



5G RECORDS

5G key technology enableRs for Emerging media COntent
pRoDuction services

Deliverable D6.3

Mid-term exploitation and dissemination results

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Abstract

This deliverable explains the dissemination and standardisation results of the 5G-RECORDS project

Keywords

Dissemination, communication, standardization

¹ CO = Confidential, only members of the consortium (including the Commission Services)

PU = Public

Disclaimer

This 5G-RECORDS D6.3 deliverable is not yet approved nor rejected, neither financially nor content-wise by the European Commission. The approval/rejection decision of work and resources will take place at the Mid-Term Review Meeting planned in November 2021, after the monitoring process involving experts has come to an end.

Executive Summary

The 5G-RECORDS plan on dissemination, communication, and exploitation activities is being carried out as scheduled. Thus, Deliverable D6.3 presents the summary of all the activities carried out during the first twelve months of the project. It is structured into several sections according to the different outreach activities.

Section 1 contains an overall introduction of the deliverable contents and includes a consolidated view of the expected and achieved results. Section 2 shows the current status of the 5G-RECORDS project deliverables. Section 3 continues with the dissemination results which include keynotes, panels, presentations and workshops, as well as the publication of research papers in journals and conferences, whitepapers, technical reports, posters and brochures, and finally, tutorials. Section 4 describes the details of the communication results: the project's website, social networks (YouTube, LinkedIn and Twitter), press releases published by project's partners, audiovisual resources produced by the consortium and FAQs that will help audience to understand better the concepts about NPNs. Section 5 focuses on the activities ongoing with some standardization organizations and Section 6 lists the repository where the software developed by the project's partners is available. Finally, Annex A describes the organizations that the 5G-RECORDS project has attended.

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List of Acronyms and Abbreviations

3GPP	3 rd Generation Partnership Project
5G	5 th Generation of mobile communications systems
5G-PPP	5G Public-Private Partnership
5GC	5G Core
6G	6 th Generation of mobile communications systems
AMWA	Advanced Media Workflow Association
AVPROD	Advanced Audio Video Production
BBC	British Broadcasting Corporation
BMSB	Broadband Multimedia Systems and Broadcasting
BTS	Broadcast Technology Society
EBU	European Broadcasting Union
EC	European Commission
EOT	Electronics of Tomorrow
ESO	European Standards Organization
ETSI	European Telecommunications Standards Institute
EuCNC	European Conference on Networks and Communications
FAQs	Frequently Asked Questions
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IEM	In-Ear-Monitoring
IoT	Internet of Things
ITU	International Telecommunications Union
KPI	Key Performance Indicator
LTE	Long-term evolution
MAG	Media Action Group
MNO	Mobile Network Operator
NPNs	Non Public Networks
OAK	OpenCV Artificial Intelligence Kit
PMSE	Programme Making and Special Events
PTP	Precision Time Protocol
QoE	Quality of Experience
QoS	Quality of Service
RAI	Radiotelevisione Italiana
R&D	Research and development
RIST	Reliable Internet Stream Transport
RRS	Reconfigurable Radio Systems
SME	Small and medium-sized enterprise
SMPTE	Society of Motion Picture and Television Engineers
SVG	Sports Video Group
TV2	Television 2
UK	United Kingdom
UPM	Universidad Politécnica de Madrid
UPV	Universitat Politècnica de València
V5G	Valencia 5G
VIAPA	Video, Imaging and Audio for Professional Applications
VQEG	Video Quality Experts Group
VSF	Video Services Forum
VSF	Video Service Forum
WG1	Working Group 1
WP	Work Package
WS	Workshop

1 Introduction

This deliverable presents the summary of the dissemination, communication and exploitation activities related to 5G-RECORDS project performed during the first half of the project, that is during the first 12 months of the project. To ensure a maximum diffusion of the project results, the submitted version of IEEE conference papers and journals have been posted on the project website as allowed by the IEEE policy [16].

The following table contains the targets of the project for different dissemination and communication activities, as well as the objectives reached so far.

Table 1. Project targets and current numbers on dissemination, communications and exploitation activities.

Category	Type of activity	Target	Expected M12	Achieved (M12)
Dissemination	Public deliverables	15	8	8
	Journal papers, whitepapers and international conference papers	20	10	3
	Keynotes, presentations and panels in major conferences	15	7.5	22
	Participation in events and forums in Europe and worldwide	10	5	
	Workshops in major IEEE conferences	4	2	3
	Summer schools, tutorials, training	2	1	2
Communication	Website	1	0.5	1
	Press releases	15	7.5	5
	Social networks	3	1.5	3
	Audiovisual resources	6	3	3
Exploitation	Standardization contributions	40	20	16
Others	Filed patents	5	2.5	3
	Open source repositories	2	1	2
	Collaborations with other research projects	4	2	0

As shown in Table 1, almost all the objectives related to the number of the dissemination activities have been achieved. Specifically, the forecasted public deliverables have been completed, published, and made available in the project website.

As project partners focused on technical deliverables, use case integration and project presentation in relevant events, the number of dissemination activities related to international scientific papers lags behind the expected target. Nevertheless, scientific publications are expected to improve considerably in the second half of the project, as all technical deliverables, experiments, tests, and feedbacks that will be developed during this period can be turned into international journals and conference papers.

On the other hand, the number of keynotes, presentations, and panels as well the participation in 5G events and forums has already exceeded in the first year of the project life the expected number of activities for the overall 5G-RECORDS lifespan.

The planned number of workshops at major IEEE conferences has also been reached. The 5G-RECORDS project has participated in two workshops and has organized one, which has brought together eleven other 5G-PPP projects. Regarding summer schools, tutorials and training events, the number of activities increased the initial goal for this first year.

As stated before, the project focused on technical deliverables and therefore focused less on patents. However, the project initially targeted five patents and has already filed three patents.

In order to approach the general public, 5G-RECORDS created a public website, three social media accounts: A LinkedIn group and Twitter profile where project's advances are disseminated and a YouTube channel releasing videos of trials and promotional material. The project's partners have published five press releases on own corporate websites to provide project's information to the scientific and industrial community and general public.

These dissemination activities have helped reach a large number of people from academia, industry, civil society, media, etc. In particular, 503 people from the scientific community, 517 people from the industry, 12 policy makers, 61 people from media, and more than 160 people from other sectors. So, 1.253 people have been reached with the 5G-RECORDS dissemination activities.

2 Deliverables

The eighteen scheduled deliverables of the 5G-RECORDS project are listed in the following table:

Table 2: 5G-RECORDS project deliverables.

