- 5G working group [11]
- WiFi alliance [12]

The work is just starting, especially in the 3GPP bodies (namely RAN and SA groups), on defining the first wave of features that will compose the 5G architecture. In this period of time, it is very important to monitor the ongoing work, to ensure that SPEED-5G outcomes will not take a completely different direction, with respect to the directions towards which standards bodies will concentrate their work.

More details on standardization bodies are provided in Section 3.2.2.

3.2.2 Regulators

Aligning with and involving regulators in the process of developing SPEED-5G's solutions will accelerate and facilitate later discussions on how regulatory bodies can constructively deal with new technologies. In fact, it is important to consider such bodies early enough to avoid unnecessary regulatory barriers that might potentially hamper the rollout of solutions developed in SPEED-5G.

Among the regulators with whom the project will establish a dialogue are:

- Ofcom, the UK regulatory body [13]
- ANFR, the French regulatory body [14]
- ECO, the European office working under the CEPT umbrella, based in Denmark [15].

Further regional regulatory bodies might be targeted in a second step of the project, depending on how well the meetings with the above mentioned regulators develop.

More details on regulatory bodies are provided in Section 3.2.3.

3.2.3 Large companies in the ICT industry and in vertical sectors

SPEED-5G already has some large ICT players in the consortium. However, in order to achieve widespread awareness among key industry players, the project will reach out additional big players within the ICT domain, especially within the 5G PPP association [4] but also outside of it, as well as to large companies from vertical sectors who could benefit from the SPEED-5G solutions.

3.2.4 Small and medium-sized enterprises (SMEs) in the ICT industry and in vertical sectors

SMEs are known to be agents of innovation. In order to achieve widespread uptake and commercial exploitation of SPEED-5G's solutions, it is important to create awareness and possible involvement by SMEs from the ICT industry and vertical sectors. As this is a heterogeneous set of target companies, the project will endeavor to find the most appropriate ways for reaching the suitable SMEs in an effective manner.

3.2.5 Scientific community in the 5G/ICT domain

A close dialogue and collaboration with the scientific community in the 5G/ICT domain is important for SPEED-5G in ensuring that the technological solutions of the project are cutting edge and meeting the highest standards of scientific excellence.

In this regard, the academic and research institutes partners in the project will play a key role in identifying the most promising venues and events in the academia during which SPEED-5G results could be presented and discussed.

3.3 Dissemination activities

3.3.1 Scientific publications (conference and journals)

SPEED-5G, while having an ambitious exploitation approach and drive is not only an innovation project, but also a genuine research project. The project partners have the ambition to generate a good footprint of SPEED-5G research outcomes in the scientific community. The main KPI that the project is using to measure this are in the form of publications in journals and at the main conferences, as well as through speeches, tutorials, etc. Concerning scientific publications, the consortium has the target to publish at least 5 top journal and 30 conference papers, in the most suitable venues. The project team uses an online tool, the Eurescom Dissemination Tracker tool ² to track the publications and report on how well the consortium meets the publication targets.

The rules, internal deadlines and procedures for project publications are governed by the CA.

While there are no conferences and journals explicitly excluded from the consortiums publication targets list, there are a number of venues (both conferences and journals) that are particularly targeted to disseminate the scientific findings of the project, these venues are listed below.

Event name	Main topics
IEEE Dyspan	Dynamic Spectrum Access (DSA) and Cognitive Radio, including novel approaches and technologies enabling more efficient use of the radio spectrum. Covering both technology as well as policy issues.

² <http://tracker.eurescom.eu/>

Crowncom - Conference on Cognitive Radio Oriented Wireless Networks	Cognitive Radio Technologies, Dynamic and Opportunistic Spectrum Access, Spectrum Usage Optimisation. Covering both technology, standardisation and regulation related to CR technologies and systems.
SPAWC – Signal Processing Advances in Wireless Communications	Signal Processing in Wireless Communication Systems.
WCNC – Wireless Communications and Networking Conference	New approaches in wireless communications and networking technology.
GLOBECOM	IEEE flagship conference covering all aspects of networking and communications.
ICC - International Conference on Communications	IEEE flagship conference covering all aspects of networking and communications.
EuCNC – European Communications and Networking Conference	Communication and networking.
IEEE VTC – Vehicular Technologies Conference	Networking and vehicular aspects.
Wireless World Research Forum (WWRF)	Wireless communications, all topics.

