



Low-cost and energy-efficient hybrid Photonic integrated circuits for fiber-optic, free-space optical and mmWave communication systems supporting Time critical networking in industrial Environments

Deliverable D8.3

Data Management Plan

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List of abbreviations

APCs	Author Processing Charges
CA	Consortium Agreement
DMP	Data Management Plan
DOI	Digital Object Identifier
DSP	Digital Signal Processing
EC	European Commission
ECL	External Cavity Laser
EML	External Modulated Laser
EU	European Union
EOSC	European Open Science Cloud
FAIR	Findable, Accessible, Interoperable, Re-usable
FSO	Free-space optical
GA	Grant Agreement
HTTP	Hypertext Transfer Protocol Secure
IA	Innovation Action
ICT	Information and Communication Technology
InM	Innovation Manager
InMC	Innovation Management Committee
IPR	Intellectual Property Rights
LNOI	Lithium Niobate On Insulator
mmWave	millimeter wave
MZM	Mach-Zehnder modulator
OA	Open Access
OAI-PMH	Open Archives Initiative Protocol for Metadata Harvesting
OBFN	Optical Beamforming Network
PC	Project Coordinator
PCB	Printed Circuit Board
PIC	Photonic Integrated Circuit
PtP	point-to-point
RAID	Redundant Array of Independent Disks
SDN-ROADM	Space Division Multiplexing – Reconfigurable Optical Add-Drop Multiplexing
TSN	Time Sensitive Networking



Executive Summary

This document provides the initial version of the Data Management Plan (DMP) to be implemented by SPRINTER project team. The SPRINTER DMP is a deliverable of WP8, and more than is a document that prescribes how SPRINTER contributes to the Horizon Europe objectives for Open Research Data Pilot, introduced in aiming to improve and maximize access to and re-use of research data generated by projects. In line with this decision, in this initial phase SPRINTER has identified a number of data sets which will be generated within the project and shared with the research community. The main objectives of the project are to improve the exchange and dissemination of research results and possibly to enable and promote a wider validation of the project results and to encourage a fair comparison and evaluation of different solutions in the technical areas of SPRINTER.

The Data Management Plan deals with all the concerns about the treatment of the data that will be collected, processed or generated in the whole project lifecycle and has been structured in compliance with the guidelines and the template conveyed by the European Commission.

Hereafter are reported the main aspects that will be considered in the Data Management Plan, for each of the data set identified in the project:

- Types of data generated, collected or processed
- Standards used to manage data
- Data exploitation methodology
- Accessibility to data produced by the Project
- Data Dissemination level
- Data Preservation and re-use

The DMP is a 'live' document in which the respective information will be made available on a finer level of granularity through updates as the implementation of the project progresses and when significant changes occur. This document is the first version of the DMP, providing an initial description of the expected data sets and their management plan, while more details and potentially further data sets might be added during the course of the project implementation. The document will be maintained active and regularly updated with additional data sets or details about the existing ones during the total duration of the project.

Keywords: Data Management Plan (DMP), open science, FAIR (Findable, Accessible, Interoperable, Re-usable data), Dissemination level, data sets, research data management



Definitions of Terminology

Dataset: Digital information created in the course of research, but which is not a published research output. Research data excludes purely administrative records. The highest priority research data is that which underpins a research output. Research data do not include publications, articles, lectures or presentations.

Background: any data, know-how or information — whatever its form or nature (tangible or intangible), including any rights such as intellectual property rights — that is:

(a) held by the beneficiaries before they acceded to the Agreement and

(b) needed to implement the action or exploit the results.

Results: any tangible or intangible effect of the action, such as data, know-how or information, whatever its form or nature, whether or not it can be protected, as well as any rights attached to it, including intellectual property rights.

Data Management Plan (DMP): A formal working document which outlines how datasets will be handled both during the active research phase and after the project is completed. DMPs in some form are now a requirement of a research project and therefore must be addressed at the earliest phase of the research lifecycle.

Digital Object Identifier (DOI): A persistent identifier or handle used to identify objects uniquely and to direct communications to the correct server, developed by the [International DOI Foundation](#). An implementation of the Handle System, DOIs are in wide use mainly to identify academic, professional, and government information, such as journal articles, research reports and data sets, and official publications.

Metadata: Information about datasets stored in a repository/database template. For example, an image may include metadata that describes how large the picture is, the color depth, the image resolution, when the image was created, and other data. A text document's metadata may contain information about how long the document is, who the author is, when the document was written, and a short summary of the document.

Repository: A digital repository is a mechanism for managing and storing digital content. Repositories can be subject or institutional in their focus.

Zenodo: A general-purpose open-access repository (<https://about.zenodo.org>) developed under the European [OpenAIRE](#) program and operated by [CERN](#). It allows researchers to deposit data sets, research software, reports, and any other research related digital artifacts. For each submission, a persistent digital object identifier (DOI) is minted, which makes the stored items easily citable.



1 INTRODUCTION

The Horizon Europe framework recommends that a data management plan ('DMP') is established and regularly updated. The scope of the DMP is to describe how to select, structure, store and make FAIR (Findable, Accessible, Interoperable and Re-usable), the "background" information used and the project "results" generated during the project.

The present deliverable is the first release of the SPRINTER DMP and it is structured along the guidelines of Data Management Plan (HE) template¹. In completing the sections of the template the requirements on "Intellectual Property Rights- Background and Results-Access Rights and Rights of Use" as stipulated in Article 16, and on "Communication, Dissemination and Visibility" as stipulated in Article 17 in the Annotated Grant Agreement, are taken into account.

