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- Final report**

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Editor(s):	Jarno Pinola (VTT), Kyösti Rautiola (VTT)
Authors:	Kyösti Rautiola (VTT), Jarno Pinola (VTT), Pedro Merino (UMA), Laura Panizo (UMA), Álvaro Rios (UMA), Oscar Castañeda (DEKRA), Adam Flizikowski (ISW), Suvidha Mhatre (ISW), Jerry Sobieski (NORDU)
Reviewers:	Ilkka Harjula (VTT), Janie Baños (DEKRA)
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Abstract

This report contains the description of the communication, exploitation and dissemination activities carried out during the project.

Keywords

communication; exploitation; dissemination; standardization

EuWireless Consortium

Universidad de Málaga

UMA



DEKRA Testing and Certification

DEKRA



Teknologian tutkimuskeskus VTT Oy

VTT



IS-Wireless

ISW



time.lex

TL



NORDUnet A/S

NORDU



Executive summary

Science needs effective communication and dissemination as well as exploitation by Industry. This deliverable presents the performed communication, exploitation and dissemination activities in the EuWireless project as per the EuWireless deliverable “D4.2 - Communication, Exploitation and Dissemination Plan”.

The deliverable describes the main tools and channels utilized in the work, target audience for the project’s communication messages and dissemination materials, and key actions taken during the project. The deliverable also lists the main standardization organizations, industry associations and other projects which have been contacted for networking purposes.

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List of abbreviations

3GPP	3rd Generation Partnership Project
5G-ACIA	5G Alliance for Connected Industries and Automation
5G IA	5G Infrastructure Association
5G PPP	5G Infrastructure Public Private Partnership
5GAA	5G Automotive Association
5GTNF	5G Test Network Finland
CEPT	European Conference of Postal and Telecommunications Administrations
ESFRI	European Strategy Forum on Research Infrastructures
ETP	European Technology Platform
ETSI	European Telecommunications Standards Institute
GSA	Global mobile Suppliers Association
GSM	GSM Association
GTS	GÉANT Testbeds Service
GVS	Global Virtualization Service
ICT	Information and Communication Technology
IoT	Internet of Things
ISG	Industry Specification Group
ITU-R	International Telecommunication Union Radiocommunication Sector
LSA	Licensed Shared Access
MNO	Mobile Network Operator
MWC	Mobile World Congress
NFV	Network Functions Virtualization
NREN	National Research and Education Network
NSF	National Science Foundation
PoP	Point of Presence
R&D	Research and Development
R&E	Research and Education
RAN	Radio Access Network
SD-RAN	Software-defined Radio Access Network
SA	Service and System Aspects
SME	Small and Medium-sized Enterprise
SOTA	Structure Oriented Testing & Analysis
TCN	Test Center Network
TIP	Telecom Infra Project
TSG	Technical Specification Group

1 Communication

“Communication on projects is a strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at promoting the action and its results. It requires strategic and targeted measures for communicating about (i) the action and (ii) its results to a multitude of audiences, including the media and the public and possibly engaging in a two-way exchange.” [1]

Having in mind that the focus is to both:

- inform about the project, and
- promote the project and its results/success,

this section presents the key communication measures performed during the project for the promotion of EuWireless and its results. By using specific channels to communicate and inform stakeholder groups on problems and solutions related to the project, the project aims to engage the interest of the public, society and different communities.

1.1 Objectives summary

Communication activities have been synchronized to project progress and milestones. Table 1 summarizes the planned key communication activities during the project execution. The most significant activity is the formulation and production of the dissemination materials (i.e. publications, reports, promotion materials and presentations) in accordance with the definition of communicated messages and selection of communication channels.

Table 1. Planned timeline and scope of the EuWireless key communication actions

Activity	2018/Q1-2 Scope: initial requirements and technology enablers	2018/Q3-4 Scope: final requirements and technology enablers	2019/Q1-2 Scope: initial architecture	2019/Q3-4 Scope: final architecture and validations
Electronic communication	Project website updates Social media news	Project website updates Social media news	Project website updates Social media news	Project website updates Social media news
Dissemination materials	Leaflet v1.0 Newsletter #1 Articles to scientific workshops and conferences Questionnaires	Press release #1 Newsletter #2 Articles to, scientific workshops and conferences Questionnaires Project deliverables	Leaflet v2.0 Newsletter #3 Articles to scientific journals	Press release #2 Newsletter #4 Articles to scientific journals Project deliverables
Participation to events	Virtual project workshop Promote project goals and concept in events organized by others	Project workshop #1 Promote requirements and enabling technologies in events organized by others	Project workshop #2 Promote initial architecture in events organized by others	Project workshop #3 Promote final architecture and validation results in events organized by others

During 2018, the focus was planned to be on communication with different stakeholders in order to collect feedback to the system requirements and promote the EuWireless goals.