ID	Deliverable Name	WP	Month
D1.1	Project management and administration guidelines	WP1	1
D1.2	Mid-term management and administration activities		12
D1.3	Final management report		24
D2.1	Use cases, requirements and KPIs	WP2	9
D2.2	5G regulatory framework for content production		14
D2.3	Business analysis		24
D3.1	First description of 5G components	WP3	11
D3.2	Complete description of 5G components		19
D3.3	Media production orchestration layer		24
D4.1	Integration of 5G components (phase-1)	WP4	11
D4.2	Integration of 5G components (phase-2)		21
D5.1	Test-beds and trials roadmap	WP5	12
D5.2	Trials initial deployment		16
D5.3	Final trials and technology validation		24
D6.1	Project exploitation and dissemination plan	WP6	2
D6.2	Data management plan		6
D6.3	Mid-term exploitation and dissemination results		12
D6.4	Final exploitation and dissemination results		24

The following nine deliverables have been produced during the first year of 5G-RECORDS's lifetime have been released on time into the European Participant Portal. As stated in the project proposal D1.1, D1.2 and D5.1 remain confidential, while the other six are public.

- [1] "Project management and administration guidelines," Deliverable D1.1 5G-PPP 5G-RECORDS project, September 2020.
- [2] "Mid-term management and administration activities", Deliverable D1.2, 5G-PPP 5G-RECORDS project, August. 2021.
- [3] "Use cases, requirements and KPIs", Deliverable D2.1, 5G-PPP 5G-RECORDS project, May 2021. [\[Link\]](#)
- [4] "First description of 5G components", Deliverable D3.1, 5G-PPP 5G-RECORDS project, July 2021. [\[Link\]](#)
- [5] "Integration of 5G components (phase-1)", Deliverable D4.1, 5G-PPP 5G-RECORDS project, July 2021. [\[Link\]](#)
- [6] "Test-beds and trials roadmap", Deliverable D5.1, 5G-PPP 5G-RECORDS project, August 2021.
- [7] "Project exploitation and dissemination plan", Deliverable D6.1, 5G-PPP 5G-RECORDS project, October 2020. [\[Link\]](#)
- [8] "Data management plan", Deliverable D6.2, 5G-PPP 5G-RECORDS project, February 2021. [\[Link\]](#)
- [9] "Mid-term exploitation and dissemination results", Deliverable D6.3, 5G-PPP 5G-RECORDS project, August. 2021.

3 Dissemination Results

The dissemination plan was designed to ensure that the outcomes of the project reach all the communities active in the technologies, systems, and services to which the project is directed.

Table 3. Project targets the dissemination activities [7].

Category	Type	Target
Dissemination	Whitepapers, journal and conference papers	20
	Keynotes and panels	15
	Participations in events and forums	10
	Workshops	4
	Tutorials	2

3.1 Dissemination events

It considered a set of minimum events to be achieved throughout the life of the project:

Table 4. Dissemination events.

Category	Type	Target	Achieved
Dissemination events	Advisory Board meetings	---	0
	Booth/demos	---	0
	Meetings with other 5G-PPP projects	---	0
	keynotes/presentations/panels	15	22
	Workshops in major IEEE conferences	4	3
	Summer schools, tutorials ² and training	2	2

The following subsections present the results of the dissemination activities during the first year of the project.

3.1.1 Keynotes, presentations and panels

The following twenty-two keynotes, presentations and panels have been presented by partners of the 5G-RECORDS project:

Table 5. Keynotes, presentations and panels.

Type	Target	Achieved
Panels	15	4
Keynotes		16
Presentations		2

[1] P. Sunna, "5G-RECORDS project summary", SMPTE, September 2020. [\[Link\]](#)

² See tutorials in section 3.2.5

- [2] D. Gómez-Barquero, “5G-RECORDS, 5G Key Technology Enablers for Emerging Media Content Production Services”, Panel on Convergence of Broadcast and Broadband, IEEE Symposium on Broadband Multimedia Systems and Broadcasting, October 2020. [\[Link\]](#)
- [3] I. Wadgin, “Overview of 5G-RECORDS project”, 5G CP EBU Group, November 2020. [\[Link\]](#)
- [4] I. Wadgin, “5G in Content Production, work in standards and deployments - 2 December 2020”, Panel on 5G Content Production Cambridge Wireless, December 2020. [\[Link\]](#)
- [5] P. Sunna, “5G for Content Production” Panel on 5G Content Production Cambridge Wireless, December 2020. [\[Link\]](#)
- [6] P. Pérez, P. Sunna, M. Brandstrup, I. Wadgin, T. Lohmar, N. Werner, “5G for Content Production” VQEG, December 2020. [\[Link\]](#)
- [7] I. Wadgin, “Overview of 5G-RECORDS project”, UK5G Creative Industries Working Group, December 2020. [\[Link\]](#)
- [8] M. Pérez, “3GPP, EBU and 5G-MAG for the development of 5G technology for content production”, IEEE BTS Webinar, December 2020. [\[Link\]](#)
- [9] D. Gómez-Barquero, “Introduce of 5G-RECORDS project”, IEEE BTS Webinar, December 2020. [\[Link\]](#)
- [10] I. Alepuz, “Overview of 5G-RECORDS project”, New 5G Core Technologies Innovation Projects, 5G-PPP Webinar, February 2021. [\[Link\]](#)
- [11] P. Sunna, “The 5G-RECORDS and use-cases”, 5G-MAG Meetings, February 2021. [\[Link\]](#)
- [12] M. Fuentes, A. García, J. Costa-Requena, “Overview of 5G-RECORDS project and its three use cases”, SME WG meeting, 5G-PPP. [\[Link\]](#)
- [13] M. Brandstrup, “Overview of the 5G-RECORDS project”, DK IoT Tech Seminar for Industry EOT-CONNECT, June 2021. [\[Link\]](#)
- [14] I. Wadgin, “5G Media Action Group”, Audio Group, SVG, May 2021. [\[Link\]](#)
- [15] M. Pérez, “5G Audio Production”, Audio Group SVG, May 2021. [\[Link\]](#)
- [16] I. Wadgin, P. Brightwell, P. Sunna, “Use case 2 – Multiple wireless cameras”, Online meeting with Video Service Forum, April 2021. [\[Link\]](#)
- [17] I. Wadgin, “5G in content production The European perspective”, Online meeting with Video Service Forum, April 2021. [\[Link\]](#)
- [18] P. Brightwell, “Operational Control Layer”, Online meeting with Video Service Forum, April 2021. [\[Link\]](#)
- [19] I. Wadgin, P. Brightwell, P. Sunna, “5G key technology enablers for emerging media content production services”, Online meeting with Video Service Forum, April 2021. [\[Link\]](#)
- [20] T. Lommar, “5G System interactions wrt QoS / Network Slicing”, Online meeting with Advanced Media Workflow Association, April 2021. [\[Link\]](#)
- [21] P. Brightwell, “Operational Control Layer”, Online meeting with Advanced Media Workflow Association, April 2021. [\[Link\]](#)
- [22] M. Pérez, “5G-RECORDS project”, Panel on V5G Valencia, June 2021. [\[Link\]](#)

3.1.2 Workshops in major IEEE conferences

During this first year in the context of the 5G-RECORDS project there have been three workshops (Table 6).