Horizon Europe framework has adopted the Open Science approach² in its Data Management strategy - that is based on open cooperative work and systematic sharing of knowledge and tools as early and widely as possible in the process. The Open Science approach aims at increasing the quality and efficiency of research and accelerate the advancement of knowledge and innovation by sharing results, making them more reusable and improving their reproducibility. Open Science and Open Access requirements and how SPRINTER fulfills them are discussed in this document.

The DMP contains information related to the types of data the project will collect, use and generate, the data standards to be employed and how project partners may disseminate and exploit project results. The deliverable also reports on the data sets that will be made available in open repositories together with the necessary reference details for access to the open data.

In particular, the DMP identifies:

- ◆ What types of data will be generated or collected;
- ◆ What data will be exploited/and which will be the data dissemination level;
- ◆ What standards will be used to manage data/ metadata;
- ◆ How will data be preserved, including after project completion.

This document provides an *initial* description of the expected data sets and their management plan, while more details and potentially further data sets might be added during the project implementation. The document will be maintained active and regularly updated with additional data sets or updates on the existing ones. As a minimum, updated versions of the DMP document will be released with D8.5- First exploitation and dissemination report and updated DMP, due in M20 and D8.9 - Final exploitation and dissemination report and updated DMP, due in M42.

¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/reference-documents>

² https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf



2 SPRINTER - PROJECT OVERVIEW

SPRINTER is a 42 month Research Programme part of the HORIZON Innovation Actions funded by the European Union through the **Horizon Europe** framework. It is launched on 1 September 2022.

SPRINTER solution is designed to address applications in the areas of factory automation, process automation, logistics, warehousing, monitoring, and maintenance. Such applications are foreseen to be implemented in the future in the context of computation, communication, and physical processes integration, including human-to-machine and machine-to-machine communication routines.

The digital industrial transformation introduces a set of requirements to be met by the physical infrastructure referring first and most importantly to the requirements for high-capacity networks. Currently, the supported data rates by the industrial networks vary from a few kbit/s, for machine-to-machine communications, up to tens of Mbit/s. With the emergence of a myriad of new types of sensors being deployed concurrently in the factory floors, the industrial networks should inherently scale-up, supporting massive data transfer with Gbit/s throughput rates. Moreover, for time-critical applications as for example the automation processes, it is of utmost importance that the communication between the controllers and their associated field devices is reliable and time-bounded. In many applications, the end-to-end (E2E) latency should be below some ms with negligible time fluctuations. Regardless of the size and type (indoor or outdoor) of the industrial premises, field devices should be able to freely move around the factory floor, overcoming the physical barriers imposed by wired connectivity towards the controller.

Within this context, optical technologies - leveraging the advancements of the photonic integrated circuit (PIC) technology, are employed. SPRINTER solution is built upon well-proven PIC technologies and comprises a complete solution that addresses the diverse needs of industrial networks. More specifically, SPRINTER will make available a set of high-capacity optical transceivers, a high-performance optical switch, a set of ultra-fast tunable optical transceivers, as well as novel photonics-enabled transceivers supporting point-to-point (PtP) wireless communication via a free-space optical (FSO) or a millimeter wave (mmWave) channel.

SPRINTER will evaluate this technology by deploying relevant application scenarios in an existing industrial environment and will incorporate a fully operational closed-loop control system. In order to showcase the true capabilities and disruptive potential of SPRINTER technology, the project will also develop a unified network platform, developing the required methods and tools to support time-deterministic operation and enable reliable and real-time communication with guaranteed service quality over both wired and wireless networks. SPRINTER will provide a set of low-cost, energy-efficient, and ultra-dynamic optical transceivers and an optical switching solution to cope with the diverse needs of the industrial networks and expedite their digital transformation. SPRINTER will combine the best-of-breed optical components and methods from various powerful but complementary photonic integration platforms to develop low-cost and energy-efficient 200 Gb/s optical transceivers, and ultra-fast wavelength-tunable 10 Gb/s optical transceivers. Leveraging well-proven integration techniques that allow for the fabrication of complex 3D photonic integrated circuits, the project will provide a low loss and polarization-insensitive reconfigurable optical add-drop multiplexer, optimized for operation within space-division multiplexing networks.



3 SPRINTER - DATA MANAGEMENT PLANNING

The present section describes the plans of SPRINTER consortium for the management of the different sets of research data that will be produced, collected and used for internal processing and validation in the project.

3.1 Open Science Approach by SPRINTER

SPRINTER will apply the Open science policies as prioritised by the Horizon Europe framework. Open science practices will be applied to ensure that research data, of all sorts, generated in the course of the project is **F**indable, **A**ccessible, **I**nteroperable, and **R**eusable (FAIR). This means that interested parties – academia, industry, end users, civil society will be able to search for, find and access research as well as to understand and use the research data. This access will help in maintaining and checking the quality of research conducted in the framework of the project, but also will offer an opportunity to interact with interested communities³.

Open Science Practices

Open science practices include early and open sharing of research (for example through preregistration, registered reports, pre-prints, or crowd-sourcing); research output management; measures to ensure reproducibility of research outputs; providing open access to research outputs (such as publications, data, software, models, algorithms, and workflows); participation in open peer-review.

In the framework of Horizon Europe a couple of open science practices are identified as mandatory, such as:

- (i) *open access to scientific publications,*
- (ii) *responsible management of research data in line with the FAIR principles of 'Findability', 'Accessibility', 'Interoperability' and 'Reusability', under the principle 'as open as possible, as closed as necessary',*
- (iii) *information about the research *outputs/tools/instruments* needed to validate the conclusions of scientific publications or to validate/re-use research data,*
- (iv) *digital or physical access to the results needed to validate the conclusions of scientific publications, unless exceptions apply,*
- (v) *in cases of public emergency, if requested by the granting authority, immediate open access to all research outputs under open licenses or, if exceptions apply, access under fair and reasonable conditions to legal entities that need the research outputs to address the public emergency.*

However, due to IP or commercial considerations, may not all data/tools/methods be at open access. Potential restrictions to open access will be evaluated on a case-by-case basis. In such cases – where immediate open access is not recommended, consortium is committed to deposit research data and outputs retrospectively in repositories and provide open access the earliest possible.

