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Year 2 report on communication, dissemination and standardisation activities

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Abstract

The B5G-OPEN project's WP6, focusing on communication, dissemination, and standardization activities, plays a vital role in harnessing the research and development endeavours of project partners. This report, titled "Year 2 Report on Communication, Dissemination, and Standardisation Activities," provides a comprehensive overview of the activities undertaken during the second year of the project.

This report recalls on the effective internal communication channels among B5G-OPEN partners, the project knowledge repository, the formulation of strategic plans and methods for dissemination. This report also reports in detail on the dissemination activities, 5G-PPP contributions and standardisation contributions. Additionally, this report highlights the excellent innovations that are analysed and remarked by the European Commission's Innovation Radar platform.

As the project advances into Year 3, this report emphasises the continued commitment of the B5G-OPEN project towards advancing the domains of communication, dissemination and standardisation within the context of optical communications.

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GLOSSARY

<i>Abbreviations/Acronym</i>	<i>Description</i>
5G-PPP	5G Infrastructure Public Private Partnership
ACP	Asia Communications and Photonics Conference
AR	Augmented Reality
CA	Consortium Agreement
CAM	Connected and Automated Mobility
CAPEX	Capital Expenditure
CLEO	Conference on Lasers and Electro-Optics
CSNDSP	International Symposium on Communication Systems, Networks and Digital Signal Processing
DRCN	International Conference on the Design of Reliable Communication Networks
ECOC	European Conference on Optical Communication
EuCNC	European Conference on Networks and Communication
ETSI	European Telecommunication Standards Institute
FGCS	Future Generation Computer Systems
GLOBECOM	Global Communications Conference
IETF	Internet Engineering Task Force
JLT	IEEE/OSA Journal of Lightwave Technology
JOCN	IEEE/OSA Journal of Optical Communication and Networks
KPI	Key Performance Indicator
LATINCOM	Latin-American Conference on Communications
MSA	Multi-Source Agreement
NG-PON2	Next Generation – Passive Optical Network 2
NFV	Network Function Virtualization
NFV-SDN	Network Function Virtualization and Software Defined Networks
OFC	Optical Fiber Communications Conference and Exhibition
ONDM	Optical Network Design and Modelling
ONF	Open Networking Foundation
PSC	International Conference on Photonics in Switching and Computing
QMR	Quarterly Management Report
SB	Steering Board
SC	Steering Committee
SDN	Software Defined Networks
SDO	Standards Developing Organization
SME	Small and Medium-sized Enterprise
SONIC	Software for Open Networking in the Cloud
SUM	IEEE Photonics Society Summer Topicals
TB	Technical Board
TAPI	Transport API
TC	Technical Committee



TIP	Telecom Infra Project
VIM	Virtual Infrastructure Management
VR	Virtual Reality
WG	Working Group
WP	WorkPackage

EXECUTIVE SUMMARY

This document offers a comprehensive summary of the achievements in communication, dissemination and standardisation activities within the B5G-OPEN project during its second year. It outlines the methodologies and tools employed to support the coordination of Work Package 6 (WP6), emphasizing its vital role in these domains.

This report firstly recalls the tools and methods used for internal communications among partners. It outlines the methodology and repository employed for sharing documentation and keeping data, further ensuring effective collaboration and information exchange. Within WP6, dissemination efforts are detailed. This includes coordinated contributions to major conferences and workshops, proposal preparation for events, active involvement in 5G-PPP activities, participation in standardisation activities, and the coordination of joint publications in high-impact factor journals. Additionally, the several innovations that were highlighted by European Commission's Innovation Radar have been described which indicate the highly potential exploitable items from the B5G-OPEN results.

The achievements of WP6 in the second year of the B5G-OPEN project have been noteworthy, spanning a wide spectrum of activities across conferences, journals, workshops, 5G-PPP and standardisation. These efforts are instrumental in advancing the project's objectives and promoting its research outcomes.

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Document Structure

This document is structured as follows.

In **introduction**, a short summary on the overall status of the project activities is presented.

Next, the B5G-OPEN **dissemination strategy** has been recalled which includes the dissemination coordination, detailed plan and objectives. Some information on the website has been updated. In year 2, B5G-OPEN 5G-PPP representatives have kept active participation in 5G-PPP activities, and the contributions have been reported.

Then the **dissemination impact in year 2** have been reported, including coordinated contributions to major conferences and workshops, proposal preparation for events, the submission of joint publications in high-impact factor journals and participation in standardisation activities.

In the following section, the five innovations which have been highlighted by the European Commission's **Innovation Radar** are presented. These innovations show great potential on the exploitation of B5G-OPEN results.

The last section summarises this document.

1 INTRODUCTION

In Year 1, we laid a robust foundation upon which our ambitious objectives were predicated. In Year 2, we are proud to report substantial progress, informed by the insights gleaned from our preceding year's endeavours. This report serves as a medium through which we provide a comprehensive update on our activities within the spheres of communication, dissemination, and standardization.

On the administrative and internal communication tools, we maintain continuity with the tools reported in the previous year's document. These tools, which include our online repository and live communication platform, continue to serve as essential components of our project infrastructure. The project logo, project template, file naming conventions, and acknowledgment text remain unchanged, ensuring consistency in our project's identity and documentation. Additionally, our mailing list remains an active channel for internal communication and collaboration.

Our project website and social media channels continue to play an important role in promoting the activities and achievements of the B5G-OPEN project. The website remains a dynamic platform for sharing project updates, research findings, and relevant resources with both our consortium members and the broader community. Our presence on social media platforms such as LinkedIn, Twitter, and YouTube remain active, enabling us to engage with stakeholders, share our progress, and foster meaningful discussions within the field.

In the realm of publications and events, we are pleased to report that we have consistently achieved commendable numbers in both areas. Our commitment to disseminating high-quality research findings remains unwavering. Moreover, we actively contribute to 5G-PPP and standardization activities, ensuring that our research aligns with industry standards and facilitates broader industry advancements.