Table 1: Indicative list of targeted conferences for the dissemination of SPEED-5G results

Publication name	Main topics
EURASIP Journal on Wireless Communications and Networking	General wireless and access network topics, covering PHY to System level.
EURASIP Journal on Advances in Signal Processing	Algorithms and Signal Processing approaches in general.
IEEE Communications letters	Communication technologies.
IEEE Communication and signal processing magazines	Communication technologies and systems in more tutorial style.
IEEE Transactions on Signal Processing	Algorithms and Signal Processing approaches in general.
IEEE Wireless Transactions	Communication technologies – scientific evaluation of approaches and techniques.
IEEE Vehicular Technology Magazine	Networking and vehicular aspects.
IEEE Access	Communication and networking aspects.
IEEE Communications Magazine	Communications and networking aspects.

Table 2: Indicative list of targeted journals for the publication of SPEED-5G results

3.3.2 Target standardisation bodies

SPEED-5G addresses a wide set of concepts which can be promoted in different kinds of standardisation or pre-standardisation bodies. Along with the definition of concepts of 5G with respect to applications and architecture requirements, organisations like NGMN, ITU-R WP5D and 3GPP will be of primary importance. SPEED-5G will take advantage of the representation of consortium partners in such SDOs for monitoring the on-going developments and for steering the debates in the creation of new *Study Items* to take into account the vision developed in the project. As SPEED-5G will also tackle innovative transmission schemes, ETSI/RRS will be addressed mainly with respect to flexible ways to share spectrum and cognitive radio systems, which will be at the heart of SPEED-5G technical objectives. Finally, IEEE has a great impact on the development of key systems which are bound to be integrated into heterogeneous 5G networks. Among others, IEEE 802.11 Working Groups and IEEE 1900.7 are working groups where technical results of SPEED-5G pertaining to traffic offloading schemes on non-3GPP trusted systems.

Before detailing the on-going activities in specific SDOs where SPEED-5G is represented by key partners, it is worth mentioning that SPEED-5G will actively work in cooperation with the 5G PPP pre-standard workgroup. Together with the other projects under the 5G PPP umbrella, SPEED-5G will contribute in the identification of standardization bodies to align with the roadmap and work programme of such organisations. Among the goals of this work, a better understanding of technical challenges relevant to the project objectives and results is expected. This will also help to have a consolidated visibility on the respective timelines of SDOs, which is a key aspect to select a technical relevant target having a work programme in accordance with the project timeframe. Also, this activity in pre-standard workgroup may also facilitate to actually manage to influence debates in SDOs so that Study Items corresponding to SPEED-5G vision or to 5G PPP vision in general could be created, thus fostering the standardisation activity of the project.

Finally, during the proposal stage, SPEED-5G identified at least two very important SDOs, both because they address technical issues very much in line with the SPEED-5G expected outcomes and due to the fact that there is a SPEED-5G partner who has a strong commitment in these bodies.

- **IEEE P1900.7:** CEA is a voting member in this working group, which is currently finalising a first standard version on radio interface for whitespace dynamic spectrum access. CEA has provided a major contribution both on the specifications of PHY and MAC layers. Provided this WG is currently ending a first standardisation cycle with an expected publication of IEEE P1900.7 standard in early 2016, there are on-going discussions within this WP to define the next steps. CEA will strive to push for the creation of a new WG where key objectives will be in line with the goals of SPEED-5G. Depending on the ability of P1900.7 working group to reach a consensus on a definition of a standard amendment, a new Project Authorization Request (PAR) is expected by late 2015.
- **Small Cell Forum:** The Small Cell Forum (SCF) is the biggest industry association for driving and promoting the small cell technology. While SCF is not an SDO, consensus formed within SCF often translates into multiple undersigned contributions to the SDOs (usually 3GPP) from member companies who are members of both SCF and 3GPP, which includes Intel, BT and Sistelbanda. The SCF has created a working group for analysing specifically the 5G standards, and other working groups like the Radio and Physical Layer working group (WG₂), and the Network working group (WG₃), where the most relevant topics are analysed and discussed in order to have a common approach for giving guidelines to both operators and SDOs. Inter-RAT coordination, RAN Virtualization as well as the study 5G standardization path, are active work items within SCF, and we can expect to use the SCF channel into 3GPP at the appropriate times. Sistelbanda plans also to make a formal presentation of the project in a dedicated

session at the WG2, in an SCF Plenary Meeting in order to socialise and disseminate the main ideas of SPEED-5G by introducing and promoting the technologies developed in SPEED-5G within the Small Cell industry.

3.3.3 Target regulations bodies

Regulatory bodies define the technical framework under the terms of which all future products will have to be compliant. Therefore understanding what are the requirements and limitations coming out of those bodies is a key success factor for each collaborative research project willing to have a concrete impact on the ICT community.