Table 6. Workshops in major IEEE conferences.

Type	Target	Achieved
Workshops	4	3

3.1.2.1 5G Content Production in IEEE BTS Pulse 2021

The PULSE event provides BTS with the opportunity to fulfill our integral role of industry information sharing [2].

IEEE BTS Pulse 5GCP 2021 was a three-day virtual event bringing together top experts covering technologies that are currently challenging the broadcast industry. In particular, the third day, February 11th, 2021, proposed an insight on 5G Content Production.

This session explored the opportunities and challenges of 5G for the professional audiovisual content production industry. 5G offers improved performance in terms of bandwidth, reduced latency, timing and quality of service. It was expected that standardized 5G-based solutions would bring down production costs and increase the operational efficiency and flexibility of production workflows, in particular in news gathering, remote production and coverage of live events.

It was organized by the European H2020 project 5G-RECORDS. The project aimed to explore the opportunities which new 5G technology components bring to the professional audiovisual content production, including PMSE. Three use cases were demonstrated in the project: live audio production, a multi-camera wireless studio and live immersive media production.

The session started with a presentation of the activities led by the European Broadcasting Union on 5G content production, which has successfully engaged in 3GPP Release-17 5G standardization. The session continued with presentations from Ericsson and Nokia about key 5G technology enablers for professional content production, such as network slicing for guaranteed QoS, Non-Public Networks, millimetre wave frequencies, edge and cloud computing, etc. The on-going technical work in 5G-RECORDS to enable the three use cases will be then presented, another session concluded with an open panel discussion.

The list of presentations on behalf on the 5G-RECORDS project was:

- [1] D. Gómez-Barquero, "Opening Remarks", Workshop on 5G content production, IEEE BTS Pulse, February 2021. [\[Link\]](#)
- [2] I. Wadgin, "5G in content production - the European perspective", Workshop on 5G content production, IEEE BTS Pulse, February 2021. [\[Link\]](#)
- [3] T. Lommar, "5G Technology Enablers for Content Production – Part I", Workshop on 5G content production, IEEE BTS Pulse, February 2021. [\[Link\]](#)
- [4] P. Pérez, "5G Technology Enablers for Content Production – Part II", Workshop on 5G content production, IEEE BTS Pulse, February 2021. [\[Link\]](#)
- [5] P. Sunna, "5G Wireless Studio", Workshop on 5G content production, IEEE BTS Pulse, February 2021. [\[Link\]](#)
- [6] M. Pérez, "5G for Live Audio Production", Workshop on 5G content production, IEEE BTS Pulse, February 2021. [\[Link\]](#)

3.1.2.2 Media Production over 5G NPNs in 5G-MAG

The 5G Media Action Group provides a framework for stakeholders to collaborate on a market-driven implementation of 5G solutions capable of meeting the requirements for the production and distribution of audiovisual media content and services. The 5G Media Action Group is a cross-industry organization gathering stakeholders across the media sector, including content and service providers, network operators, technology solution suppliers, equipment manufacturers, R&D organizations, regulators and policy makers [3].

The workshop, held on April 21st, 2021, and was organized in three sessions, which tackled different aspects of Media Production over 5G NPNs. An important part of the workshop was devoted to exchanging questions and answers allowing attendees to get

involved in the discussion. In this interactive session the aforementioned 5G-RECORDS members acted as moderators.

On the first session, Ian Wadgin (BBC) and Thorsten Lohmar (Ericsson) presented the media production requirements (AVPROD and VIAPA) collected in TS 22.263 and TR 22.827; and the SA4 Study Item on “Media production over 5G NPN”, respectively. Further, María Dolores Pérez (Sennheiser) gave some valuable insights into the audio use cases.

The second session about initiatives in the media industry was hosted by Peter Brightwell (BBC), who presented the technology landscape that enable the transition towards IP media production. The thirds session consisted of 3 interactive sections, moderated by Ian Wadgin (BBC), Thorsten Lohmar (Ericsson), María Dolores Pérez (Sennheiser) and also Morten Brandstrup (TV2), in which the participants could ask questions and spark discussions about NPNs for media production for tier 1, 2 and 3 events, as well as Audio networks and production.

- [1] I. Wadgin, “Media Production requirements (AVPROD and VIAPA)”, Workshop on Media Production over 5G Non-Public Networks, 5G-MAG, April 2021. [\[Link\]](#)
- [2] T. Lohmar, “SA4 Study Item on Media Production over 5G NPN”, Workshop on Media Production over 5G Non-Public Networks, 5G-MAG, April 2021. [\[Link\]](#)
- [3] P. Brightwell, “The technology landscape and the transition towards IP”, Workshop on Media Production over 5G Non-Public Networks, 5G-MAG, April 2021. [\[Link\]](#)
- [4] I. Wadgin , T. Lohmar, “Interactive Session: 5G NPNs for Tier 1/2 Events: Sports, Music and large-scale deployments”, Workshop on Media Production over 5G Non-Public Networks, 5G-MAG, April 2021. [\[Link\]](#)
- [5] M. Brandstrup, T. Lohmar, “Interactive Session: 5G NPNs for Tier 3 Events: News-gathering and small-scale deployments”, Workshop on Media Production over 5G Non-Public Networks, 5G-MAG, April 2021. [\[Link\]](#)
- [6] M. Pérez, T. Lohmar, “Interactive Session: Audio Production and Audio Networks”, Workshop on Media Production over 5G Non-Public Networks, 5G-MAG, April 2021. [\[Link\]](#)

3.1.2.3 Non-Public Networks in EuCNC'21

The 2021 Joint EuCNC & 6G Summit, initiated this year, builds on putting together two successful conferences in the area of telecommunications: EuCNC, in its 30th edition of a series, supported by the European Commission and the 6G Summit, in its 3rd edition, originated from the 6G Flagship programme in Finland, one of the very first in its area. The conference is sponsored by the IEEE Communications Society and by the European Association for Signal Processing and focuses on all aspects of telecommunications ranging from 5G deployment and mobile IoT to 6G exploration and future communications systems and networks, including experimentation and testbeds, and applications and services. It brings together cutting-edge research and world-renown industries and businesses, attracting in the last years more than 900 delegates from all over the world, to present and discuss the latest results, and an exhibition space of more than 1.500 m² for demonstrating the technology developed in the area, namely from R&D programmes co-financed by the European Commission [1].