In a noteworthy development, we are pleased to announce the acceptance of all five innovations submitted to the European Commission's Innovation Radar. This recognition emphasises the innovative nature of our project and highlights the potential impact of our contributions to the field.

We will continue to engage with the European Commission's Innovation Radar, leveraging this recognition to further promote our project's innovations on a broader scale.

As we progress into Year 3 of the B5G-OPEN project, we remain our commitment to advancing the fields of communication, dissemination, and standardization. The achievements and milestones outlined in this report represent our dedication to driving innovation, knowledge sharing, and collaboration. We look forward to the opportunities and challenges that lie ahead as we continue to shape the future of optical communications and its vital role in the digital era.

2 DISSEMINATION STRATEGY

For a complex project such as B5G-OPEN with a wide set of partners, the managed dissemination activities ensure that publications, tasks and objectives are adequately planned and delivered.

This should avoid inferior quality publications and inefficient use of time and resources. It is also important to avoid partial or missed tasks and objectives.

The project dissemination and standardisation effort are split into the following sub-level areas: industry dissemination, scientific dissemination, specification, and standardisation.

To achieve quality publications across the areas mentioned we use a set of processes and tools, a variety external platforms and channels, and social media platforms, to disseminate our output to the industry, academia and public. These have been reported in D6.1. Some updates on the project website have been given in the following section.

The project coordination, dissemination plan and objectives remain the same as reported last year. The involvement of 5G-PPP have been updated and the contributions during this year have been reported. The arrangement for the generated data by partners in B5G-OPEN has also been clarified in the last section.

2.1 PROJECT WEBSITE

As reported in D6.1, the project public area is accessible for any Internet user. The website (<https://www.b5g-open.eu/>) is mainly managed and updated by CNIT, leveraging on content provided by WP6 contributors. The project site structure remains same as reported previously. The updated consortium logos are shown in **Fig x.x**

CONSORTIUM



Fig. 3.2 Project web site - Consortium

2.2 DISSEMINATION COORDINATION

2.2.1 Internal Dissemination Coordination

There are periodical bi-weekly conference calls for the individual work package where partners could catchup and update with regards to project advancements. Also, in Year 2 the project has held two plenary sessions:

1. January 2023, as an online meeting
2. April 2023, in Paris, France

These plenary sessions provided an opportunity for internal dissemination. In particular during the physical session, project partners could meet personally and discuss in length the relevant topics. In addition to these sessions, the online conference calls allowed partners to be periodically updated with regards to project advancements.

2.2.2 External Dissemination Coordination

Concerning dissemination to external channels, posts to multiple different platforms are targeted to reach a broad audience. Such platforms include, but are not limited to, social media, the project website, blogs, newsletters, news articles and press releases. The published

information should provide updates based on the research output of the project partners. The coordination also encourages partners to submit articles to any relevant scientific journals, peer-reviewed conferences, and books, solidifying the presence of the project within those mediums to reach a broader audience.

2.3 PROJECT DISSEMINATION PLAN

The project dissemination plan is recalled here which covers diverse periods of the project and has been reported in D6.1.

Period 1: includes the creation of the project website increasing the visibility of the project; the definition of the dissemination strategy document(s); the identification of which SDOs to target for B5G-OPEN proposals; reporting the first architecture approach, identifying the principal research challenges; and the creation of the project education programme, appropriate for industry and academia (MSc and PhD programs).

Period 2: Publication of early findings in scientific journals; create new education resources scoping the solution and involved technologies; the submission of first technical reports to SDO with more precise and specified solutions; continuous development and industry collaboration of SDO proposals; participation with the project education programme in workshops, webinars and lectures on MSc and PhD programs.

Period 3: Publication of techno-economics data, infrastructure, experiments, services and applications, demos, and other relevant knowledge; formal adoption of specification and standards, and publication as standards.

2.3.1 Planned Scientific Publications

The B5G-OPEN project considers two main methods to disseminate scientific results: conferences and publications.

Conferences: The B5G-OPEN project will participate and present the knowledge, results, and key innovations at academic and industry conferences.

Publications: The B5G-OPEN project expects to publish over 5 publications in journals, 10 articles, magazines, whitepapers, specifications, and standards, that highlights the scientific and industry technology leadership.

2.3.2 Organisation of Planned Events

During the project duration, the B5G-OPEN partners participate in several activities. Some of these activities are planned from the beginning, and outstanding events should be required according to the course of the project.

Project Workshops: The partners will demonstrate the results of the project with best practices and successful studies, applications, functions, and services tested within the B5G-OPEN framework and overall 5G PPP community. They will contribute to demonstrating the value of B5G-OPEN across all European ICT innovators.

Joint 5G PPP workshop and sessions: The project will participate in the presentations and exhibitions in the 5G PPP events including Optical Fiber Conference (OFC), 5G Global events,

European Conference on Networks and Communication (EuCNC), European Conference on Optical Communication (ECOC), etc.

2.4 PROJECT DISSEMINATION OBJECTIVES

The dissemination plan is designed to maximize the external knowledge of B5G-Open proposal in order to influence network operators, equipment vendors, Small Medium Enterprises (SMEs), and the research organizations to adopt and exploit the proposed architectures and technologies. This will be achieved with a thorough dissemination of the project outcomes to relevant industry and scientific communities through:

- Scientific dissemination in conferences (industry and academic) and academic journals. We expect to publish over forty journals, magazines, whitepapers, specifications, and standards (Table 1);
- Organization of events such as: B5G-OPEN Workshops and joint 5G PPP workshop/sessions;
- Educational activities for students moving to industrial roles to promote the development of skills and knowledge necessary to design, build and deploy the B5G-OPEN infrastructure;
- Standardisation and Open-Source activities to significantly impact SDOs (Table 2);
- Dissemination with the 5GPPP by participating in Steering Board activities, where program level decisions will be taken on actions to achieve the objectives of the program.