In the remaining of this section, the how those practices are applied by SPRINTER is discussed.

³ SPRINTER-GA, DoA, par. 1.2.4



3.1.1 Open access to publications

The first aspect to be considered in the DMP is related to the open access (OA) to the publications generated within the context of the project and made available online to any user at no charge. In line with the Horizon Europe guidelines on open access to scientific publications, the publications that will arise from the SPRINTER project will be made public through the following two channels:

- a) **Open access publishing** (also referred to as '**Gold**' open access) means that an article is immediately placed in open access mode (on the publisher/journal website). In this option, beneficiaries publish their results in open access journals, or in hybrid journals that sell subscriptions and offer the possibility of making individual articles openly accessible via the payment of Author Processing Charges (APCs). SPRINTER will preferably target 'Gold' open access journals which apply article processing charges for the article to be published and then it is freely available online via the Open Access journal site.
- b) **Self-archiving** (also referred to as '**green**' open access). The project will use widely self-archiving (or green open access) services for research community like [ResearchGate](#) or [Academia](#), that will allow balance between traditional publications and open-access. In this option, the beneficiaries deposit the final peer-reviewed manuscript in an online repository of their choice (e.g. Zenodo). If this route is chosen, the beneficiaries will ensure open access to the publication within a maximum of six months, in-line with the open access obligations established by the EC.

The consortium partners will use the Open Research Europe publishing platform to enable direct publication of the research outputs in support of research integrity, reproducibility, transparency and open science practices. We should note here that there may be cases where the project participants, may need to submit articles to journals (or proceedings) that only offer a lower level of open-access, requiring either parallel publication or an embargo period.

Additionally, whenever possible the SPRINTER consortium will retain the ownership of the copyright for their work using a 'License to Publish', which is a publishing agreement between author and publisher. With this agreement, authors can retain copyright and the right to deposit the article in an Open Access repository, while providing the publisher with the necessary rights to publish the article.

All publications will acknowledge the project funding. This acknowledgment will be included also in the metadata of the generated information since it allows to maximize the discoverability and visibility of publications and to ensure the acknowledgment of EU funding.

Metadata of deposited publications will be open under a Creative Common Public Domain Dedication (CC 0) or equivalent, in line with the FAIR principles (in particular machine actionable) and provide information at least about the following: publication (author(s), title, date of publication, publication venue); Horizon Europe ; grant project name, acronym and number; licensing terms; persistent identifiers for the publication, the authors involved in the action and, if possible, for their organisations and the grant. Where applicable, the metadata will include persistent identifiers for any research output or any other tools and instruments needed to validate the conclusions of the publication(GA, Article 17)

To ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication, the metadata must be in a standard format and will include all of the following:

- the terms "European Union (EU)" and " Horizon Europe";
- the Name of the action, the Acronym and Grant Number;
- the publication date and length of embargo period (if applicable), and



- a persistent identifier (e.g. DOI)

3.1.2 Research Data Management

Apart from the open access to publication explained in the previous section, SPRINTER will adopt the European Open Science Cloud (EOSC) as the trusted environment for hosting and processing research data. The EOSC portal capabilities will be explored and embraced as a medium to underpin the open access research policy. In specific, two types of data sets are defined:

Background: any data, know-how or information (tangible or intangible), including any rights such as intellectual property rights, that already exist or have been already generated and reported by other research initiatives or held by the consortium members from their own research and development activities prior or in parallel with the project and which might be used as inputs in SPRINTER in implementing the project or exploiting its results. SPRINTER will act only as recipient of this type of data and, if just re-used “as-is”, the project will not define any specific strategy for their management which is already handled by other organizations.

Results: any data, know-how (tangible or intangible) - whether or not it can be protected, as well as any rights attached to it, including IPRs - that is produced as a result of project activities.

Before a dataset is deposited in an open access repository, the partner(s) responsible for uploading and preserving the data will seek consent for data preservation and sharing from all partners involved (according to the provisions of the CA and with the guidance of the Innovation Management Committee [InMC]). The respective partners, in collaboration with the Project Coordinator (PC) and the Innovation Manager (InM) will be responsible for postponing or restricting data sharing to allow enough time for publishing the results in peer-reviewed journals or for seeking patents. To facilitate handling of datasets especially where multiple partners are involved, to expedite data dissemination and ensure that no ethical issues are associated to the respective datasets, the process will be overseen by the InMC.



3.2 FAIR (Findable, Accessible, Interoperable, and Reusable) data

Data and research outcomes generated by SPRINTER activities will be managed and curated in line with the FAIR principles. In summary, the application of FAIR principles for SPRINTER generated data, i.e. publications, simulation data and experimental data as identified in DoA, is as follows:

For Publications

F: Reputable publications, **A:** Green open access or gold open access; deposited in trusted repositories e.g., Zenodo,

I: Readable online, downloadable, and printable, Machine-readable copies, standard text file formats. Use of bibliographic metadata including terms, name of project, acronym and grant number, publication data and persistent identifier, **R:** Efforts will be made to provide right to copy, distribute, search, link, crawl and mine on an as-needed basis. (**Curation:** By the author, Article Processing Charges (APCs) for gold open access have been included in partners' other costs where applicable).