The first edition of the Workshop on Non-Public Networks (5G NPNs) took place on June 8th at the 2021 joint EuCNC and 6G Summit to provide a holistic view of NPNs, covering from vertical use cases, operation aspects, business models, trials and emerging technologies Around 70 attendees joined this full day workshop with four sessions, two in the morning and two in the afternoon. It was organized by the 5G-RECORDS project, its organizing committee was chaired by David Gómez-Barquero (UPV), Project Coordinator of 5G-RECORDS, and five other members of the project team were also

involved in the organizing committee. The workshop gathered presentation from twelve 5G-PPP projects.

The 5G-RECORDS project was represented by Jordi Giménez (EBU) who presented an overview of the project:

- [1] J. Giménez, “The role of 5G Non-Public Networks for Media Production”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)

The rest of the presentations selected by the organizing committee were:

- [2] X. An, “Shaping the Industrial 5G Revolution”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [3] X. Li, “NPN Deployment Solutions & Industry 4.0 Pilot Examples”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [4] N. König, “5G NPNs for Process Monitoring”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [5] N. Tzanis, “Autonomous Edge 5G Private Network Requirements for Smart Factories”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [6] M. Fuentes, “5G-enabled AGVs for NPN Production Lines in Manufacturing”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [7] K. Noland, “5G for Military Use”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [8] K. Sun, “On the Role of 5G NPNs for Mission Critical Services”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [9] J. Ordonez-Lucena, “Outlook for operator adoption of 5G Private Networks”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [10] S. Gonzalez, “High-Tech and Affordable 5G Private Network Roll-Out to Every Corner”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [11] H. Lonsethagen, “Towards efficient 5G NPN Readiness and Testing, addressing the Industry 4.0 challenges of SMEs”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [12] S. Fletcher, “Operation of 5G NPNs: Industry Sector Considerations for Deployment and Sustainability”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [13] J. Costa, “Seamless integration of TSN into 5G NPNs for Industry 4.0”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [14] D. Munaretto, “Cloud Deployments of 5G NPNs: The Athonet Connectivity Platform”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [15] S. Robitzsch, “Cloud Native Service-Based Architecture Deployment Considerations for NPNs: An Evolution of NFV”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [16] D. Trossen, “Making (Virtualized) Service Interactions More Flexible Within and Across 5G Private Networks”, Workshop on Non-Public Networks, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)

3.1.3 Persons reached

In this section, the estimated number of persons reached is specified, in the context of all dissemination activities in each of the following categories:

Events details		Persons Reached								
Name	Date	Scientific community ³	Industry	Civil society	General public	Policy makers	Media	Investors	Customers	Others
SMPTE Standards Community	Sept. 2020									More than 100
IEEE BMSB2020	Oct. 2020	44								
5GCP	Nov. 2020	5	15				30			
ETSI RRS	Nov. 2020	1	8			2				
Cambridge Wireless	Dec. 2020									More than 50
UK5G	Dec. 2020		20							
IEEE BTS	Dec. 2020	181								
VQEG	Dec. 2020	35	35				5			
IEEE BTS Pulse WS	Feb. 2021	50								
5G-PPP Webinar	Feb. 2021	60	60			5	10			
5G-MAG	Feb. 2021		6				1			
5G-PPP SME WG	Mar. 2021		25							
VSF	Apr. 2021									5
AMWA	Apr. 2021									5
5G-MAG WS	Apr. 2021	7	183							
SVG	May. 2021		60							
EOT-CONNECT	Jun. 2021		75							
V5G	Jun. 2021	40	30			5	15			
EuCNC & 6G Summit	Jun. 2021	80								

³ Higher education, Research.

3.2 Dissemination documents

This section presents the scientific and technical documents containing project outcomes that have been presented elsewhere.

Table 7. Dissemination documents.

Category	Type	Target	Achieved
Dissemination documents	Journal and conference papers	20	1
	Whitepapers		2
	Technical reports	---	1
	Posters/brochures	---	2
	Tutorials	2	2

3.2.1 Journal papers

- [1] P. Carballeira, C. Carmona, C. Díaz, D. Berjón, D. Corregidor, J. Cabrera, F. Morán, C. Doblado, S. Arnaldo, M.M. Martín, N. García, "FVV Live: A real-time free-viewpoint video system with consumer electronics hardware", IEEE Trans. Multimedia, 2021 (Early Access). [\[Link\]](#)

3.2.2 Whitepapers

5G-RECORDS has contributed to the working groups in the 5G-PPP TB providing the use-cases and additional information to the white-papers on Architecture and NPNs still work in progress.

3.2.3 Technical reports

- [1] P. Pérez, J. Ruiz, D. González, F. Adeyemi-Ejey, K. Brunnström, N. García, J. Gutiérrez, M. Martini, I. Wadgin, "Proposal for scope and use cases for G. QoE-5G", ITU-T Study Group 12 meeting, contribution SG12-C519, May 21.

3.2.4 Posters and brochures

- [1] D. Gómez-Barquero, I. Alepuz, C. Avellán, S. García, A. Rodrigo, E. Madejón, N. García, "5G-RECORDS 5G Key Technology Enablers for Emerging Media Content Production Services", Eur. Conf. on Networks and Communications, EuCNC 2021, 2021 Joint EuCNC & 6G Summit, Porto, Portugal, June 2021. [\[Link\]](#)
- [2] 5G-RECORDS Team, "5G-RECORDS, 5G Key Technology Enablers for Emerging Media Content Production Services", The European 5G Annual Journal, 2021. [\[Link\]](#)

3.2.5 Tutorials

There have been two tutorials one in the IEEE BTS PULSE and another one an internal tutorial for the 5G-RECORDS partners.

- [1] I. Wadgin, "5G in content production - the European perspective", IEEE BTS PULSE, Feb. 2021. [\[Link\]](#)
- [2] T. Lommar, "5G Technology Enablers for Content Production (Part I)", IEEE BTS PULSE, Feb. 2021. [\[Link\]](#)
- [3] P. Pérez, "5G Technology Enablers for Content Production (Part II)", IEEE BTS PULSE, Feb. 2021. [\[Link\]](#)

- [4] P. Sunna, "5G Wireless Studio", IEEE BTS PULSE, Feb. 2021. [\[Link\]](#)
- [5] M. Pérez, "5G for Live Audio Production", IEEE BTS PULSE, Feb. 2021. [\[Link\]](#)
- [6] I. Kostiukevych, "PTP + network features influencing the PTP accuracy", 5G-RECORDS online meeting, Jun. 2021. [Internal]

4 Communication Results

The key to the Communication plan was to disseminate all aspects of the project among the scientific community, professionals in the 5G sector and the general public. So, quantitative targets for measuring the success of these activities along the lifespan of the project were defined:

Table 8: Communication activities [7].

Category	Type	Target	Achieved
Communication Results	Website	1	1
	Social networks	3	3
	Audiovisual resources	6	3
	Press releases	15	5

4.1 Website

The project website⁴, managed by UPM, was unveiled in September 2020 at the beginning of the 5G-RECORDS project. The public portal comprises static contents (e.g. main project objectives, consortium, use cases, infrastructure, etc.) and dynamic contents (e.g. partners' news, videos, events, FAQs etc.).