Table 1 – Summary of targeted Yearly dissemination activities and verification

Dissemination Activity and Verification Plan	Year 1	Year 2	Year 3
Publication in selected peer-reviewed Journals	5	10	10
Presentation and Publication at selected conferences	10	15	15
Organization of Workshops/Symposia	-	1	1
Participation at industry conference/workshops/events	1	1	2
Contribution to SDOs (different WG contributions)	1	2	2

Table 2 – Standardisation and Open-Source activity plan

Standardisation	By completion of the Project
SDO contributions (individual drafts, documents, interop reports, best practices, and applicability documents)	4+ contributions.
Contributions to Open-Source projects, including code, documentation, bug fixes, features, and testing reports.	Contributions to at least 2 Open-Source projects.

2.5 5G-PPP

In D6.1, the 5G-PPP (<https://5g-ppp.eu/>) has been introduced regarding the background and main objectives. B5G-OPEN was added to the 5G-PPP website and a specific e-mail was also assigned to the project:

- ✓ 5G-PPP website: <https://5g-ppp.eu/b5g-open/>
- ✓ B5G-OPEN 5G-PPP e-mail: b5gopen-contact@5g-ppp.eu.

All B5G_OPEN partners have been informed about the contractual commitment of the 5G-PPP as well as its organizational structure. Indeed, all partners have acknowledged the roles and commitments of the European Commission, the 5G-PPP partnership board, the 5G Infrastructure Association, and the 5G for Europe and commit to constructive interactions with these bodies as part of B5G-OPEN research and impact activities.

2.5.1 B5G-OPEN 5G-PPP representatives and participation in working groups (WGs)

This section recalls in detail those activities performed by the B5G-OPEN partners and representatives in each of the working groups (WGs) as part of the 5G-PPP related activities as described in D6.1.

Aiming at exploiting synergies and enhancing collaboration with 5G-PPP projects as well as participating in joint dissemination activities while actively contributing to the different WGs, the following representatives were allocated to each one of the 5G-PPP WGs and have been updated since D6.1:

5G-PPP WG	Main representative	Partner	Second representative	Partner
Vision and Societal	Javier Garcia	TID	Alexandros Stavdas	OLC-E
TMV KPIs	Emilio Hugues Salas	BT	Vangelis Kosmatos	OLC-E
Trials	Oscar González	TID		
Software Networks	Ramón Casellas	CTTC	Behnam Shariati	HHI
5G Architecture	Albert Rafel	BT		
Pre-standardization	Antonio Napoli	INF-D		
O-RAN WG9 “Open X-haul Transport Working Group”	Roberto Mercinelli	TIM	Annachiara Pagano	TIM
	Filippo Cugini	CNIT	Javier Garcia	TID

Goals and main objectives for each of the WGs are detailed below as follows:

- ✓ Vision and Societal Challenges WG: This specific WG aims to develop a consensus in Europe on 5G systems, infrastructures, and services as well as to identify the societal, economic, environmental, business, and technological benefits that can be obtained from the realization of 5G implementation.
- ✓ Test, Measurement and KPIs Validation: 5G network will bring new services and technologies, and therefore it will be required to evaluate the 5G related KPIs accordingly. The purpose of the Group is to bring together the projects that have common interest in topics towards the development of Test & Measurements and validation methods, test cases, and procedures that can support the verification of the KPIs.
- ✓ Trials WG: The WG was launched to develop the European Trial Roadmap based on the 5G Manifesto. The scope of the activities is threefold:
 - To facilitate the involvement of verticals in the trial's roadmap.
 - To discuss and define business principles underpinning the economic viability of trials.
 - To consider and coordinate the activity on trials with other relevant initiatives at international level.
- ✓ Software Networks WG: The objective of this WG is to analyse the applicability of research topics towards Software Defined Networks (SDN) and Network Function

Virtualization (NFV) and foster the development of related activities by the 5G-PPP projects.

- ✓ 5G Architecture WG: The goal of this WG is to serve as a common platform that will facilitate the discussion between 5G-PPP projects developing architectural concepts and components as well as promote any discussions based on the KPI's as described by 5GPPP.
- ✓ Pre- Standardisation WG: This WG focuses on developing a roadmap of relevant standardisation and regulatory topics for 5G by identifying the standardisation and regulatory bodies to align with e.g. ETSI, 3GPP, IEEE and other relevant standards bodies such as ITU-R and WRC, as well as evaluating roadmaps in international level.
- ✓ Open X-haul Transport WG: The WG shall focus on the transport domain – consisting of transport equipment, physical media and control / management protocols associated with the transport network underlying the assumed Ethernet interfaces (utilized for fronthaul, mid-haul and backhaul). The WG shall focus on specifying deployment architectures, requirements and solutions, identify gaps and proposals towards existing transport SDOs. The WG shall also coordinate requirements from other WGs, negotiating as necessary to align requirements among the WGs.

Indeed, the work being performed in the above mentioned WGs falls under the same scope and objectives as B5G-OPEN and they are therefore all of interest for the project.

The consortium also develops interactions with the 5G-IA governing bodies (i.e., Steering Board and Technical Board) by keeping an active communication and regularly attending meetings calls.

5G-PPP Governing body	Main representative	Partner	Second representative	Partner
Steering Board (SB)	Javier Garcia	TID	Oscar González	TID
Technical Board (TB)	Filippo Cugini	CNIT	Oscar González, Alexandros Stavdas	TID, OLC-E

- 5G-PPP Steering Board: It consists of mandated representatives of each 5G-PPP project who are people with the responsibility to decide on common actions and initiatives of the programme.
- 5G-PPP Technical Board: The technical board addresses the inter-working of the technical solutions developed within the projects and also ensures coherence and consistency across the programme.