Indeed, monitoring the on-going activities in regulatory bodies is an important aspect of the effort SPEED-5G will spend on delivering results that have a high market potential, but that aspect only is not enough to achieve the projects targets and to ensure a successive effective impact of the project results in the exploitation phase.

Establishing a communication channel with regulatory bodies is in fact a needed additional step to the monitoring phase. Exchanging information and starting an open discussion with those bodies will avoid taking directions, in the research and innovation activities performed under the project umbrella, which will not have a real market possibility.

In fact, SPEED-5G intends to engage with regulators in the first phases of the project, pursuing the following approach: first send a set of questions SPEED-5G is interested to get to know regulators' visions and then ask for a face-to-face meeting to analyse and debate on those topics. This approach was found to be very successful for other EU-funded projects, which some SPEED-5G partners were involved in, and therefore the whole consortium accepted to go along this line of actions.

A planned calendar for engagement with regulatory bodies has been defined during the first quarter of the project activities. In the first or second quarter of 2016 meetings with Ofcom (the UK regulatory body), ANFR (the French regulatory body) and ECO, the European agency located in Denmark working under the CEPT umbrella are planned. Other national bodies can be taken into considerations, e.g. Deutsche Net-Agentur in Germany or Ficora in Finland, depending on the outcomes of the first meetings and the availability of further travelling of the project partners. The meeting is supposed to be attended by a restricted group of project partners, who feel confident to represent the vision of the whole consortium. Exact dates cannot be fixed at the moment as those depend on the availability of SPEED-5G partners and regulatory bodies. Ideally those meetings will be co-organized with other dissemination activities to maximize the effort spent on those travels.

In addition, the outcomes of the work of the WRC'15 (World Radio Conference), planned in the month of November 2015, will be very important in paving the way for further work done at the national level by Ofcom and ANFR. The work done by SPEED-5G could ideally be used in the preparatory phase of the forthcoming WRC'18, where the framework for 5G system development will be defined, especially with respect to the frequency bands that will be allowed to be used by wireless services in different regions of the world.

3.3.4 Communication oriented to the scientific community

Besides the activity of publication of results in scientific conferences and journals described in section 3.3.1, SPEED-5G will implement a comprehensive dissemination strategy towards the scientific community with the organisation of events where innovative concepts of SPEED-5G can be promoted. As a complement to articles, this dissemination strategy is of prime importance to let SPEED-5G results and findings percolate among academic and industrial research peers. Organization of workshops along the technical issues of SPEED-5G will be proposed to relevant conferences. For example, a member of the SPEED-5G consortium has already organized a

workshop on “Novel Waveform and MAC design for 5G” at IEEE WCNC 2016 [16]. Another channel that will be used is panel and industrial session among different consortiums member of 5GPP projects which further benefit SPEED-5G results. Finally, tutorials within the consortium member organizations as well as public tutorials at EUCNC and at conferences such as GlobeCom, ICC, IEEE VTC, IEEE PIMRC, IEEE WCNC, and ISWCS are foreseen. To disseminate and promote SPEED-5G solutions, the different dissemination work items include:

The planned dissemination activities include:

- *Panel and industrial session* will be one of the important activity to disseminate SPEED-5G results. We are planning to have at least one panel and industrial session along the lifetime of the SPEED-5G. These activities invite industrial partners from other 5G PPP projects (i.e. mmMagic, Fantastic5G, etc.) and other industry to share and discuss ideas, which will be foster the results of SPEED-5G. For example, we have already organized one industrial panel session in Dyspan spectrum issues below 6GHz with Sistelbanda representing the SPEED-5G vision [17].
- *Organising tutorials* within the consortium member organisations, with the aim to educate a wider range of engineers and decision makers on the technology outcomes of the project, as well as giving public tutorials at conferences as for example, EUCNC, GlobeCom, ICC, ISWCS, IEEE VTC, IEEE PIMRC, IEEE WCNC.
- *Participation in program committees and editorial boards*: This is important for the team members who can play a role in setting the agenda (e.g., defining special conference sessions), and defining key areas of interest for the research community. The project is very well positioned already with respect to this goal, as project members are highly involved in the programme committees and editorial boards of key conferences and journals. Instances of PCs and editorial boards project members are involved in are IEEE Communication Magazine and Wireless Transactions.
- *Publication of white papers*, book chapters or editorship of books on topics related to SPEED-5G research.
- SPEED-5G will also plan to arrange at least *one summer school* along the lifetime of the project, which further help to disseminate SPEED-5G results. The main idea of this school is to educate the student about SPEED-5G innovation and pre-standardization activities in relation with SPEED-5G
- SPEED-5G will also contribute to the events driven by 5G PPP initiative in the form of workshops, white papers and tutorial talks. SPEED-5G contribution to 5G PPP event put a stepping stone towards the standardization activities of 5G in the area of novel MAC design for new waveform (i.e. Filter Bank Multi Carrier).