Figure 1. 5G-RECORDS website.

The website also includes a section⁵ about dissemination activities where all of them are collected together with their respective references (e.g. scientific publications, presentations, public deliverables, etc.) in order to comply with the EC open access policies.

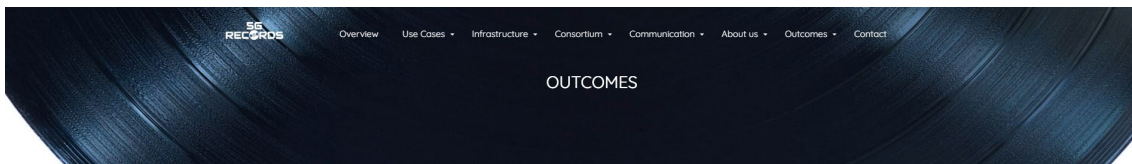


Figure 2. 5G-RECORDS outcomes.

⁴ <https://www.5g-records.eu/>

⁵ <https://www.5g-records.eu/index.php/outcomes>

The portal web is being regularly updated with all information facilitated by partners and contacts of the project with news about the project and relevant 5G topics.



Figure 3. 5G-RECORDS communication⁶.

The partners' news published on the 5G-RECORDS website were:

- [1] EBU, "5G in content Production", December 2019. [\[Link\]](#)
- [2] EBU, "EBU 5G report concludes", June 2020. [\[Link\]](#)
- [3] European Commission, "EU boosts investment in 5G", June 2020. [\[Link\]](#)
- [4] COREnect, "New consortium to develop a 5G and beyond strategic roadmap for future European connectivity systems and components", July 2020. [\[Link\]](#)
- [5] EBU, "The EBU has published its 'Technology Pyramid for Media Nodes' in the SMPTE ST 2110 ecosystem of LiveIP technology.", July 2020. [\[Link\]](#)
- [6] UPM, "The 5G-RECORDS project kick-off meeting", September 2020. [\[Link\]](#)
- [7] LiveU, "5G for media and entertainment: from theory to practical use cases", September 2020. [\[Link\]](#)
- [8] EBU, "5G for professional media production and contribution", October 2020. [\[Link\]](#)
- [9] UPV, "Convergence of Broadcast and Broadband", October 2020. [\[Link\]](#)
- [10] EBU, UPV, UPM, "NEW Deliverable", October 2020. [\[Link\]](#)
- [11] EBU, "5G-RECORDS in the 5G in content production group", November 2020. [\[Link\]](#)
- [12] LiveU, "What 5G means for media and entertainment", November 2020. [\[Link\]](#)
- [13] LiveU, "5G for media and entertainment", November 2020. [\[Link\]](#)
- [14] Red Technologies, "ETSI RRS WG1 #52 meeting", November 2020. [\[Link\]](#)
- [15] UPV, "5G-RECORDS 2nd Plenary Meeting", December 2020. [\[Link\]](#)
- [16] NOKIA/SENNHEISER, "5G Whitepaper", January 2021. [\[Link\]](#)
- [17] UPV, "International Day of Women and Girls in Science", February 2021. [\[Link\]](#)
- [18] UPV, "IEEE BTS Pulse 2021", February 2021. [\[Link\]](#)
- [19] UPV, "5G-PPP Webinar", February 2021. [\[Link\]](#)
- [20] EBU, "5G-MAG Group", February 2021. [\[Link\]](#)
- [21] UPM, "New Deliverable", February 2021. [\[Link\]](#)
- [22] UPV, "Non-Public Networks", March 2021. [\[Link\]](#)
- [23] Fivecomm, "5G-PPP SME WG meeting", March 2021. [\[Link\]](#)
- [24] UPM, "5G-RECORDS 3rd plenary meeting", March 2021. [\[Link\]](#)
- [25] EBU, "5G-RECORDS & VSF", April 2021. [\[Link\]](#)
- [26] EBU, "5G-RECORDS & AMWA", April 2021. [\[Link\]](#)
- [27] UPV, "5G-MAG Workshop", April 2021. [\[Link\]](#)
- [28] LiveU, "NEXT GENERATION:5G, IP-bonding and the new world of production", April 2021. [\[Link\]](#)
- [29] UPV, Telefonica. "Live 5G", May 2021. [\[Link\]](#)
- [30] UPM. "New Deliverable", June 2021. [\[Link\]](#)
- [31] UPM, "Connect to the tech future", June 2021. [\[Link\]](#)
- [32] UPV, "V5G Day", June 2021. [\[Link\]](#)

⁶ <https://www.5g-records.eu/index.php/communication>

- [33] UPM, “Workshop on 5G-NPNs”, June 2021. [\[Link\]](#)
- [34] UPM, “Poster paper at EUCNC | 6GSummit”, June 2021. [\[Link\]](#)
- [35] UPM, “5G-RECORDS 4th Plenary Meeting”, June 2021. [\[Link\]](#)
- [36] UPM, “Live Immersive Content Production”, July 2021. [\[Link\]](#)
- [37] UPM, “New Deliverable”, July 2021. [\[Link\]](#)
- [38] UPM, “New Deliverable”, July 2021. [\[Link\]](#)

4.2 Social Networks

The project has considered that online media are very effective to reach as much scientific and industrial community industry as a general public. Thus, three accounts on different social networks (YouTube⁷, LinkedIn⁸ and Twitter⁹) have been created and managed by UPM.