2.5.2 B5G-OPEN contributions to 5G-PPP

The contribution to 5G-PPP can be differentiated into three main streams: (i) contributions to the WGs; (ii) (co)-organization of workshops; and (iii) collaboration to prepare white papers.

In Year 2, B5G-OPEN delivers the following contributions:

- Test, Measurement WG:
 - B5G-OPEN has been presented to the WG and feedback was positive. B5G-OPEN contributed to the white paper “Beyond 5G/6G KPI Measurement”, which has been also presented at the EuCNC 2023.

- ICT-52 joint workshop (2023, January) where B5G-OPEN was represented by Óscar González de Dios (TID).
- Trial/ pilot WG:
 - B5G-OPEN trials/pilot (the final demos) are planned in the second half of the project. The discussion of this activity is ongoing.
- Contributed to a workshop proposal at IEEE ICC '23 (Rome) with the co-participation in joint 5G-PPP workshop called “AI/ML driven Autonomous 6G networks”. Title of the proposal: “Real-time Autonomous Optical Network Operation: from Vision to Development in B5G-OPEN”, led by UPC.
- The project has always been represented in all 5G-PPP Steering Board meetings by Mr. Javier Garcia Rodrigo.

2.6 GENERATED DATA

Throughout the lifecycle of B5G-OPEN project, a substantial volume of data will be generated, reflecting the research activities and findings. It is crucial to outline the approach and strategies for handling these datasets, including decisions regarding their long-term preservation, as well as the establishment of an online repository for selected datasets. This section provides an overview of our data management framework, highlighting key aspects of data generation, storage, and preservation within the B5G-OPEN project by each partner.

Partner/ Third Party	Type of data	Will be kept or not (after end of B5G- OPEN) [Y / N]	Online repository [Y / N]
1. TID	As of September 14, TID is not expecting to generate data sets. As soon as TID gets results from the experimentation activities, an update on data management will be provided	N	N
1.1. UC3M	Not expecting to generate data for dissemination activities	N	N
1.2. TSA	As of 2023 September 14, TID is not expecting to generate data sets. As soon as TID gets results from the experimentation activities, an update on data management will be provided	N	N
2. TIM		N	N
3. BT	Not expecting to generate data for dissemination activities	N	N

4. INF-D	Not expecting to generate data for dissemination activities	N	N
5. INF-P	Not expecting to generate data for dissemination activities	N	N
6. ADVA	Not expecting to generate data for dissemination activities	N	N
7. Nokia	Power spectral density for 16-QAM & QPSK on a 7-node meshed network testbed	N	N
8. CNIT	Not expecting to generate data for dissemination activities	N	N
8.1 CNR			
9. CTTC	The data is synthetic, obtained by running simulations on the TAPI Network Orchestrator. A simulation consists of the arrival and departure of connections following some pre-defined statistic. It depends on the pre-defined topology and relevant parameters. The data is the stream of network events that is generated by the TAPI orchestrator regarding topology and connectivity changes in the network. Each event is timestamped and contains the relevant information	N. the data can be generated on demand	N. No plans to keep the data unless it is used for some experiment that uses it beyond feasibility assessment and proof of concept
10. UPC	A dataset containing synthetic IQ optical constellation data for 16-QAM optical connections generated with a Matlab-based coherent WDM optical system simulator	Y	Available via this link (https://doi.org/10.34810/data146/2)
11. HHI	Networking KPIs and parameters collected from the testbed, experimental dataset generated during the course of the project	Y	will be published at https://www.hhi.fr/aunhofer.de/networkdata
12. OpenLight		N	N
13. ELIG	Not expecting to generate data for dissemination activities	N	N
14. TuE			
15. pureLiFi	KPIs and test results collected from the experimental set-up and demo implementation	Y	N

3 DISSEMINATION IMPACT IN YEAR 2

3.1 DISSEMINATIONS WITH PUBLICATIONS

3.1.1 Summary

B5G-OPEN has been active in several dissemination activities. The number of publications has been significantly higher than that was planned. B5G-OPEN partners publish at top IEEE/OPTICA conferences and on the leading magazines. Many partners have been invited to talk at workshop, symposia, and various scientific collaborative events.

3.1.2 Disseminations by Type

The dissemination by type is reported in the next two sections.

3.1.3 B5G-OPEN Presence in Industry Conferences

Table 3 (below) lists the industry conferences where B5G-OPEN had or will have a presence.

Table 3 List of Industry Conference with B5G-OPEN’s Presence

Conference or Workshop Name	# Contributions
International Telecommunication Networks and Applications Conference (ITNAC2022)	1
IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN 2022)	1
Optical Fiber Communications Conference and Exhibition (OFC 2023)	16
The 27th International Conference on Optical Network Design and Modelling (ONDM 2023)	5
OPTICA Advanced Photonics Congress 2023	1
European Conference on Networks and Communications (EuCNC2023)	1
European Conference on Optical Communication (ECOC 2023)	1
Arxiv Technical report	1
TOTAL	27

3.1.4 B5G-OPEN Publications in Journals

The table below lists the scientific journal published or submitted by B5G-OPEN partners.

Magazine title	# Contributions
IEEE / OPTICAL J. of Optical Communications and Networking (JOCN)	8
IEEE / OPTICAL J. of Lightwave Technology (JLT)	2
IEEE Network Magazine	1
IEEE Photonics Technology Letters (PTL)	1
Sensors - Secure and Reliable Autonomous Optical Communications and Networks	1
TOTAL	13

3.2 STANDARDISATION ACTIVITY [TO BE UPDATE]

Standardisation bodies active in the field of technology covered by B5G-OPEN have been identified and contact persons from the project that are already contributing to them have been found out. Thus, paths for submitting contributions have been defined.

Relevance of different standards has been checked and project partners have contributed to the following standardisation bodies and activities:

1. ETSI ISG F5G
2. IETF
3. ITU
4. ONF TAPI
5. openConfig
6. openROADM
7. openXR forum
8. O-RAN
9. TIM MUST

Hereafter some examples of contributions:

3.2.1 ETSI ISG F5G [HHI]

...