During 2019, activities supporting the dissemination of the EuWireless architecture as well as preparation of the publication manuscripts and reports to be disseminated to the target groups have higher priority.

During the project extension period in January-March 2020, the key activities identified for 2019 continued.

1.2 Performed activities

Electronic communication includes the following activities:

- Project website¹ has been published on January 2018 and updated regularly during the project execution.
- Link to the project website has been added to DEKRA's website² (available both in English and Spanish).

¹Project website: <https://euwireless.eu/>

²DEKRA website: <https://wireless.dekra-product-safety.com/corporate/rd-activities/euwireless.html>

- Project activities have been promoted through the EuWireless Twitter profile.

Dissemination material includes the following documents:

- EuWireless Leaflet v1.0 was published on 15 February 2018.
- EuWireless Leaflet v2.0 was published on 1 February 2019.
- EuWireless Leaflet v3.0 was published on 11 February 2020.
- EuWireless Newsletter #1 was published on 21 September 2018³.
- EuWireless Newsletter #2 was published on 1 July 2019⁴.
 - EuWireless Newsletter #3 will be published in April 2020. The third newsletter will shortly introduce the EuWireless final architecture and cover the dissemination activities performed during the end of 2019 and beginning of 2020.
 - Newsletters #4 will be published in May-June 2020. The final newsletter will introduce the planned next steps for the implementation of the EuWireless infrastructure.
- One (1) press release on the EuWireless project⁵ has been published on 12 February 2018 by UMA.
- Four (4) news articles on the EuWireless project have been published in Spanish media during February 2018.
- Ten (10) scientific articles presenting EuWireless project results have been published in peer reviewed publications.
 - A detailed publication list is presented in Appendix 1.
- Eight (8) presentations on the EuWireless project have been given in events held in Spain, Norway, Denmark, Finland and Germany.
- Two (2) online questionnaires have been published.
 - Details can be found from Appendix 1 of the EuWireless deliverable “D1.1 - Technical and operational requirements”.
- All project deliverables have been submitted according to planned schedule.
 - Public EuWireless deliverables are available at the project’s website⁶.



Figure 1. EuWireless leaflets at DEKRA booth at MWC 2019 Barcelona.

³Newsletter #1: https://euwireless.eu/wp-content/uploads/2018/09/EuW_Newsletter-1.pdf

⁴Newsletter #2: https://euwireless.eu/wp-content/uploads/2019/07/EuW_Newsletter-2_Final.pdf

⁵Press release: <https://www.uma.es/sala-de-prensa/noticias/la-uma-coordina-un-proyecto-internacional-para-compartir-redes-moviles-entre-universidades/>

⁶Public deliverables: <https://euwireless.eu/deliverables>



Figure 2. EuWireless booth at EuCNC 2019.

Consortium members have participated to and organized the following events:

- EuWireless has been promoted in MWC 2018, RedIris Technical Conference 2018, TNC 2018, FICORA 5G Momentum Ecosystem seminar 2018, ESFRI Roadmap 2018 Launch event, ICRI 2018, NORDUnet Conference 2018, Spanish Infoday on Research Infrastructures 2018, MWC 2019, 6G Wireless Summit 2019, RedIris Technical Conference 2019, EuCNC 2019, TNC 2019, JCSD 2019, ICT Proposers' Day 2019, JITEL 2019, 5GTNF Results and Demo seminar, and FUSECO 2019.
- Two (2) EuWireless workshops have been organized during 2019.
 - “Empowering Transatlantic Platforms for Advance Wireless Research” workshop in EuCNC 2019 (joint session with H2020 ICT-17 projects). The event was held during 18-21 June 2019 in Valencia, Spain. The workshop was organized on 18 June 2019⁷. The workshop program consisted of numerous presentations from the representatives of participating funding programs, projects and research infrastructures, among which EuWireless had one dedicated presentation slot. During the workshop, EuWireless got a good response from the audience consisting of approximately 30 representatives from academia, research and industry working on 5G test infrastructures in other projects. In the discussion and feedback from the present stakeholder groups, EuWireless’ focus on sharing between commercial and research infrastructures was seen as an important and interesting approach when compared to other projects mostly relying on fully owned and single site infrastructures.
 - “5G: pan-European mobile research capabilities” workshop in TNC 2019. The event was held during 16-20 June 2019 in Tallinn, Estonia. The workshop was organized on 19 June 2019⁸. The program consisted of four presentations covering the motivation for the EuWireless approach, overview of the 5G architecture, introduction to the spectrum and Radio Access Network (RAN) sharing, and fundamentals of the GÉANT Testbeds Service (GTS) virtualization framework and its utilization in the EuWireless project. The 5G topic and integration between commercial and research infrastructures in EuWireless attracted approximately 100 participants to the audience consisting mostly of National Research and Education Network (NREN) operators and academia. The discussion and feedback from the stakeholder groups present during the workshop focused on the future possibilities (for both technologies and services)