For Simulation Data from components/sub-system modelling activities

F: Types of persistent, unique identifiers (e.g., digital object identifiers); deposited in trusted repositories e.g. Zenodo,

A: Open access over standard protocols (e.g., HTTP and OAI-PMH); IPR considerations and timeline for open access; provisions for access to restricted data for commercial exploitation and/or verification purposes,

I: Standards, formats and vocabularies for data and metadata; accompanied with a "README" file describing any of the relevant information to a specific dataset,

R: Licenses for data sharing and re-use (e.g., Creative Commons, Open Data Commons); availability of tools/software/models for data generation and validation/interpretation/reuse. Storage/preservation costs; person/team responsible for data management and quality assurance.

For Experimental data from components/sub-system characterization and demonstrators testing

F: Types of persistent and unique identifiers (e.g., digital object identifiers); deposited in trusted repositories e.g. Zenodo

A: Open access over standard protocols (e.g., HTTP and OAI-PMH); IPR considerations and timeline for open access; provisions for access to restricted data for commercial exploitation and/or verification purposes,

I: Standards, formats and vocabularies for data and metadata; accompanied with a "README" file describing any of the relevant information to a specific dataset,

R: Licenses for data sharing and re-use (e.g., Creative Commons, Open Data Commons); availability of tools/software/models for data generation and validation/interpretation /re-use. Storage/preservation costs; person/team responsible for data management and quality assurance.



3.2.1 Making data findable, including provisions for metadata

For the open datasets, a Digital Object Identifier (DOI) will be assigned to datasets for effective and persistent citation when it is uploaded to the repository [[Zenodo](#)]. This DOI can be used in any relevant publications to direct readers to the underlying dataset.

Each dataset generated during the project will be recorded in an Excel spreadsheet with a standard format and allocated a dataset identifier according to

Table 1. The owner of each dataset will be responsible for the creation of the spreadsheet associated with the generated dataset, while ICCS (Project Coordinator) will be responsible for gathering and preserving the information of all the dataset in its local repository.

SPRINTER naming convention for project datasets will comprise of the following:

- A unique chronological number of the datasets in the project will be added;
- The title of the dataset;
- A prefix "SPRINTER" indicating an SPRINTER dataset.
- A unique identification number linking with the dataset work package e.g., "WP2".
- For each new version of a dataset it will be allocated with a version number which will be for example start at v1.0;

Search keywords will be provided when the dataset is uploaded to Zenodo, which will optimize possibilities for re-use. Zenodo follows the minimum Data Cite metadata standards. The information and metadata stored in the record-spreadsheet for each generated dataset is summarized in Table 1 below.

Table 1. The structure (fields) of the record-spreadsheet for each generated dataset in SPRINTER

Data set Reference Name	<i>The reference name will be based on the naming convention outlined above in Paragraph 3.2.1</i>
Description	<i>Description of the Dataset</i>
Standards and Metadata	<p>In the absence of a well-defined metadata standard for this type of data, a simple README file will be used. This will be generated in raw text format and will describe basic details that will help people to find the data, including who created or contributed to the data, its title, date of creation and under what conditions it can be accessed. Documentation will also include details on the methodology used as well as file and folder naming conventions. The following fields will be used:</p> <ol style="list-style-type: none"> 1. Dataset Title <i>The title of the dataset which should be easily searchable & findable</i> 2. Name(s) of dataset creator(s) <i>Lead partners responsible for the creation of the dataset</i> 3. Description of Data <i>Brief description of the open data to be included in the metadata</i> 4. Data Source <i>How/why was the dataset generated.</i> 5. Creation Date <i>Date of generation of the dataset</i> 6. Format <i>Possible formats of the datasets e.g. DOC, XLSX, PDF, JPEG, TIFF, etc</i> 7. Expected size <i>Approximate size of the dataset</i> 8. Location of Data <i>Institutional repository where the data are stored.</i> 9. Digital Object Identified (DOI)



Data set Reference Name	<i>The reference name will be based on the naming convention outlined above in Paragraph 3.2.1</i>
	<p><i>The DOI can be entered once the dataset has been deposited in the repository</i></p> <p>10. Access status Type of Dataset "Open" or "Restricted"</p> <p>11. Embargo Embargo period of the dataset (if applicable)</p> <p>12. Funding Statement This project has received funding from the European Union's Horizon Europe Framework Programme (HORIZON) under G.A No 101070581. The results of this dataset reflect only the creator's view and the Commission is not responsible for any use that may be made of the information it contains.</p> <p>13. Work Package <i>SPRINTER Work Package associated with this dataset</i></p> <p>14. Related publications Bibliographical details of publications based on the dataset will be listed, with links to abstracts and, where possible, full text.</p> <p>15. Dataset Citation A 'ready-to-use' citation reference for the dataset will be provided –incorporating the core descriptive elements.</p> <p>16. Keywords Dataset related Keywords</p> <p>17. Version number Dataset version number in order to keep track of changes to the dataset</p>
Data sharing	<p>♦ Repository Expected repository to be submitted.</p> <p>♦ Date of Repository Submission <i>The date of submission to the repository will be added once it has been submitted</i></p>
Archiving and preservation	<p>For redundancy, besides uploading the data on Zenodo it will be also maintained on a university-owned storage server at ICCS (PCRL group). The server offers real-time data mirroring through RAID (redundant array of independent disks) and weekly backups to external disk drives. The dataset will be preserved for at least 5 years after the project end and the associated costs will be covered by ICCS through own funds.</p>

3.2.2 Making data openly accessible

Research data that are created during the project are owned by the beneficiary that generates them (G.A. Article 16). Each beneficiary must disseminate its results as soon as possible unless there is legitimate interest to protect the results. A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries — unless agreed otherwise — at least 45 days, together with enough information on the results it will disseminate (G.A. Article 17).