3.2.2 IETF [TID]

...

3.2.3 ITU-T and FSAN [TIM]

...

3.2.4 ONF TAPI North Bound Interface [CTTC]

CTTC and Telefonica have contributed to the standardization of the ONF TAPI 2.4 North Bound Interface, to be used between an orchestrator and an optical controller (or Open Line System Controller). The activities relate to R&D and standardization for the definition of data models and related interfaces. The activities involve the participation in weekly standardization meetings (weekly ONF OTCC TAPI meetings), representation in the OTCC Technical Steering Team (TST), the definition of use cases covering operators' requirements, the definition of the supporting data models and, finally, the editorship of TAPI reference implementation agreements (RIA).

The main outcome at the time of writing is the release of TAPI 2.4.1 as a maintenance release of TAPI 2.4.0 completing pending points of the previous release. This corresponds to the release of version 2.4.1-RC1 of the ONF Transport API (TAPI) SDK. This SDK is being released under the Apache 2.0 license. The ONF Transport API (TAPI) project charted under the ONF Open Transport Configuration & Control (OTCC). As a non exhaustive list, this activity has covered:

- Additional improvements to the use cases related to OAM and the use of new features 2.4.

- Introduction and consolidation of the generic concept of TAPI profiles, with a focus on the photonics layer, as well as the definition of transmission capacities to characterize Multiplexing Sequences in NEPs.
- Definition of new procedures to "extend" top connections, in support of Composite Link Connections
- Better support for modelling of regeneration (3R) and amplification functions
- Review current assumptions about connection navigation and partitioning, ensure proper use of Connectivity Services connection list and relationship with bottom connection and subsequent partitions.
- Elaboration of models of physical deficiencies (physical impairments) and use cases. Relationship with IETF models and related activities.
- Improvement in the use cases related to the user network interface (UNI) and related refinements.
- Definition and development of use cases related to route calculation. This includes use cases related to constrained route calculation, concurrent route precomputation, and bulk request processing.
- Reconsider the use of remote procedure calls (RPCs) and deprecate RPCs that have direct data model equivalents.

3.2.5 Openconfig [TID]

...

3.2.6 OpenROADM [TIM]

...

3.2.7 OpenXR forum [TIM, TID-TSA, BT]

...

3.2.8 O-RAN [TIM]

...

3.2.9 TIP [TIM, TID]

...

3.2.10 OpenSource Software

A large number of open-source software is used for the work of the different work packages. Furthermore, partners are planning to contribute to open-source software packages such as ONOS SDN. Examples for used software are given in the following list:

- **ONOS SDN** controller for preliminary studies on control plane architecture
- **Openstack** as VIM
- **Kubernetes** as container management system
- **Netopeer** and related software for Netconf prototype testing

- **Docker** to dockerize applications and function
- **Kafka** and **Redis** as telemetry systems
- **Grafana** for dashboard visualization
- **SONIC** as a network operating system for hybrid packet-optical nodes
- **Net2Plan** as network planner
- **GNPy** for estimating the power of the non-linear interference
- **BMv2** for emulating a P4-based switch
- open-source operating systems, languages, compilers, and tools
- open-source libraries to develop part of our software (Boost C++ Libraries)

3.3 B5G-OPEN WEBSITE

3.3.1 Main contents

The project website - <https://www.b5g-open.eu/> - has been constantly updated.

For example, the NEWS area includes 7 pieces of news, informing the public audience about project events (e.g., plenary meetings), relevant publications (JOCN/JLT journals, OFC/ECOC conference papers), participation to workshops, and dissemination events targeting the broad community.



26 B5G-OPEN booth @ EuCNC 2023
06.2023

June 26, 2023 / 6 news / 64

B5G-OPEN Project extremely active at the EuCNC 2023 Conference in Gotenburgh, Sweden. A dedicated B5G-OPEN booth presented all project activities and results. In addition, two Posters showed relevant project activities in the field of multiband data plane infrastructure and packet-optical networking. Furthermore, Emilio Riccardi (TIM) provided a B5G-OPEN talk on 'An operators' perspective on the migration to multi-band networks' at the Special Session entitled 'Novel technologies in disaggregated packet-optical networks'

[Read More](#)



06 B5G-OPEN contributed to the new Whitepaper on beyond 5G KPI
06.2023

June 6, 2023 / 6 news / 36

The eTest, Measurement and KPIs Validation Working Group of the 5G Public Private Partnership just released a new whitepaper covering the Beyond 5G/6G KPI Measurement white_paper_b5g-6g_kpi_measurement_FINAL

Fig. 4.1. Project website - news

3.3.2 Website statistics [Filippo,..]

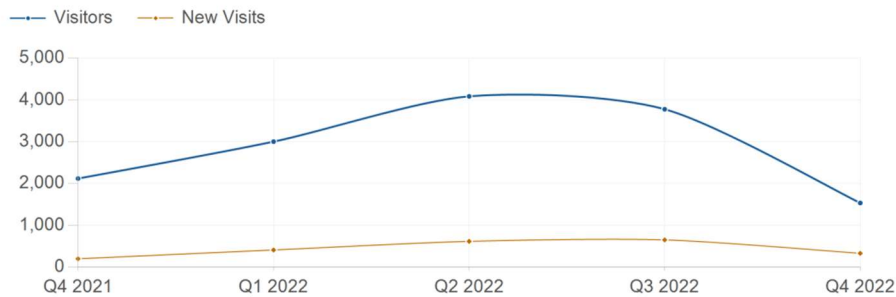
Fig. 4.2 shows the project web site statistics in terms of number of visitors. A remarkable result of more than 14.500 visitors has been achieved during the first year of the project.

This result is even more relevant if compared with the results achieved by other H2020 projects, like H2020 METRO-HAUL which focused on the same topic of optical networking between 2017 and 2020. The METRO-HAUL website registered 1017 visitors during its first year.