⁷EuCNC 2019 workshop: <https://www.eucnc.eu/workshops/workshop-1/>

⁸TNC 2019 workshop: <https://tnc19.geant.org/sessions/#s53>

to extend wired research infrastructures with wireless mobile technologies as the integration process becomes easier with 5G.

- The third EuWireless workshop was planned to be held in the end of 2019 or in the beginning of 2020 in parallel with the events related to the National Science Foundation (NSF) visit organized by the EU-US EMPOWER project. Due to the postponed date for the visit and the travel and public event restrictions related to the rapid global spreading of COVID-19, it has not been possible to organize the third workshop according to the original plans.



Figure 3. EuWireless workshop at EuCNC 2019.

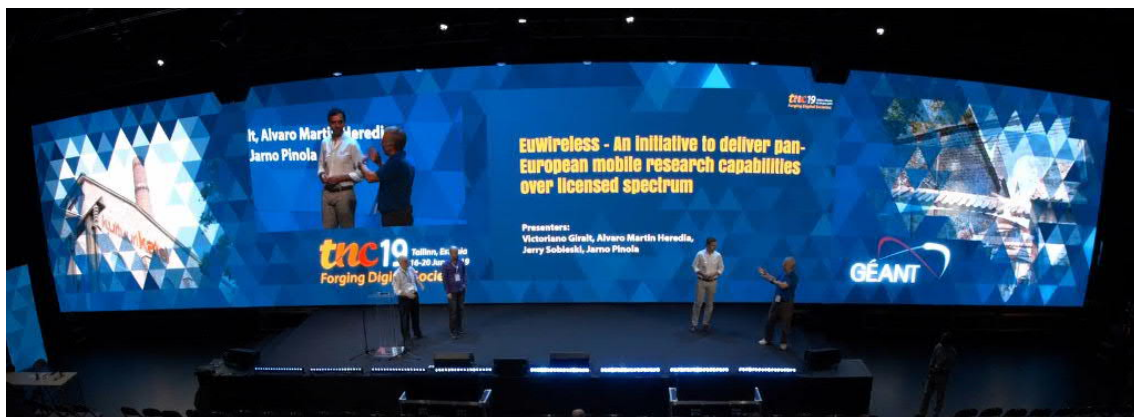


Figure 4. EuWireless workshop at TNC19.

Other communication activities include:

- The project coordinator Pedro Merino and Victoriano Giralt from UMA had a meeting with the staff of the unit managing the spectrum in Spain. They presented the project objectives and requirements in terms of experimental spectrum on 14 January 2018.
- The project coordinator Pedro Merino from UMA and Janie Baños from DEKRA had a meeting with Qualcomm Test Center Network (TCN) representatives during their visit to Málaga in the context of Qualcomm training that took place in Málaga.

- The EuWireless consortium has done also “informal” communication/dissemination through the interviews during the requirements gathering process for deliverable “D1.1 - Technical and operational requirements”.

2 Exploitation

In this chapter, the activities progressing the exploitation of the project results are presented. In the dissemination plan, an exploitation roadmap for 2019 and beyond has been defined. Starting exploitation in an early phase enhances the possibilities to successfully utilize the subsequent exploitation opportunities. The following subsections present a summary of the exploitation plan and describe the partner specific exploitation activities performed during the project.

2.1 Objectives summary

Table 2 presents the project results exploitation roadmap for 2019 and beyond for the EuWireless consortium and for each individual partner. The common goal of the EuWireless consortium is to implement the EuWireless concept and create business, societal and scientific impact. Large joint trials with potential beneficiaries will have a critical role in this activity. The EuWireless academic and research partners will utilize the project results to increase their technology related scientific competencies, to provide new commercial services to the industry, and to enhance the capabilities and reach of their current local test facilities with EuWireless technologies. The EuWireless industrial partners will utilize the project results in their business development where the ultimate target will be the development of improved products and services.