Generated research data will be deposited as follows:



- ⇒ **Restricted data** will be deposited in the repository of the partner that owns it.
- ⇒ **Data accessible by the consortium members only** will be deposited in the SharePoint Documents Repository of SPRINTER (Private area for consortium members only). More specifically a folder(-s) will be setup in the project's private area, for easy upload of project datasets visible to the consortium members.
- ⇒ **Open data** will be deposited in Zenodo repository. Zenodo.org is open, free, searchable and structured with flexible licensing allowing for storing all types of data: datasets, images, presentations, publications and software. In addition, Zenodo repository allows researchers to deposit both publications and data, while providing tools to link them.

SPRINTER project has chosen to use [Zenodo.org](https://zenodo.org) as the repository for storing the open project data for the following reasons:

- ✓ It enables *Shared Research* through the reposition of all research outputs from across all fields of research and science;
- ✓ It is *Citeable and Discoverable*: uploads get a Digital Object Identifier (DOI) to make them easily and uniquely citeable;
- ✓ It *fosters the establishment and curation of research Communities* through the creation of digital repositories, fully controlled by the owner;
- ✓ Allows the *identification of grants*, integrated in reporting lines for research funded by the European Commission via OpenAIRE;
- ✓ Allows for *Flexible licensing* and,
- ✓ *Ensures security of the stored research results* for the future in the same cloud infrastructure as CERN's own LHC research data.

Data objects will be deposited in Zenodo under:

- Open access to data files and metadata and data files provided over standard protocols such as HTTP and OAI-PMH
- Use and reuse of data permitted
- Privacy of its users protected

For the data being deposited in an external repository (i.e. Zenodo), a dataset registry record will also be created in SPRINTER Documents Repository. The registry record will be updated by the partner that is responsible for the specific generated data and will include relevant metadata explaining what data exists and a DOI linking to where the data is available in the external repository.

During embargo periods, information about the restricted data will be published in the data repository, and details of when the data will become available will be included in the metadata. Where a restriction on open access to data is necessary, attempts will be made to make data available under controlled conditions to other individual researchers. In accordance with G.A. Article 25, data must be made available to partners upon request, including in the context of checks, reviews, audits or investigations. Data will be made accessible and available for re-use and secondary analysis.

In parallel to the available Open Research Datasets, several restricted datasets will be generated within the project. These datasets that contain critical details on SPRINTER developments will be protected in a restricted area. Each SPRINTER partner is responsible to identify these datasets, to communicate with the consortium the updates on these datasets. Of course, these datasets can be moved from restricted area to the Open Data zone of SPRINTER if their owners select to partially or fully release them. This change will be resembled in the Data Management Plan of the project.



3.2.3 Making data interoperable

SPRINTER project aims to collect and document the data in a standardized way to ensure that, the datasets can be understood, interpreted and shared in isolation alongside accompanying metadata and documentation.

Generated data will be preserved either in the SPRINTER SharePoint Documents Repository or in the institutional intranet platforms until the end of the Project (see [Section 8](#)).

a) General Information

- Title of the dataset
- Dataset Identifier
- Responsible Partner
- Author Information
- Date of data collection
- Geographic location of data collection
- Title of project and Funding sources that supported the collection of the data

b) Sharing/Access Information

- Licenses/access restrictions placed on the data
- Link to Data Repository
- Links to other publicly accessible locations of the data
- Links to publications that cite or use the data
- If the data derived from another source?

c) Dataset/File Overview

- This dataset contains X sub-dataset as listed below:.....
- What is the status of the documented data? – “complete”, “in progress”, or “planned”
- Are there plans to update the data?

d) Methodological Information

- Description of methods used for experimental design and data collection: *<Include links or references to publications or other documentation containing experimental design or protocols used in data collection>*
- Methods for processing the data: *<Describe how the submitted data were generated from the raw or collected data>*
- Instruments and software used in data collection and processing-specific information needed to interpret the data
- Standards and calibration information, if appropriate
- Environmental/experimental conditions
- Describe any quality-assurance procedures performed on the data
- Dataset benefits

An indicative example of a metadata file can be found in [Appendix I](#) of the present document.

3.2.4 Increase data re-use (through clarifying licenses)

The open datasets will be made available for re-use through uploads to the Zenodo community page for the project. In principle, the data will be stored in Zenodo after the conclusion of the Project without additional cost. All the research data will be of the highest quality, have long-term validity and will be well documented in order other researchers to be able to get access and understand them after 5 years.

If datasets are updated, the partner that possesses the data has the responsibility to manage the different versions and to make sure that the latest version is available in the case of publically available data. Quality control of the data is the responsibility of the relevant responsible partner generating the data.



4 DATA SUMMARY

SPRINTER will produce several datasets during the lifetime of the project. The data will be both quantitative and qualitative in nature and will be analyzed from a range of methodological perspectives for project development and scientific purposes. These will be available in a variety of easily accessible formats, including Post Script (PDF, XPS), Excel (XLSX, XLS, CSV), Word (DOCX, DOC, RTF), Power Point (PPTX, PPT), image (JPEG, PNG, GIF, TIFF), compressed formats (TAR.GZ, MTZ).

Table 2 below summarizes the data that is foreseen to be generated during the implementation of SPRINTER project. They are listed under each of the Work Package taken from the GA Annex 1 – Description of Action (DoA). The datasets will have the same structure, in accordance with the guide of Horizon Europe for the Data Management.