Fig. 4.3 shows the daily statistics. It is possible to appreciate peaks of more than 400 visitors in a single day.

Visitors Trend

10/1/2021 - 10/28/2022



Date	Visitors	Unique Visits	New Visits	Return Visits
Q4 2021	2,118	198	198	0
Q1 2022	3,001	441	409	32
Q2 2022	4,084	693	615	78
Q3 2022	3,776	781	650	131
Q4 2022	1,534	457	329	128
Total	14,513	2,570	2,201	369

Fig. 4.2. Project website statistics – visitors

Visitors Trend

10/1/2021 - 10/28/2022

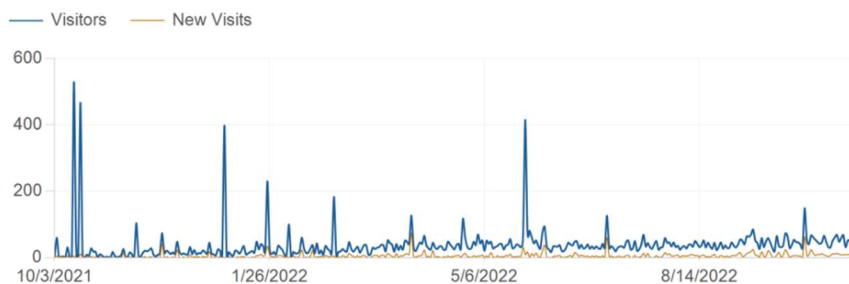


Fig. 4.3. Project website statistics – visitors per day

3.4 SOCIAL MEDIAS [ANTONIO, ..]

In addition to the B5G-OPEN website, we are making large usage of the various social platforms in order to increase the possibilities of dissemination of the project activities.

We selected the following widely used social medias:

- Twitter (@B5G-OPEN)
- YouTube ([B5G-OPEN Project - YouTube](#))
- LinkedIn (<https://www.linkedin.com/company/b5g-open/?viewAsMember=true>)

Details on the utilizations of these three platforms are provided hereafter.

3.4.1 LinkedIn

LinkedIn is one of the most used social media platforms for professionals and it is the main social media where WP6 actively posts about the project and its member activities, such as organized

workshops as well as any scientific achievement and outreach initiatives. B5G-OPEN has been publishing its scientific achievements, in terms of participation to conferences and publications of the results on the leading journals. On 14th of Nov. 2022, we counted

- 569 page views
- 168 unique visitors
- 53 custom button clicks

with an average of visit per page of 1.6. Fig. 4.4 shows the evolution of visitor over time.

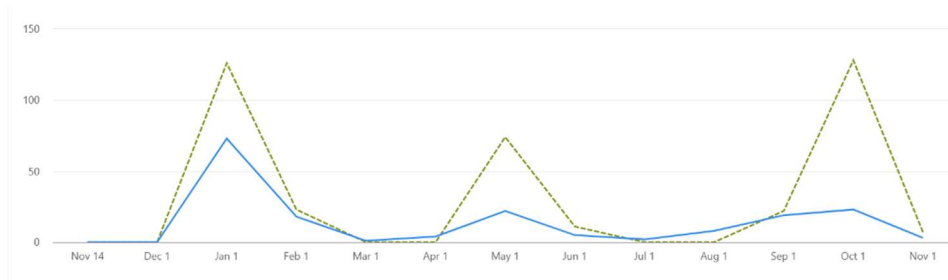


Fig. 4.4. LinkedIn visitors over the last year (Nov. 2021 – Nov. 2022).

3.4.2 YouTube Channel

YouTube is the most-known online video platform, and B5G-OPEN project uses this resource to upload multimedia content. The B5G-OPEN YouTube channel was created in QMR2. As of the writing of this documentation, we currently have two playlists available to public:

Playlist	Video	Views	Likes
B5G-OPEN workshop	ICT 52 Workshop on 6G	316	3
B5G-OPEN plenary meetings	[B5G-OPEN] 3rd Plenary meeting Barcelona (UPC) 2022/10/18 (1)	65	1
	[B5G-OPEN] 3rd Plenary meeting Barcelona (UPC) 2022/10/18 (2)	139	4
OFC 2023	A talk with project coordinator at OFC 2023	32	3
	Telemetry Demo at OFC 2023	37	1
	Distributed Architecture Supporting Measurement Aggregation and Event Telemetry	8	0
EuCNC 2023	SDN Control of Multiband Optical Networks with externalized path computation exploiting device manifests.	0	0

Note: The previous hyperlinks redirect to B5G-OPEN videos in YouTube.

The YouTube's statistics on 6th of Oct. 2023 for the 1-year period are:

- 281 views
- 627 impressions
- 10.1% Impressions click-through rate
- 0:27 average view duration

Fig. 4.5. shows the YouTube channel views and average view duration over time.

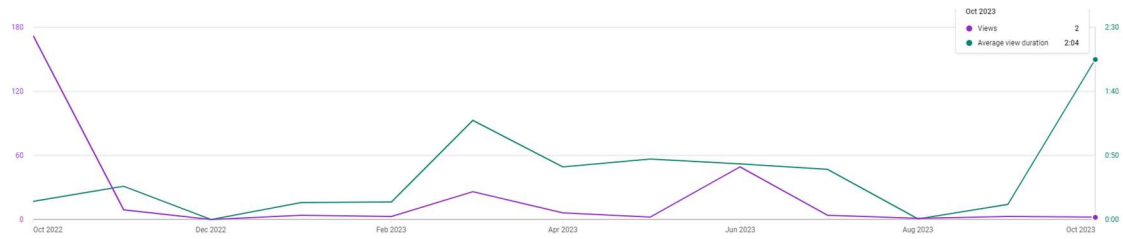


Fig. 4.5. YouTube channel views and average view duration (Oct. 2022 – Oct. 2023).