Table 2. Project results exploitation roadmap

Actor	2019	2020	2021	2022 →
EuWireless consortium as a whole	Discuss with decision makers (ESFRI, ETSI, operators, etc.) and prepare implementation project proposal.	System implementation and preparations of joint trials with potential project beneficiaries.		Large joint trials with potential project beneficiaries in EU area.
UMA	Increased participation in project proposals. Strengthened scientific knowledge. PerformNetworks development to field deployment and commercial use.		Use PerformNetworks resources in field deployments. Provide services to industry.	
DEKRA	Increased participation in project proposals. Identification of field testing needs and methodologies.		Deployment of new services based on testbeds and integrating DEKRA test tools and more specifically develop test solutions for CV2X applications.	
VTT	Increased participation to project proposals. Design of the next generation 5GTNF facility.	Implementation of next generation 5GTNF facility. Increased volume of EuWireless technology related Research and Development (R&D).	Local focused trials inside Finland with potential project beneficiaries.	
Other industrial partners: ISW, TL and NORDU	Business development; creation of new products and services.		New products and services business ramp-up; production, marketing and sales.	

2.2 Performed activities

An extended EuWireless consortium is working on the preparation of a project proposal for the INFRAIA-02-2020 call to be submitted during spring 2020. The project proposal is the first step towards a pan-European implementation of the designed EuWireless architecture with deployed Point of Presences (PoPs) in several European countries. The proposal also contains interconnected research facilities and commercial Mobile Network Operator (MNO) resources, which are part of the overall shared infrastructure. By shifting the promotion of the offered infrastructure possibilities and services from Information and Communication Technology (ICT) research community also towards other disciplines, the aim of the continuation project is not only to realize the first version of EuWireless concept, but also to serve a larger user base than envisioned in the original EuWireless project. This shift has been motivated by the increasingly

important role of mobile network infrastructures as the critical communication platform for the digitalized services of the industry and society.

2.3 Partner activities

Partners have performed the following individual exploitation activities during the project:

- **UMA:** The participation in EuWireless is an important step to extend the use of PerformNetworks resources to a field deployment. During the first year, UMA in collaboration with NORDU is deploying a GTS node in the UMA facilities (located in the Ada Byron building). UMA has increase the participation in joint projects with other research institutions (e.g. 5GENESIS), mobile operators and vendors. EuWireless will position UMA for the new calls for platforms and trials in the 5G part of ICT work programme 2018-2020 (5 projects proposals under review in the last ICT-19 call). UMA is also aware of a real need for experimentation platforms for Small and Medium-sized Enterprises (SMEs) and has a long experience in the support of experiments selected by Fed4FIRE to be executed in FIRE testbeds. This is a potential and reasonable market to exploit a lab-level testbed like PerformNetworks, especially to be used remotely by SMEs. UMA is currently planning a business model supported by the Spanish rules for collaborations among Universities and private sector. Finally, as a public University, UMA takes advantage of research to produce scientific publications, to complete new MsC and PhD thesis and to create and improve teaching material.
- **DEKRA:** DEKRA exploitation plan is mostly related to improve its testing and certification services. DEKRA joined 5G Alliance for Connected Industries and Automation (5G-ACIA) and has been actively contributing to WG5, where the test process is being defined. The alliance is looking at the concept of testbed for testing and DEKRA is planning to present the EuWireless concept. DEKRA is already a member of 5G Automotive Association (5GAA) and is actively contributing to the definition of the test plans. Various plugfests on connected car technologies took place in Málaga, during 2019, and more are planned for the near future. These events have been a good opportunity to understand the requirements in terms of wireless testbed and connectivity to address the testing requirements of the automotive industry and how EuWireless can address them. DEKRA also provides certification consultancy services for telecommunication equipment vendors. Furthermore DEKRA is developing various testing tools and participation in EuWireless is helping to identify the technical development specifications for the evolution of the tools to cover 5G and especially the automotive industry. Participation in EuWireless is helping DEKRA to improve its know-how on 5G technologies, the specific interest of potential customers and deeper knowledge of the targeted 5G spectrum requirements. DEKRA has also increased its participation in H2020 by being part of the 5G-MOBIX project.
- **VTT:** Participating in EuWireless has improved VTT's competitiveness and competence in the field of future communication networks and specifically within the area of spectrum and network sharing, including both regulatory and technical aspects. Another concrete exploitation of the project results is preparation of enhanced 5G Test Network Finland (5GTNF) ecosystem which offers 5G trialling infrastructure and services to Finnish companies. National research project and funding application for that work was successfully prepared and submitted together with Finnish research partners and industry in the end of 2018. The planning for the next phase (2021-) of the 5GTNF ecosystem collaboration is currently starting and uses the EuWireless results and experiences as input in the process. The results of the EuWireless project have also improved the position and scientific expertise of VTT for the 5G Infrastructure Public Private Partnership (5G PPP) Phase 3 calls from which several new projects have started already during 2019. VTT's project personnel have also