Table 2. The potential data that will be generated in SPRINTER project

Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
WP2. System design and specifications of SPRINTER technology						
Simulation studies of SPRINTER 200Gb/s PSM4 transceivers The data set includes simulation results from the system level evaluation of the transmission performance of SPRINTER Module-1.	D2.2, D2.5	Results	TXT, TSV, CSV, JPEG	<250 MB	Open	1. ICCS
Simulation studies of SPRINTER 10Gb/s tunable transceiver The data set includes simulation results from the system level evaluation of of SPRINTER Module-2.	D2.2, D2.5	Results	TXT, TSV, CSV, JPEG	<250 MB	Open	1. ICCS
Simulation studies of SPRINTER hybrid mmWave/FSO transceivers The data set includes simulation results from the system level evaluation of of SPRINTER Module-4.	D2.2, D2.5	Results	TXT, TSV, CSV, JPEG	<250 MB	Open	1. ICCS
DSP of SPRINTER mmWave transceiver The data set includes simulation results from the DSP of SPRINTER Module-4 (mmWave).	D2.2, D2.5	Results	TXT, TSV, CSV, JPEG	<250 MB	Open	8. ICOM
Analysis of radiation pattern of emitter/receiver antennas	D2.3	Results	.TXT, .JPG	<250 Mb	Restricted/Data accessible by the consortium members only	6. UC3M
Evaluation of beamforming algorithms	D2.4	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the	1. ICCS



Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
The data set will include simulation results from the performance evaluation of the beamforming algorithms that will apply to the Blass-matrix-based optical beamforming network of SPRINTER.					consortium members only	
3D mechanical modelling and thermal simulation of Sprinter modules The data set will include results of thermal simulation and step files of the 3D mechanical design	D2.3	Results	JPEG, .docx, PNG, STEP	<250 MB	Restricted/ Data accessible by the consortium members only	7. PHIX
WP3. Development of hybrid PICS for 200Gb/s transceivers and 3D polymer switch						
Characterization of SPRINTER VCSELS and PDs for PSM4 transceivers The data set includes results from DC, RF and time-domain measurements on VCSELS and PDs for Module-1b.	D3.3	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the consortium members only	9. MLNX
Simulation of Polymer motherboards for the 200 Gb/s transceivers and the SDM-ROADM switch This data set includes the files generated by photonic simulation software.	D3.1, D3.2	Results	TXT, XLSX, PPT	< 100 MB	Restricted/Data accessible by the consortium members only	2.FhG
Simulation of the 4-fold O-band EML and PD arrays for the 200 Gb/s transceivers This data set includes the files generated by photonic simulation software.	D3.1	Results	TXT, XLSX, PPT	< 100 MB	Restricted/Data accessible by the consortium members only	2.FhG
Layout of Polymer motherboards for the 200 Gb/s transceivers and the SDM-ROADM switch This data set includes the CAD files that will be used for the fabrication of the mask-sets.	D3.1, D3.2	Results	GDS, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
Layout of the 4-fold O-band EML and PD arrays for the 200 Gb/s transceivers This data set includes the CAD files that will be used for the fabrication of the mask-sets.	D3.1	Results	GDS, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG



Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
<p>Characterization of Polymer motherboards for the 200 Gb/s transceivers and the SDM-ROADM switch</p> <p>This data set includes the pictures of the fabricated devices and measurement data acquired with the optoelectronic characterization setups.</p>	D3.1, D3.2	Results	JPEG, TIFF, PNG, TXT, XLSX, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
<p>Characterization of the 4-fold O-band EML and PD arrays for the 200 Gb/s transceivers</p> <p>This data set includes the pictures of the fabricated devices and measurement data acquired with the optoelectronic characterization setups.</p>	D3.1	Results	JPEG, TIFF, PNG, TXT, XLSX, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
WP4. Development of hybrid PICs for 10 Gb/s optical transceivers and FSO/mmWave transceivers						
<p>Design and fabricate high-performance integrated LNOI-MZM</p> <p>The data set includes simulation results using FEM in COMSOL and Lumerical as well as fabricated LNOI MZM chips</p>	D4.3	-Results -LNOI chips, images	-TXT, TSV, CSV, JPEG - Optical images of the LNOI chips	<250 MB	Restricted/Data accessible by the consortium members only	5.CSEM
<p>Design and fabricate high-power, ultra-fast tunable ECLs and 1x16 OBFN for FSO/mmWave transceivers based on PZT actuators</p> <p>The data set includes high level functional design, simulation data of the edge couplers, ECL and OBFN and pictures of the fabricated devices</p>	D4.1, D4.3, D4.4	Results	TXT, PPT, JPEG,GDS	<250 MB	Restricted/Data accessible by the consortium members only	3.LXI
<p>Simulation of Planar Antennas</p> <p>The data set includes the simulation results, S-parameters, radiation patterns and designs of mmWave antenna arrays.</p>	D4.2, D4.4	Results	SnP, GDS	10 GB	Restricted/Data accessible by the consortium members only	6.UC3M
<p>Simulation of InP add-ons (gain chips, phase modulators and photodiodes) for the 10 Gb/s and FSO/mmWave transceivers</p> <p>This data set includes the files generated by photonic simulation software.</p>	D4.1, D4.4	Results	TXT, XLSX, PPT	< 100 MB	Restricted/Data accessible by the consortium members only	2.FhG
<p>Simulation of PolyBoards for the 10 Gb/s and FSO/mmWave transceivers</p>	D4.1, D4.4	Results	TXT, XLSX, PPT	< 100 MB	Restricted/Data accessible by the	2.FhG



Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
This data set includes the files generated by photonic simulation software.					consortium members only	
Simulation of InP THz emitter arrays for the FSO/mmWave transmitters This data set includes the files generated by photonic simulation software.	D4.1, D4.4	Results	TXT, XLSX, PPT	< 100 MB	Restricted/Data accessible by the consortium members only	2.FhG
Layout of InP add-ons (gain chips, phase modulators and photodiodes) for the 10 Gb/s and FSO/mmWave transceivers This data set includes the CAD files that will be used for the fabrication of the mask-sets.	D4.1, D4.4	Results	GDS, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
Layout of PolyBoards for the 10 Gb/s and FSO/mmWave transceivers This data set includes the CAD files that will be used for the fabrication of the mask-sets.	D4.1, D4.4	Results	GDS, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
Layout of InP THz emitter arrays for the FSO/mmWave transmitters This data set includes the CAD files that will be used for the fabrication of the mask-sets.	D4.1, D4.4	Results	GDS, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
Characterization of InP add-ons (gain chips, phase modulators and photodiodes) for the 10 Gb/s and FSO/mmWave transceivers This data set includes the pictures of the fabricated devices and measurement data acquired with the optoelectronic characterization setups.	D4.1, D4.4	Results	TXT, XLSX, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
Characterization of PolyBoards for the 10 Gb/s and FSO/mmWave transceivers This data set includes the pictures of the fabricated devices and measurement data acquired with the optoelectronic characterization setups.	D4.1, D4.4	Results	TXT, XLSX, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
Characterization of InP THz emitter arrays for the FSO/mmWave transmitters	D4.1, D4.4	Results	TXT, XLSX, PPT	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG



Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
This data set includes the pictures of the fabricated devices and measurement data acquired with the optoelectronic characterization setups.						
Visual inspection of polymer-based antenna arrays This data set includes the pictures of the fabricated devices	D4.3	Results	JPEG, TIFF, PNG	< 200 MB	Restricted/Data accessible by the consortium members only	2.FhG
WP5. Development of electrical parts and packaging of SPRINTER prototypes						
Assembly and packaging of SPRINTER prototypes The data set will include step files of the mechanical designs and reports containing images of the completed prototypes.	D5.1, D5.2, D5.3, D5.5, D5.6, D5.7	Results and prototypes	.docx, JPEG, STEP	<250 MB	Restricted/Data accessible by the consortium members only	7. PHIX
High-speed PCBs for SPRINTER prototypes The design of PCB motherboards with DC and RF access lines for the assembly of PICs and ICs and module packaging.	D5.1, D5.2, D5.3, D5.5, D5.6, D5.7	Results and prototypes	GERBER, .DOC	1 GB	Restricted/Data accessible by the consortium members only	5. UC3M
Circuit schematics of the electronic integrated circuits This dataset contains the schematics of the driver and TIA chips including all transistor-level buildings blocks and their interconnections.	D5.4	Internal	Cadence Netlist	25 MB	Restricted/Data accessible by the consortium members only	4. IMEC
Simulation studies of the electronic integrated circuit designs Most simulation results are temporary, intermediate results to evaluate different circuit topologies and to optimize the sizing and operating points of the circuits. Corner simulations, post-layout simulation, signal integrity, power integrity, signal quality, etc.)	D5.4	Internal	CSV	1 TB	Restricted/Data accessible by the consortium members only	4. IMEC
Layout of the electronic integrated circuits	D5.4	Internal	GDS	100 MB	Restricted/Data accessible by the consortium members only	4. IMEC



Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
The layout (or blueprint) represents the exact physical implementation of the circuit schematics, which is converted in a set of masks for fabrication by the semiconductor foundry.						
Characterization of the electronic integrated circuits The data set includes the experimental results from the characterization process of the driver and TIA chips.	D5.4	Internal	CSV	100 GB	Restricted/Data accessible by the consortium members only	4. IMEC
PCB schematics and layout This dataset contains the schematics and the layout of the PCBs for assembling and testing imec's driver and TIA chips together with Sprinter's electro-optical devices.	D5.4	Internal	DXF, GBR	50 MB	Restricted/Data accessible by the consortium members only	4. IMEC
Simulation studies of the PCBs This dataset includes various simulations that will be carried out during the design of the Sprinter PCBs, such as signal integrity simulations.	D5.4	Internal	CSV	50 MB	Restricted/Data accessible by the consortium members only	4. IMEC
WP6. Development of network management system						
TSN system time synchronization network bootstrapping Topology information	D6.1	Internal	.JPEG,.PNG,.DOC	<100MB	Restricted/Data accessible by the consortium members only	10.CMC
Wired network resource control and traffic management Management of resources (information collected in real time), setting policies (applying information)	D6.2	Internal	CSV	<100MB	Restricted/Data accessible by the consortium members only	10.CMC
Wireless network resource control and traffic management Network performance across wired and wireless modules	D6.3	Internal	TXT	<100MB	Restricted/Data accessible by the consortium members only	10.CMC
WP7. System integration and testing of SPRINTER prototypes						