3.5 WORKSHOP ORGANISATION

3.5.1 ONDM

At ONDM organized by Luis – participation, Filippo, Ramon, Antonio

3.5.2 ICTON

At ICTON – ask Luis

3.5.3 Gender and diversity workshop within IMOC 2023 [Laia]

Preparation and organization of the gender and diversity workshop “Talent and career in research: The role of mentoring to foster diversity and inclusion” in the framework of the 20th SBMO/IEEE MTT-S international microwave and optoelectronics conference (IMOC) 2023 that will be held at CTTC premises in Castelldefels on 8th November. Workshop organizers from B5G-OPEN include Laia Nadal and Michela Svaluto Moreolo. More information can be found at: <https://www.events.sbmo.org.br/imoc2023/pagina/33/workshops>

3.6 DEMOS [ANTONIO, ..]

Including demo pictures, info,...

3.6.1 OFC 2023

3.6.2 Booth EUCNC 2023

3.6.3 ECOC 2023

4 EXPLOITATION PLAN

4.1 INDIVIDUAL EXPLOITATION PLAN [ALL PARTNERS]

Report the individual exploitation plan for each partner.

4.1.1 TID

4.1.2 TIM

4.1.3 BT

4.1.4 INF-D

4.1.5 INF-P

4.1.6 ADVA

4.1.7 Nokia

4.1.8 CNIT

4.1.9 CTTC

4.1.10 UPC

4.1.11 HHI

4.1.12 OLC-E

4.1.13 ELIG

E-lighthouse actively works to achieve the goals of the B5G-OPEN project. Our primary objective is to enhance the capabilities and performance of the E-Lighthouse Network Planner, as part of the B5G-ONP module, and increase the value of the research results acquired during the project by incorporating these benefits into optimization tools in the field of network management. The key aspects of E-lighthouse's exploitation plan are:

- **Development of Innovative Services:** E-lighthouse is committed to using research results to generate practical products and services that add significant benefit to new or existing commercial solutions. Collaboration with the technology partners and project experts will be key in turning scientific advancements into solutions that meet the market's demands.
- **Intellectual Property Protection:** It is important to protect the intellectual property resulting from previous research, so appropriate mechanisms will be identified to secure the work carried out. Strategic formulas will also be explored for future partnerships or the granting of specific authorizations to broaden the scope of the development obtained.
- **Marketing Strategy:** Commercial positioning of the company and its optimization solutions in the telecommunications market. This involves conducting in-depth market

and competitive analyses, identifying target segments and devising effective plans. Strategic alliances will also be established with telecom operators and integration companies to promote the adoption of the solutions developed by E-lighthouse.

- Funding and Investment Pursuit: Seeking sources of funding and investment to support the commercialization of our tool. This includes exploring European funding programs and other sources of capital to strengthen our marketing, production, and expansion efforts. E-lighthouse is committed to efficient financial management.
- Impact monitoring and evaluation: Measurement of the impact of research and development on the telecommunications market. To this end, data will be collected on technology adoption rates, economic benefits generated and key performance indicators. This information will be used to continuously improve the products and services offered by E-lighthouse.

E-lighthouse aims to maximize the potential of our research results to advance the field of telecommunications, contributing to the sustainable growth of the company and society as a whole.

4.1.14 TUE

4.1.15 PLF

4.2 JOINT/GROUP EXPLOITATION PLAN []

Plan for a sub-group of partners.

4.3 INNOVATION RADAR HIGHLIGHTS

Five innovations from B5G-OPEN have been summarised and submitted to the European Commission’s innovation radar questionnaire. At the time of this report being prepared, all these five innovations have been analysed and highlight by the innovation radar platform. In this section, we present a high-level summary and introduction of the five innovations, as well as the analysis result from innovation radar.

- 1) “Fibre optical communication platform offering increased capacity over existing fibre infrastructure with good transient performance” by ADVA
- 2) “Holistic network optimization and planning tool for IT and network resources, with optical multi-band capabilities” by ELI-G
- 3) “Improved power profile monitoring with accurate estimation for both point-to-point or optical mesh connections” by Nokia
- 4) “Optical Multi-Band PCE exploiting a Physical Layer Impairment-aware Routing Modulation and Spectral Assignment (PLI-aware RMSA) Algorithm” by OLC-E
- 5) “Enhanced LiFi connectivity for network integration” by PLF

4.4 INNOVATION #1: FIBRE OPTICAL COMMUNICATION PLATFORM OFFERING INCREASED CAPACITY OVER EXISTING FIBRE INFRASTRUCTURE WITH GOOD TRANSIENT PERFORMANCE

Existing fibre optical systems are soon no longer able to cope with the increased demand for capacity. Therefore, the capacity of an existing transmission system is increased by introducing the multiband technology. An important aspect is to provide transient performance that is comparable with the current single band version at reasonable cost. In an extensive study, the maximum capacity that can be provided over links with a given margin has been determined.

This innovation is led by ADVA.

Details of this innovation, and how it was categorised by the analysis, are as follows:

- Innovation Title: FIBRE OPTICAL COMMUNICATION PLATFORM OFFERING INCREASED CAPACITY OVER EXISTING FIBRE INFRASTRUCTURE WITH GOOD TRANSIENT PERFORMANCE;
- Market Maturity of the Innovation: Tech Ready;
- Market Creation Potential of the innovation: Addresses needs of existing markets

4.5 INNOVATION #2: HOLISTIC NETWORK OPTIMIZATION AND PLANNING TOOL FOR IT AND NETWORK RESOURCES, WITH OPTICAL MULTI-BAND CAPABILITIES

This innovation is settled in the control plane, responsible for coordinating and orchestrating IT and network resources in optical multi-band scenarios. It offers functionalities for designing, optimizing, and planning the deployment, management, and configuration of services and resources. Additionally, it features a user-friendly Graphical User Interface (GUI) that aims to improve the Quality of Experience (QoE) and simplify interactions with the underlying network components.