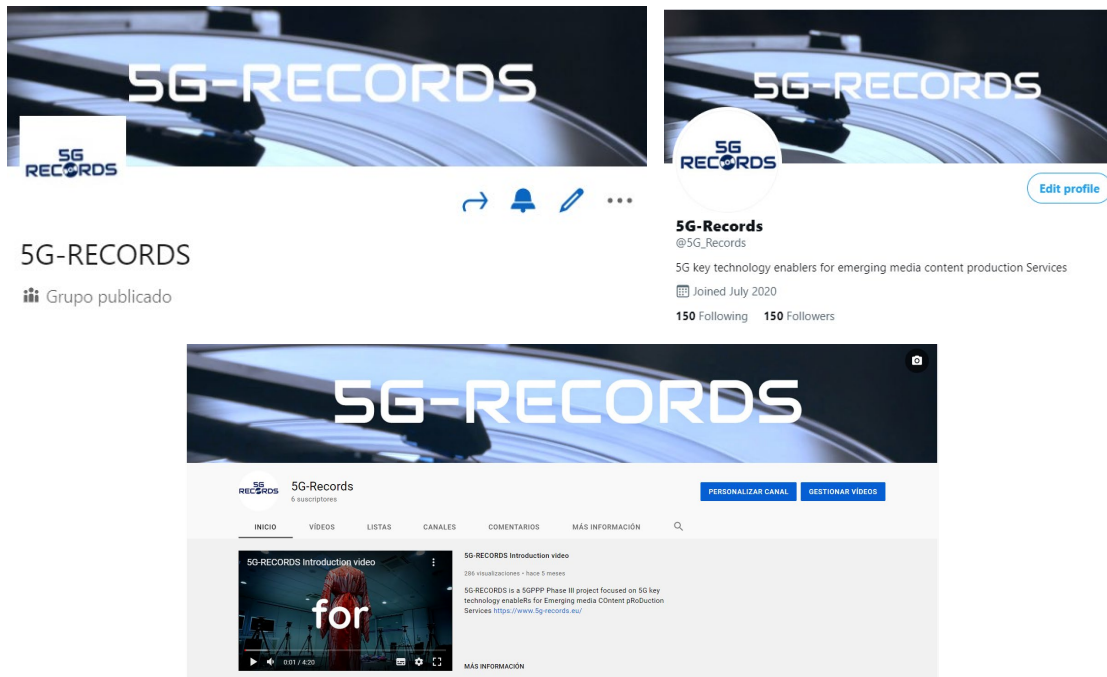


Figure 4. 5G-RECORDS social Networks.

Those social network accounts have been populated with the ongoing updates of the project and partner’s news published on the website. During the first year of the 5G-RECORDS’s lifetime and thanks to the active participation of the project’s partners on the publication of their latest news, the project’s social networks have earned a large number of followers and impressions, reaching a large number of audiences as can be seen in Table 9.

Table 9. Social Networks of 5G-RECORDS (updated July 2021).

Category		Twitter	LinkedIn	YouTube
Social networks	Followers	147	214	6
	News	126	126	3

⁷ https://www.youtube.com/channel/UCXlJFcm_Ee8sXzjmS3cJUJw

⁸ <https://www.linkedin.com/groups/8964293/>

⁹ https://twitter.com/5G_Records

	Impressions ¹⁰	289	584	327
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4.3 Press Releases

In the Communication plan, a minimum number of press releases was defined (Table 10).

Table 10: Minimum list of press releases [7].

Type	Name	Leader	When
Overview	The key challenge of 5G-RECORDS	UPV	2020
Components Definition	5G microphones and IEM systems	Sennheiser	2021
	Spectrum sharing management technologies	RED Technologies	
	Compact 5G Core	Cumucore	
	Dynamic Profile Controller		
	dRAX platform	Accelleran	
	5G-enabled cellular bonding	LiveU	
	OAK module	Image Matters	
	Edge computing platform	Telefónica	
Free Viewpoint Video	UPM		
Use Cases	Live audio production	Sennheiser	2021
	Multiple camera wireless studio	BBC/EBU	
	Live immersive video production	NOKIA/UPM	
Outcomes	Achieved goals	UPV	2022
	Results	Nokia / Eurecom / Ericsson	

The press releases that were delivered by project partners concerning its work for the project were:

- [1] N. García, “5G-RECORDS, 5G key technology enableRs for Emerging media Content pRoDuction Services, European Commission”, Information Processing and Telecommunications Center (IPTC Review), October 2020. [\[Link\]](#)
- [2] M. Fuentes, “5G-RECORDS: showcasing the real power of 5G for professional content production” Fivecomm website, October 2020. [\[Link\]](#)
- [3] Universitat Politècnica de València (UPV), “5G-RECORDS”, UPV website, May 2021. [\[Link\]](#)
- [4] eNEM, “5G key technology enableRs for Emerging media Content pRoDuction Services, European Commission (5G-RECORDS)”, eNEM website, May 2021. [\[Link\]](#)
- [5] I. Wadgin, “Trials and challenges: Unlocking the potential of 5G for sports broadcast production”, Sport Video Group Europe, July 2021. [\[Link\]](#)

¹⁰ Clicks, likes, retweets, visualizations, etc.

4.4 Audiovisual resources

The 5G-RECORDS Communication plan considered that audiovisual content delivery is a must for the project outreach. The table below lists the videos that should be produced throughout the project.

Table 11: Videos [7].

Type	Name	Leader	When
Overview	The key challenge of 5G-RECORDS	EBU/UPV/UPM	2020
Components Definition	5G microphones and IEM systems	Sennheiser	2021
	Spectrum sharing management technologies	RED Technologies	
	Compact 5G Core	Cumucore	
	Dynamic Profile Controller	Accelleran	
	dRAX platform	LiveU	
	5G-enabled cellular bonding	Image Matters	
	OAK module	Telefónica	
	Edge computing platform	UPM	
Use Cases	Free Viewpoint Video	Sennheiser	2021
	Live audio production	BBC/EBU	
	Multiple camera wireless studio	NOKIA/UPM	
Outcomes	Live immersive video production	EBU/UPV/UPM	2022
	Achieved goals	Nokia / Eurecom / Ericsson	
Results	Results		
Media	Media services orchestration	BBC/EBU	2021
Broadcasters	RAI and 5GRecords	RAI	2021
	TV2 and 5GRecords	TV2	2021
	Red Bee and 5GRecords	Red Bee	2021

During the first year of 5G-RECORDS's lifetime the following videos have been produced:

- [1] I. Wadgin, D. Gómez-Barquero, R. Ortíz, P. Pérez, M. Nabil, R. Knopp, P. Sunna, N. Werner, T. Lomar, I. Alepuz, E. Madejón, D. Corregidor, "RECORDS Introduction video", February 2021. [\[Link\]](#)
- [2] J. Duerre, C. Avellán, E. Madejón, "Use Case 1: Live audio production", June 2021. [\[Link\]](#)
- [3] M. Messaoudi, C. Le Thierry, "Use Case 1: Spectrum sharing management technologies", July 2021. [\[Link\]](#)

4.5 FAQs

5G-RECORDS partners are working on a FAQ on professional media production using 5G NPNs. This FAQ should be published by the end of September.