been able to further enhance their expertise in the project topics and to advance their PhD thesis work with the publications created during the project.

- **ISW:** EuWireless participation is helping ISW further its expertise in the area of developing tools for education and research in 4G/5G technologies with the focus on open interfaces, resource sharing and virtualization. Especially, ISW has furthered the on-site development of its simulation product by adding functionalities and support for new protocols in the physical layer, ready to be included in the product release. ISW is currently discussing the idea of spectrum-sharing as an extension to the system level simulator. ISW is also becoming a member of the open radio interface consortia, to help further the development of open RANs, which will greatly benefit the research community. ISW has recently joined the O-RAN Alliance, considering joining one of the following working groups: WG2 (Orchestration and Automation), WG3 (RAN Intelligent Controller), WG5 (Multi-Radio Access Technology Central Unit Protocol Stack) or WG6 (Network Function Virtualization Infrastructure platform). ISW is also in the process of joining the Telecom Infra Project (TIP) and considering joining the 5G New Radio Whitebox project. Moreover ISW is especially looking to gain new research knowledge related with the spectrum sharing methods and mechanisms, e.g., Licensed Shared Access (LSA), in combination with the centralized radio resource management for 5G systems. The company is currently developing a product called Software-defined Radio Access Network (SD-RAN) that covers complete virtualization of the radio access networks for WiFi, 4G and 5G. Hereby we are considering the integration of spectrum sharing solutions with the product by performing Structure Oriented Testing & Analysis (SOTA) and system design studies.
- **NORDU:** The award of EuWireless and its ambitious objectives have raised awareness among the traditional wired Research and Education (R&E) networks that mobility and Internet of Things (IoT) are no longer disjoint activities from conventional core backbones. The adoption of the generic virtualization model first introduced in GÉANT and now in the EuWireless planning has forced a re-assessment of virtualization more generally and it is being taken more seriously as a comprehensive architectural concept – not simply an adjective applied to software. NORDU has proposed demonstrations of the cellular wired integration as part of XNET – an experimental networking exercise at Supercomputing 2019 (the whole event attracted over 15 000 attendees).

3 Dissemination

“The public disclosure of the results by any appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium.” [1]

Starting dissemination process early and with contents tailored for the targeted audience increases its impact. In this chapter, dissemination activities performed during the project are described. First, the dissemination plan summary is presented. Then, the technical and non-technical dissemination materials are described. At the end, partner specific dissemination actions are summarized.

3.1 Objectives summary

EuWireless key dissemination activities and content is synchronized to the progress of the project and its milestones. Table 3 presents the disseminated information during project execution time.

Table 3. Planned timeline and key dissemination materials

Disseminated information	2018/Q1-2 Scope: initial requirements and technology enablers	2018/Q3-4 Scope: final requirements and technology enablers	2019/Q1-2 Scope: initial architecture	2019/Q3-4 Scope: final architecture and validations
Technical	Questionnaires Discussions / interviews	Questionnaires Discussions / interviews Contributions to association white papers	Scientific publications (architecture design and components) Project deliverables Presentations Discussions / interviews Contributions to association white papers	Scientific publications (final architecture and validation results) Project deliverables Presentations Discussions / interviews Contributions to association white papers
Non-technical	Scientific publications (project concept and goals) Project deliverables Presentations Leaflets Questionnaires Discussions / interviews	Scientific publications (requirements and regulation) Project deliverables Presentations Leaflets Questionnaires Discussions / interviews	Presentations Leaflets	Presentations Leaflets

During 2018, the focus has been on the collection of feedback to EuWireless system requirements and dissemination of the system concept and initial architecture. The level of technical details in the dissemination materials is still quite low.

During 2019, refined architecture definition, key enabling technologies, validation results and EuWireless benefits to different stakeholder groups have had higher priority. The level of technical details in the dissemination materials is high. In order to enable EuWireless concept implementation as well as scientific, business and societal impact, dissemination of key results to funding agencies, regulators and commercial MNOs have the highest priority.