This innovation is led by e-LightHouse Network Solutions (ELI-G).

Details of this innovation, and how it was categorised by the analysis, are as follows:

- Innovation Title: HOLISTIC NETWORK OPTIMIZATION AND PLANNING TOOL FOR IT AND NETWORK RESOURCES, WITH OPTICAL MULTI-BAND CAPABILITIES;
- Market Maturity of the Innovation: Business Ready
- Market Creation Potential of the innovation: Moderate

4.6 INNOVATION #3: IMPROVED POWER PROFILE MONITORING WITH ACCURATE ESTIMATION FOR BOTH POINT-TO-POINT OR OPTICAL MESH CONNECTIONS

Power profile monitoring is a new monitoring technique allowing to localize the power losses along the transmission line with very good location accuracy (<1km). It is a competitive alternative to optical time domain reflectometry (OTDR) which needs to deploy a specific hardware device span by span.

The pioneering technique did not allow the estimation of power losses, which we added in this innovation. In addition, we make it more scalable for optical mesh network, as it leverages lightpath diversity to enhance the accuracy of both the estimation and the localization and also to simplify the estimation.

This innovation relies on the development of a specific advanced signal processing algorithm which has been optimized to be able to process only a part of the transmission link to reduce computational complexity and latency. If leveraging lightpath diversity, an additional algorithm has been developed and is deployed in a centralized management and control plane to get correlated information from multiple lightpaths.

This innovation is led by Nokia.

Details of this innovation, and how it was categorised by the analysis, are as follows:

[To be added]

4.7 INNOVATION #4: OPTICAL MULTI-BAND PCE EXPLOITING A PHYSICAL LAYER IMPAIRMENT-AWARE ROUTING MODULATION AND SPECTRAL ASSIGNMENT (PLI-AWARE RMSA) ALGORITHM

The multi-band PCE (MB-PCE) is tasked to complete computationally intensive operations so it is externalized to the SDN control plane. The MB-PCE consists of a routing engine that exploits a Physical Layer Impairment-aware Routing and Spectral Assignment Algorithm (PLI-aware RMSA) and it is equally applicable to both end-to-end transparent and translucent paths. The MB-PCE retrieves network topology including any network status updates from telemetry. The PLI-aware RMSA also gets as input the deployed optical transmission system parameters as well as the traffic components of the existing and the new connections.

This innovation is led by OpenLightComm Europe (OLC-E).

Details of this innovation, and how it was categorised by the analysis, are as follows:

- Innovation Title: OPTICAL MULTI-BAND PCE EXPLOITING A PHYSICAL LAYER IMPAIRMENT-AWARE ROUTING MODULATION AND SPECTRAL ASSIGNMENT (PLI AWARE RMSA) ALGORITHM;
- Market Maturity of the Innovation: Business Ready
- Market Creation Potential of the innovation: Noteworthy

4.8 INNOVATION #5: ENHANCED LIFI CONNECTIVITY FOR NETWORK INTEGRATION

This innovation is an enhancement on existing LiFi system on the connectivity for network integration. It helps to integrate LiFi access technology into a larger scale network including 5G, Wi-Fi access technologies. The objective is to introduce a comprehensive solution comprising a LiFi SDN agent for LiFi Access Points (APs) and a LiFi SDN controller to current LiFi system for managing and configuring LiFi APs and networks.

This innovation also entails the development of advanced algorithms specifically designed to address the challenges posed by user movement in LiFi environments. As users move within the coverage area, channel conditions in LiFi networks tend to fluctuate. To ensure optimal Quality of Service (QoS) even in the presence of changing channel conditions, these algorithms will dynamically configure and control LiFi APs.

The algorithms will leverage the capabilities of the LiFi SDN controller to monitor and adapt the LiFi APs based on real-time feedback regarding user movement and channel conditions. By continuously optimizing the configuration of LiFi APs, the innovation aims to provide reliable connectivity, seamless handoffs, and uninterrupted user experience in LiFi environments.

This innovation is led by pureLiFi (PLF).

Details of this innovation, and how it was categorised by the analysis, are as follows:

- Innovation Title: ENHANCED LIFI CONNECTIVITY FOR NETWORK INTEGRATION;
- Market Maturity of the Innovation: Exploring
- Market Creation Potential of the innovation: Very high

5 SUMMARY [TO BE UPDATE]

This deliverable summarizes the activities carried out within the first year of the project on communications, dissemination, and standardisation.

Administrative information and tools are introduced firstly in this document which are beneficial for achieving efficient and effective internal disseminations. It includes:

- MS TEAMS for basic cooperative work support.
- Details of project logo, template documents, file naming conventions, acknowledgement text and mailing list
- Tracker tool for publications and deliverables
- Gitlab repository for B5G-OPEN source code management

The strategy for external disseminations is then introduced. After a detailed description of the project website, the project dissemination plan for each period has been presented. It covers activities across a variety of platforms and channels such as industry conferences, scientific publications, social media platforms, and organisation of workshops.

To evaluate and maximize the impact from B5G-OPEN dissemination activities, the numeric objectives are proposed and presented. In addition, the planned educational activities are described as well as the planned contribution to 5G-PPP such as whitepapers, working groups, and workshops.

Within the first year, B5G-OPEN has been active in these pre-mentioned dissemination activities. The number of publications has been 50 contributions to industry conference and 17 to scientific journals, which is significantly higher than the objective of 10 and 5 respectively for the first year. Moreover, constant effort has been made for updating the project website and the content in social medias such as LinkedIn, Twitter and the YouTube project channel.

Overall, excellent progress has been made towards WP6 tasks and objectives on dissemination and standardisation. We are confident to keep such active activities in the rest of project periods.



6 APPENDICES A COMPREHENSIVE LIST OF YEAR 2 DISSEMINATION ACTIVITY LIST