5 Standardization Results

With respect to standardization activities, the main 5G-RECORDS activity on standards has been that 5G-RECORDS partners have provided inputs to the new SI (Study Item) by 3GPP on Media Production over 5G NPNs (see [here](#)) with the timeline as follows:

SA4#113e	6th April to 14th April 2021
SA4#114e	19th May to 28th May 2021
SA4#115e	18th August to 27th August 2021
SA4#116e	10th November to 19th November 2021
SA4#117	14th to 18th February 2022, Sophia Antipolis

“The intention of the study is to identify standardization needs and potential standards gaps when using 5G Systems for media production. More specifically:

- *To identify the relevant media production use cases (professional, semi-professional, production, contribution), based on existing use-cases from TR 22.287 as well as requirements from TS 22.163, that may benefit from 5G System functionalities. This includes collaboration use cases between media producers and 5G System operators.*
- *To develop one or several reference media production architectures and to map the variety of different media and control flows (such as uplink video, return video, tally, etc.) involved in media production onto 5G System delivery components.*
- *To identify relevant QoS requirements for media production workflows, including required bit rates, loss rates, formats, latencies and jitter, and to identify their impact on the relevant KPIs for media production workflows (reliability, mean-time-between failure, service-level agreements, etc.).*
- *To identify relevant 5G System features like NPNs, Network Slicing, QoS classes, network event reporting and assistance, etc. that are useful for media production, and to clarify their usage for media production.*
- *To identify the suitability of existing media production content delivery protocols, codecs and service layers for 5G System usage, evaluate benefits and gaps, and recommend profiles or extensions in collaboration with organizations that develop and deploy existing protocols and codecs.*
- *To study media device and network orchestration solutions (such as AMWA NMOS), and their integration/interactions with the 5G exposure framework.*
- *To collaborate with relevant other 3GPP groups and external organizations (VSF, 5G-MAG, EBU, etc.) on media-related aspects of Media Production use cases.*
- *To identify potential normative work on media level for media production use cases in 5G Systems.*

The work primarily focuses on the usage of 5G Systems including NPNs (both Standalone NPN and Public Network Integrated NPN) and aims to identify needed normative specifications. The study follows the use-cases and requirements from TR 22.827 and 22.263. Interactions with SA2 and RAN, e.g. around time synchronization of devices, time sensitive communication, 5G NPN aspects, etc. are expected.”

Besides, 5G-RECORDS partners participate in the 5G-KPI work group of the Video Quality Experts Group (VQEG). In this context, they have proposed a new work item to ITU-T Study Group 12: GSTR-5GQoE "QoE requirements for 5G services".

The proposed scope for this Technical Report is addressing services which are required on 5G-and-beyond, either because they are related to vertical-market use cases, or because they rely on 5G-specific capacities. Proposed use cases are: Tele-operated Driving, Content Production, and Mixed Reality.

For all the targeted use cases, the work item will study the specific QoE requirements, as well as the required performance and features from the network. By addressing them in parallel, it will be possible to find synergies between them and, more relevantly, extract the common information that can be used to also analyze other use cases that may arise outside the scope of this work item.

The Work Item was accepted in ITU-T SG12 e-Meeting in May 2021, and it is targeted for consent in the next e-Meeting in October 2021.

In the following subsections not only the partner's contributions to standards are listed but also the work/SI proposals and support to other companies are listed.

5.1 Standardization contributions

Table 12. Standardization contributions.

Partner	QR	Title of the contribution	Date	SDO	Group	Document ID	Place
EDD	3	Structure of the technical report (TR 26.805)	Apr 2020	3GPP	SA4	S4-210527	online
	3	Description of camera media flows in a Multi-Camera production	Apr 2020	3GPP	SA4	S4-210530	online
	3	Overview of NMOS functionality	Apr 2020	3GPP	SA4	S4-210528	online
	3	Addition of different production types and addition of more information about existing workflows.	May 2020	3GPP	SA4	S4-210823	online
	4	Clarification of Cloud vs Remote Production	Aug 2021	3GPP	SA4	S4-211162	online
	4	Proposal of Media Protocol related Key Issues	Aug 2021	3GPP	SA4	S4-211163	online
	4	Proposal of a Remote Camera Configuration Key Issue	Aug 2021	3GPP	SA4	S4-211164	online
	4	Proposal of two bitrate adaptation related Key Issues	Aug 2021	3GPP	SA4	S4-211165	online
	4	Proposal of a Key Issue around configurable audio channels	Aug 2021	3GPP	SA4	S4-211166	online
	4	Proposal of a new NPN usage related Key Issue	Aug 2021	3GPP	SA4	S4-211167	online
	4	Proposed Timeplan updates	Aug 2021	3GPP	SA4	S4-211168	online

RED	1	Presentation of 5G-RECORDS at ETSI	Nov 2020	ETSI	RRS WG1 #52 meeting	RRSWG1 (20)0520 05r1	Online
	1	Spectrum sharing for PMSE; RED Technologies SAS Server role and architecture was presented, as well as the 2 scenarios for PMSE explored in 5G RECORDS: (1) Access to shared spectrum through a local license and (2) Access to shared spectrum through a lease	Nov 2020	ETSI	RRS WG1 #52 meeting	RRSWG1 (20)0000 02r1	Online
EUR	1	Low-PAPR Sequence-Based Approaches for PUCCH Coverage Enhancement	Nov 2020	3GPP	RAN WG1	R1-2009451	Online
	1	Limitations of NR short block-length codes for PUCCH coverage enhancement	Aug 2020	3GPP	RAN WG1	R1-2006880	Online
BBC	3	Study on Media Production over 5G NPN Systems	May 2021	3GPP	SA4	26805	Online

5.2 Standardization Work Study Items Proposals

Table 13. Standardization Work Study Items Proposals.

Partner	QR	Title of the work/study Item	Date	SDO	Group	Document ID	Place
EBU	2	New Study Item on Media Production over 5G NPNs	Feb 2021	3GPP	SA4	S4-210326	S4#112e
	3	FS_NPN4AV Prod	Apr 2021	3GPP	SA4	S4aI211164	S4#113e
	3	FS_NPN4AV Prod	Apr 2021	3GPP	SA4	S4aI211165	S4#113e
	3	FS_NPN4AV Prod		3GPP	SA4	S4-210823	S4#114e

EDD	2	New Study Item on Media Production over 5G NPNs	Feb 2021	3GPP	SA4	S4-210326	online
NOK	3	New Work Item on QoE requirements for 5G services	May 2021	ITU-T	SG1 2	SG12-C519	online

5.3 Standardization support to other companies

Table 14. Standardization support to other companies.

Partner	QR	Title	Leading company	Date	SDO	Group	Document ID	Place
BBC, EBU, SEN, EDD	3	Draft of WID for study item	Ericsson	Apr 2021	3GPP	SA4	TR 26.805	online
EDD, BBC, EBU, SEN	4	Clarification of Cloud vs Remote Production	Ericsson	Aug 2021	3GPP	SA4	S4-211162	S4#115e
EDD, BBC, EBU, SEN	4	Proposal of Media Protocol related Key Issues	Ericsson	Aug 2021	3GPP	SA4	S4-211163	S4#115e
EDD, BBC, EBU, SEN	4	Proposal of a Remote Camera Configuration Key Issue	Ericsson	Aug 2021	3GPP	SA4	S4-211164	S4#115e
EDD, BBC, EBU, SEN	4	Proposal of two bitrate adaptation related Key Issues	Ericsson	Aug 2021	3GPP	SA4	S4-211165	S4#115e
EDD, BBC, EBU, SEN	4	Proposal of a Key Issue around configurable audio channels	Ericsson	Aug 2021	3GPP	SA4	S4-211166	S4#115e

EDD, BBC, EBU, SEN	4	Proposal of a new NPN usage related Key Issue	Ericsson	Aug 2021	3GPP	SA4	S4-211167	S4#115e
EDD	4	Proposed Timeplan updates	Ericsson	Aug 2021	3GPP	SA4	S4-211168	WG4#114-e

6 Others

6.1 Patents

The 5G-RECORDS considers that original results should be patented. Thus, a target of five patents to be filled during the lifespan of the project (Table 15). Until now, three patents have been filled: two by EURECOM and one by RED Technologies.