3.3.5 Website, newsletter

The project website is the central hub for dissemination activities. It provides access to all information related to SPEED-5G activities and results. An initial version of the website has been online at <https://speed-5g.eu/> since the start of the project in July 2015. It has been subsequently amended and improved and it is continuously updated with information on news and events. Figure 2 is a screenshot of the project home page. Beyond the factual information related to the project like mission, summary, consortium description and deliverable list, the website provides an updated list of news showing the latest events where SPEED-5G has been represented. The project website will be also updated to display the dissemination activity, either related to standardisation or to scientific publications.

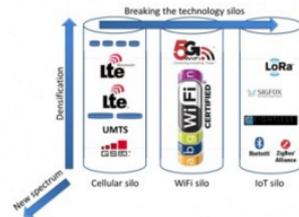


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SPEED-5G is a 5G-PPP project which aims to achieve a significantly better exploitation of heterogeneous wireless technologies.

To achieve this goal, SPEED-5G will develop new techniques for optimizing spectrum utilization. As a result, SPEED-5G will provide solutions answering the request for a thousand-fold increase in mobile traffic volume over a decade and for efficiently supporting very different classes of traffic and services.

The project started on 1 July 2015 and will run until the end of 2017. It is performed by a consortium of ten organisations, led by Sistelbanda SA, Spain.



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Figure 2: SPEED-5G website at <https://speed-5g.eu/>

As a measure of effectiveness, the project will closely monitor and document the number of visitors and the responses elicited by the website.

The project website is closely linked with the quarterly newsletter, called 'SPEED-5G News'. The purpose of the newsletter is to inform the above-defined target audiences about activities and results of the project. The envisaged start date of the newsletter is the end of Q3/2015.

The planned structure of the newsletter includes the following sections:

- Editorial
- Project Highlights
- Events
- Imprint/contact

Interested readers are invited to subscribe to the SPEED-5G newsletter in a very simple procedure, linked to the Eurescom mailing list management tool. As for the website, the effectiveness of the newsletter in reaching its target audiences will be closely monitored by capturing the number of recipients and the level of response elicited by each edition.

4 Conclusion

This deliverable presents and elaborates on the dissemination plan and the innovation roadmap of SPEED-5G. Because of the industry-oriented research nature of the project, specific attention has been paid to the definition of innovation capture and management, so that exploitation of foreground results can be optimised. In creating the Innovation Management Committee, SPEED-5G takes a proactive attitude with respect to innovation, also illustrated by the consortium's decision to rely on novel innovation stimulation methods. In addition, this deliverable also presents the tools which will be put in place to manage the knowledge and IPR created in technical WPs along the concepts of resource management and smart medium access. How the foreground results will be documented and tracked during the course of the project is presented in this deliverable.

As a complement to the description of the innovation strategy developed within SPEED-5G, this deliverable describes the dissemination targets, which have been identified so far. The research results from SPEED-5G will be disseminated in world-leading conferences and journals, and this document gives a first list of candidates that look very relevant to publish the results and achievements of the project. Additionally, since SPEED-5G is part of the 5G PPP initiative and provided the latter strives to give to European industry a leading role in the 5G standardisation activity, this document shows that SPEED-5G has already identified key SDOs and regulatory bodies where concepts or technical results can be promoted. It also reports that a first action has already happened in an SDO, the IEEE 1900.7. Focused events and workshops will be organised to accelerate the promotion and possible adoption of the SPEED-5G results; this report gives factual elements to show that this dissemination pathway has already started by organising a panel at the IEEE Dyspan 2015 conference as well as having a workshop proposal accepted at the IEEE WCNC 2016 conference.

Naturally, the dissemination plan and innovation roadmap will be updated and profiled during the course of the project. As an example, standardisation targets and strategy may be adapted with respect to the activity of the SDOs will develop within the time frame of the project. A particular attention will be paid to the alignment of project schedule related to results promotion with the roadmap of SDOs. Along the same idea of refining the SPEED-5G strategy, innovation creation methods will be assessed after some time, in order to find the most suitable method that can provide the most effective results.

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