During the project extension period in January-March 2020, the finalization of the project deliverables and the scientific publications related to the final results of the project were the main focus in the dissemination activities.

3.2 Performed activities

Following informational materials have been disseminated regarding the EuWireless system requirements, technology enablers, overall architecture, validation use cases, deployment plans, and legal aspects.

Disseminated technical materials include:

- Two (2) online questionnaires for the gathering of technical and operational requirements from the project's stakeholder groups have been published at the project website.
 - Details can be found from Appendix 1 of the EuWireless deliverable "D1.1 - Technical and operational requirements".
 - The EuWireless partners have gathered requirement candidates also by interviewing their co-operation network partners and stakeholders with additional face-to-face questions.
- Six (6) public technical deliverables have been published according to planned schedule (including the project extension period).
 - "D1.3 - Enabling technologies" in October 2018.
 - "D2.1 - Initial EuWireless architecture" in December 2018.
 - "D2.2 - Final EuWireless architecture" in March 2020.
 - "D2.3 - Technical enablers for spectrum sharing" in March 2020.
 - "D2.4 - Technical enablers for network sharing" in March 2020.
 - "D3.1 - Validation with use cases" in March 2020.
- Five (5) technical scientific papers have been published in a peer-reviewed publications.
 - Publications 4, 6, 7, 9, and 10 in Appendix 1.
- Two (2) technical scientific papers are currently under review for publication in peer-reviewed publications.
 - Publications 11 and 12 in Appendix 1.
- One (1) book chapter has been published.
 - Publication 8 in Appendix 1.

Disseminated non-technical materials include:

- Eight (8) public non-technical project deliverables have been submitted according planned schedule (including the project extension period).
 - "D1.1 - Requirements" in December 2018.
 - "D1.2 - Analysis of regulations in Europe" in December 2018.
 - "D3.2 - Deployment and business plan" in March 2020.
 - "D3.3 - Governance and legal aspects" in March 2020.
 - "D4.1 - Assessment methodology of ethical rules & IPR issues" in March 2018.
 - "D4.2 - Communication, exploitation and dissemination plan" in April 2018.

- “D4.3 -Communication, exploitation and dissemination plan - final report” in March 2020.
- “D5.2 - Web-based project collaborative space” in March 2018.
- Four (4) non-technical scientific publications presenting the project concept, goals, requirements and regulations have been published.
 - Publications 1, 2, 3, and 5 in Appendix 1.
- EuWireless Leaflets v1.0 and v2.0 have been circulated in MWC 2018 and MWC 2019, and other events as physical copies.
 - Although foreseen, no activity has taken place in MW2020 due to its cancelation. Hence, EuWireless Leaflet v3.0 has been utilized in digital format and is available at the project website.

3.3 Partner activities

Partners have collaborated and contributed to internal and external dissemination activities:

- **UMA** members have written and presented two scientific papers in JCSD 2018 and EuCNC 2018. In addition, UMA members have presented posters of the EuWireless project in TNC 2018 and ICRI 2018. Pedro Merino, as Project coordinator, presented the project at the REDIRIS 2018 conference and at the Spanish infoday devoted to the H2020 calls on research infrastructure. The project was presented during the NORDUnet Conference 2018 and leaflets and talks were given in both Engineering Conferences of the Fed4FIRE+ consortium in 2018. In 2019 UMA has published a paper presenting the initial architecture in the Mobile Information Systems journal and have submitted a paper presenting the final architecture to IEEE Access which is under evaluation. UMA has authored conference papers included in proceedings of JCSD 2019 and JITEL 2019. In addition, the advances of the projects have been presented in TNC2019, EuCNC 2019 and FUSECO 2019.
- **DEKRA**: During the spectrum research project the consortium has found that one of the Global mobile Suppliers Association (GSA) white papers has erroneous or incomplete information. This has been reported by DEKRA and GSM Association (GSMA) has acknowledged this and plans to correct the information in next updates. DEKRA has distributed information on EuWireless at the two main events: MWC 2018 and MWC 2019. DEKRA has advertised the project in DEKRA Product testing web site, and DEKRA Spain web sites. DEKRA has also used its channels to provide visibility to EuWireless. In particular the announcement of the publication and availability of deliverable D1.2 was done in January 2019, through its regulatory newsletter services, which has a wide audience in the relevant community (product managers and certification experts in companies in the telecommunication arena, across the world).
- **VTT**: VTT has led the writing of three (TRIDENTCOM 2019, VTC 2020-Fall and EuCNC 2020) and participated to three (JCSD 2018, EuCNC 2018 and KKRRiT 2019) joint scientific publications with the project consortium. In addition, VTT has presented the project concept and technologies in several workshops, conferences, and seminars. EuWireless results have also supported the on-going and coming PhD works of VTT’s personnel.
- **ISW**: Has led the writing of one (KKRRiT 2019) and participated to four joint publications with the project consortium (JCSD 2018, EuCNC 2018, TRIDENTCOM 2019 and VTC 2020-Fall) and has also presented project ideas during the industry panel (IP06: “Is 5G Coming to Rural Areas Any Time Soon?”) during GLOBECOM 2018 conference in December 2018. ISW presented the project goal during session “MNO network sharing as a service for research community” at GLOBECOM 2019 conference in December 2019.