Table 15. Patents.

Partner	Problem to be solved	Basic idea	Involved partners	Status
EUR	“Improved Device and Method for Transmitting Control Data with Low Peak-to-Average Power Ratio”	“DMRS-less” PUCCH transmission strategy, medium payload (12-84 bits), combining binary codes (e.g. 3GPP polar) and low-PAPR sequences	EURECOM	European Patent Application, EP20306230.2, October 2020
	“Device and Method for Transmitting Control Data with Low Peak-to-Average Power Ratio”	“DMRS-less” PUCCH transmission strategy for short payload (11 bits or less), combining new and classical codes with low-PAPR sequences and low-complexity decoding	EURECOM	European Patent Application, EP20306231.0, October 2020
RED	“Partage dynamique de spectre avec garantie de la puissance de transmission autorisée”	The present invention describes a method of creating a local license making it possible to mitigate these limitations, while guaranteeing, throughout the life of this local license, an authorized transmission power value for each radio base station, as well as " protection from interference at any point within the protection zone associated with this local license, up to a predefined interference threshold, independently of other local licenses created	RED Technologies	French Patent Application, FR2102640, March 2021

		by the same process after this local license.		
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6.2 Open-source repositories

The media operational control layer is being developed using an implementation of the [AMWA Networked Media Open Specifications](#) in C++, [licensed](#) under the terms of the Apache License 2.0 available here <https://github.com/sony/nmos-cpp>

7 Conclusions

The dissemination and communication plan defined a set of objectives to ensure the success of the dissemination, communication and standardization activities along the lifespan of the project.

This deliverable summarizes the results of:

- Deliverables.
- Dissemination events.
- Dissemination documents.
- Communication activities.
- Standardizations contributions.
- Patents.
- Open-source repositories.

In view of the good results obtained and although the scientific impact related to international journal and conference papers is still insufficient, the dissemination and communication plan is managing to maximize project's visibility in all the communities active in the technologies, systems and services.

During the second half of the project, one of the main target of the dissemination plan will be to focus on encouraging project's partners to increase the number scientific publications, turning all technical deliverables, experiments, tests, and feedbacks into international journals and conference papers.

A Annex

A brief description of the organizations 5G-RECORDS project has attended is provided.

SMPTE Standards Community

SMPTE is an internationally recognized Standards organization, bringing order to the chaos of constantly evolving technologies with a high level of unbiased technical excellence. SMPTE's more than 800 engineering standards and guidelines are developed in a collaborative process with individuals and corporations to advance global interoperability of hardware and software [4].

IEEE BMSB

The IEEE BMSB symposium is the premier forum for the presentation and exchange of technical advances in the rapidly converging areas of multimedia broadcasting, telecommunications, consumer electronics, and networking technologies.

5G in Content Production

The EBU's project group 5G in Content Production brings together broadcasters and the industry to identify requirements in content production that need to be met in the 5G context. The EBU also facilitates an ongoing dialogue with the wider industry on a range of issues related to 5G, including business arrangements amongst the stakeholders along the value chain [5].

Cambridge Wireless

CW is the leading international community for companies involved in the research, development and application of wireless and mobile, internet, semiconductor and software technologies [6].

UK5G Creative Industries Working Group

The UK5G Creative Industries Working Group will focus on developing the potential economic and social opportunities afforded by 5G in the UK [7].

IEEE BTS Webinar

Broadcasting is a one-to-many communication service in which the transmissions are intended for direct reception by the general public or a target audience, which may include audio, video and/or data services. The field of interest of the IEEE BTS shall encompass devices, equipment, techniques, and systems related to broadcast technology, including the production, distribution, wired and wireless transmission, propagation aspects and reception [8].

5G-PPP Webinar: New 5G Core Technologies Innovation Projects

The 5G-PPP is a joint initiative between the European Commission and European ICT industry (ICT manufacturers, telecommunications operators, service providers, SMEs and researcher Institutions) [9].

5G-MAG Meetings

The 5G Media Action Group provides a framework for stakeholders to collaborate on a market-driven implementation of 5G solutions capable of meeting the requirements for the production and distribution of audiovisual media content and services [3].

5G-PPP SME WG

Since its inception, SME Working Group activities have been mostly focusing on promoting the skills and expertise of SMEs in the telecommunications domain, especially towards larger companies and research organizations, and on supporting the engagement of SMEs in collaborative projects and cooperation with those players, via networking and exchange of information amongst SME representatives [10].

AMWA

The AMWA focuses on the industry move to IP based architectures. To enable software based systems to recognize and exploit devices, the AMWA has developed the Networked Media Open Specifications (NMOS). These have been created in practical workshops by the Networked Media Incubator project. This activity complements the work of other well established technology associations, such as the Audio Engineering Society (AES), the European Broadcasting Union (EBU), the Society of Motion Picture and Television Engineers (SMPTE) and the Video Services Forum (VSF). The AMWA continues its support for the Media Exchange Format (MXF), the Advanced Authoring Format (AAF) and the Framework for Interoperable Media Services (FIMS). The organization maintains open membership and committee participation [11].

SVF

The VSF is an international association comprised of service providers, users and manufacturers dedicated to interoperability, quality metrics and education for media networking technologies. The organization's activities include providing forums to identify issues involving the development, deployment, operation, and security of media networking technologies, and promoting interoperability by contributing towards the development of Standards [12].

EOT-CONNECT

EOT is the fixed meeting place and knowledge hub for the electronics and technology industry, bringing together people, businesses and network to share knowledge and new ideas [13].

SVG

The SVG was formed in 2006 to support the professional community that relies on video, audio, and broadband technologies to produce and distribute sports content. Leagues, owners, teams, players, broadcasters, webcasters, and consumer technology providers have joined the SVG to learn from each other, turn vision into reality, implement new innovations, while sharing experiences that will lead to advancements in the sports production/distribution process and the overall consumer sports experience [14].

VQEG

VQEG was born from a need to bring together experts in subjective video quality assessment and objective quality measurement. The general motivation of VQEG is to advance the field of video quality assessment by investigating new and advanced subjective and objective methods for assessing quality. However, with the exception of some recent contributions on subjective assessment methods for multimedia, VQEG has focused, in the last few years, its effort on the validation of new objective quality metrics for standardization purposes [15].

References

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