- **NORDU:** NORDU presented the EuWireless project at the TNC2019 (Tallinn). TNC is the annual conference of European R&E networks. EuWireless was also offered as an example of network virtualization as part of the XNET program at Supercomputing 2019 (Denver). EuWireless was again referenced at the US workshop on MidScale Experimental Research Infrastructures (January 2020) sponsored by the US National Science Foundation.

4 Standardization

In this chapter, the summary of relevant standardization bodies, working groups and study items to follow as well as potential targets for contributions are first presented. Then, the list of executed actions are described.

4.1 Objectives summary

From the beginning of the project, the EuWireless consortium members have been paying close attention to following the standardization bodies, working groups and study items:

- Network Functions Virtualization (NFV) European Telecommunications Standards Institute (ETSI) Industry Specification Group (ISG)
- 3rd Generation Partnership Project (3GPP) Technical Specification Group (TSG) Service and System Aspects (SA) Working Group 1 (WG1), Services
- 3GPP TSG SA Working Group 2 (WG2), Architecture
- 3GPP TSG SA, Working Group 5 (WG5), Telecom Management
- 5G PPP Trials WG
- ITU Radiocommunication Sector (ITU-R) and European Conference of Postal and Telecommunications Administrations (CEPT)

The following industry forums and working groups are also considered to be highly relevant for the project:

- O-RAN Alliance, WG3 (RAN Intelligent Controller), WG5 (Multi-Radio Access Technology Central Unit Protocol Stack), WG6 (Network Function Virtualization Infrastructure platform)
- TIP, and especially the 5G New Radio Whitebox project

Another area where there are potential targets for standard contributions, are the groups working on specifications related to different vertical industry domains. The following target groups have been selected:

- OmniAir Consortium
- 5GAA working groups
- 5G-ACIA

The selection of potential contribution is based on the functional, operational and technical requirements of the EuWireless concept, as well as on a gap analysis performed to the current standardization efforts.

4.2 Performed activities

The EuWireless consortium has performed the following actions related to standardization:

- DEKRA has been participating in the 5G-ACIA that has been working on the requirements for testbeds to be used in Industrial applications.
- DEKRA has been very active in OmniAir, helping with the hosting of connected vehicle plugfests. It is important that plugfests are a key milestone in the development of any wireless technology as it helps ensure the interpretation of the specifications by vendors are homogeneous, and the specifications themselves have sufficient levels of details so that implementations become interoperable.

- DEKRA has also been very active in 5G-AA, which has been working in coordination with ETSI, in the definition of test specifications. DEKRA also contributes to other groups, especially the group addressing cyber-security aspects.
- IS-Wireless has joined the O-RAN Alliance and looks for opportunities of disseminating EuWireless research results to the group and promote the ideas of pan-European operator.
- IS-Wireless has participated in the TIP plenary meeting and is currently planning to become a member and is looking for opportunities of disseminating EuWireless research results to the group and possibilities of liaisons between the initiative and the project.
- NORDU is part of an in-depth study of Orchestration, Automation, and Virtualization frameworks underway as part of the GÉANT project. The goal is to distil which of the frameworks under review are standardized or pose the best prospect for adoption. Global Virtualization Service (GVS) is part of this study.

5 Project liaisons

Networking towards different associations and organizations working in the field of telecommunications are in key role when awareness of the project concept is increased. In addition, direct collaboration with other projects and testbed initiatives enhance the trialling possibilities during the project and open new cooperation possibilities. In this chapter, networking as well as the key national and international project cooperation activities are described. In practise, cooperation includes discussions in EuWireless workshops, participation to project seminars/workshops, and utilization of the projects public deliverables for information sharing, etc.

5.1 Networking activities

The EuWireless consortium has done networking activities in the following organizations:

- 5G PPP and 5G Infrastructure Association (5G IA): VTT has contributed to planning of pan-European trials roadmap, discussions about large trials requirements and needed test environments.
- NetWorld2020 General Assembly: IS-Wireless has participated in the SME sessions during NetWorld2020 General Assemblies and promoted the EuWireless project.
- ICT 2018⁹: IS-Wireless has promoted the EuWireless project and its goals to ca. 30 companies and research institutions during the brokerage sessions.

In practise, networking has been implemented by inviting members from the above organizations to the EuWireless workshops or/and participating to their meetings and workshops as much as possible.

5.2 Collaboration activities

The EuWireless consortium has done cooperation with the following projects and testbed initiatives:

- 5G-SAFE¹⁰: VTT has discussed about automotive trial requirements and needed test environments.
- 5G ESSENCE¹¹: IS-Wireless has been discussing the spectrum sharing topics with the “mission critical” use-case partners.
- 5GENESIS¹²: UMA has the role of technical manager in 5Genesis. 5Genesis is building a 5G experimental platform in 5 European cities, including Malaga. UMA is making liaison with 5Genesis for joint events and collaborations.
- 5GTNF¹³: VTT has led the discussions about large trial requirements and needed test environments.
- ORCA¹⁴: IS-Wireless has submitted a proposal that deals with spectrum sharing for multiple radio access technologies to better understand the architectures behind the solution.

⁹<https://ec.europa.eu/digital-single-market/en/events/ict-2018-imagine-digital-connect-europe>

¹⁰<http://5gsafe.fmi.fi/>

¹¹<http://www.5g-essence-h2020.eu/>

¹²<https://5genesis.eu/>

¹³<http://5gtmf.fi/>

¹⁴<https://www.orca-project.eu>

6 Conclusion

This deliverable “D4.3 - Communication, exploitation and dissemination - Final report”, summarizes the main achievements of the communication, exploitation and dissemination work performed during the EuWireless project. Majority of the activities have been carried out according to the plan presented in “D4.2 - Communication, exploitation and dissemination plan”. However, the planned activities for the second half of 2019 have been partially performed during the time period between 1 July 2019 – 31 March 2020 due to the three months extension to the project duration. Furthermore, recent travelling bans and other measures, due to COVID-19, have prevented the executing of some planned networking activities, for example participation in MWC 2020.

A summary of the deviations to the original plan:

- The third and fourth EuWireless newsletters will be published when the project has ended (publication planned for April and May-June 2020, respectively) in order to include all the outputs of the project in the newsletter materials and clarify the next steps in the implementation of the designed EuWireless architecture in more detail.
- The timing for the second press release focusing on the project results and next steps in the implementation of the designed EuWireless architecture will be planned in parallel with the third and fourth newsletters.
- The third EuWireless workshop focusing on demonstrations was planned to be held in the end of the project, but due to the postponement of the planned host events and the challenging international situation during February-March 2020, it was not possible to meaningfully organize a physical event for the demonstrations.
- Due to the inactivity period of the key association working groups, especially the 5G-PPP Trials WG, during the second half of 2019 and beginning of 2020, the planned contributions to association white papers were not made.

7 References

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- [2] EU Framework Programme for Research and Innovation HORIZON2020: Communicating EU research and innovation, guidance for project participants, Version 1.0, 25 September 2014. Available: http://ec.europa.eu/research/participants/data/ref/h2020/other/gm/h2020-guide-comm_en.pdf

Appendix 1 - Scientific publications

Scientific publications produced in the EuWireless project:

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9. Jarno Pinola (VTT), Ilkka Harjula (VTT), Adam Flizikowski (ISW), Maria Safianowska (ISW), Arslan Ahmad (ISW), and Suvidha Sudhakar Mhatre (ISW), “EuWireless RAN architecture and slicing framework for virtual testbeds,” in *Proc. TRIDENTCOM 2019*, 7.-8.12.2019, Changsha, China. URL: https://doi.org/10.1007/978-3-030-43215-7_10
10. Ilkka Harjula (VTT), Jarno Pinola (VTT), Mika Hoppari (VTT), Adam Flizikowski (ISW), Maria Safianowska (ISW), Laura Panizo (UMA), and Barbara Valera-Muros (UMA), “Dynamic Spectrum Management for European-Wide Research Network,” accepted for publication in *Proc. VTC 2020-Spring*, 25.-28.5.2020, Antwerp, Belgium.
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