Data Description	Related Deliverable (s)	Type	Format	Estimated Volume	Access	IPR Owner
<p>SPRINTER prototypes evaluation in lab-settings This set of experimental data will contain the characterization measurements of the SPRINTER prototypes in the lab settings</p>	D7.2, D7.3, D7.4	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the consortium members only	1. ICCS
<p>Characterization and performance evaluation of SPRINTER prototypes (Module-2 and Module-4) This data set will contain the experimental results from the system level evaluation of SPRINTER prototypes Module-2 and Module-4 in TSN-enabled infrastructure</p>	D7.2, D7.3, D7.4	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the consortium members only	1. ICCS
<p>Application scenarios: capture from motion and visual inspection The data summarizes the experimental results of the prototypes generated with the new network concept and the generation of data by stereo and line scan cameras.</p>	D7.6	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the consortium members only	12.FILL
<p>Characterization and performance evaluation of SPRINTER prototypes (Module-1.a, 1.b and Module-3) This data set will contain the experimental results from the system level evaluation of SPRINTER prototypes Module-1.a, 1.b and Module-3 in TSN-enabled infrastructure</p>	D7.5	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the consortium members only	11.TEI
<p>Module-4 evaluation in lab-settings and in a relevant industrial environment This data set will contain the validation data from the testing campaign of the BBU for the mmWave signals in lab and industrial settings</p>	D7.4, D.75, D7.6	Results	TXT, TSV, CSV, JPEG	<250 MB	Restricted/Data accessible by the consortium members only	8. ICOM

5 SPRINTER OPEN RESEARCH DATASETS

The following tables detail the OPEN research DATASETS that are foreseen to be generated at this stage of project. However the DMP is a live document and this information will be verified in the course of the project.

5.1.1 Data set 01. Simulation studies of SPRINTER 200Gb/s PSM4 transceivers _ SPRINTER_WP2_VX.0

Data set Reference Name	<i>DS 01. Simulation studies of SPRINTER 200Gb/s PSM4 transceivers _ SPRINTER_WP2_VX.0</i>
Description	<i>This set comprises the obtained simulation results of optical waveforms and/or eye diagrams of an optical PSM4 transceiver system based on EML (O-band) and VCSEL (1064nm) based transceivers, operating with NRZ modulation format, with total aggregated capacity up to 200 Gb/s over</i>
Standards and Metadata	<p>In the absence of a well-defined metadata standard for this type of data, a simple README file will be used. This will be generated in raw text format and will describe basic details that will help people to find the data, including who created or contributed to the data, its title, date of creation and under what conditions it can be accessed. Documentation will also include details on the methodology used as well as file and folder naming conventions. The following fields will be used:</p> <ol style="list-style-type: none"> 1. Dataset Title <i>DS1. Simulation studies of SPRINTER 200Gb/s PSM4 transceivers</i> 2. Name(s) of dataset creator(s) <i>ICCS staff</i> 3. Description of Data <i>Simulated optical waveforms and/or eye diagrams of O-band EML and 1064nm VCSEL based transceivers</i> 4. Data Source <i>This dataset is a primary output of SPRINTER project.</i> 5. Creation Date <i>TBD</i> 6. Format <i>TXT, TSV, CSV, JPEG</i> 7. Expected size <i><250 MB</i> 8. Location of Data <i>Zenodo (exact link to be provided).</i> 9. Digital Object Identified (DOI) <i>TBD (DOI from Zenodo)</i> 10. Access status <i>Open Data</i> 11. Embargo <i>No embargo period foreseen for this dataset</i> 12. Funding Statement <i>This project has received funding from the European Union's Horizon Europe Framework Programme (HORIZON) under G.A No 101070581. The results of this dataset reflect only the creator's view and the Commission is not responsible for any use that may be made of the information it contains.</i> 13. Work Package <i>WP2</i>



Data set Reference Name	<i>DS 01. Simulation studies of SPRINTER 200Gb/s PSM4 transceivers _ SPRINTER_WP2_VX.0</i>
	<p>14. Related publications Bibliographical details of publications based on the dataset will be listed, with links to abstracts and, where possible, full text.</p> <p>15. Dataset Citation A 'ready-to-use' citation reference for the dataset will be provided – incorporating the core descriptive elements.</p> <p>16. Keywords SPRINTER, Simulation, EML, VCSEL, O-band, 1064nm, optical transceivers</p> <p>17. Version number (TBD)</p>
Data sharing	<p>♦ Repository The research data will be deposited and maintained in Zenodo, the research data repository launched by CERN and OpenAIRE.</p> <p>♦ Date of Repository Submission TBD</p>
Archiving and preservation	<p>For redundancy, besides uploading the data on Zenodo it will be also maintained on a university-owned storage server at ICCS (PCRL group). The server offers real-time data mirroring through RAID (redundant array of independent disks) and weekly backups to external disk drives. The dataset will be preserved for at least 5 years after the project end and the associated costs will be covered by ICCS through own funds.</p>

5.1.2 Data Set 02 - Simulation studies of SPRINTER 10Gb/s tunable transceiver_SPRINTER_WP2_VX.0

Data set Reference Name	<i>DS 02. Simulation studies of SPRINTER 10Gb/s tunable transceiver_SPRINTER_WP2_VX.0</i>
Description	<i>This set comprises the obtained simulation results of optical waveforms and/or eye diagrams of C-band optical transceivers, operating with NRZ modulation format, at 10 Gb/s over</i>
Standards and Metadata	<p>In the absence of a well-defined metadata standard for this type of data, a simple README file will be used. This will be generated in raw text format and will describe basic details that will help people to find the data, including who created or contributed to the data, its title, date of creation and under what conditions it can be accessed. Documentation will also include details on the methodology used as well as file and folder naming conventions. The following fields will be used:</p> <ol style="list-style-type: none"> Dataset Title <i>DS2. Simulation studies of SPRINTER 10Gb/s tunable transceiver</i> Name(s) of dataset creator(s) <i>ICCS staff</i> Description of Data <i>Simulated optical waveforms and/or eye diagrams of C-band 10Gb/s optical transceivers</i> Data Source <i>This dataset is a primary output of SPRINTER project.</i> Creation Date TBD Format <i>TXT, TSV, CSV, JPEG</i>



Data set Reference Name	<i>DS 02. Simulation studies of SPRINTER 10Gb/s tunable transceiver_SPRINTER_WP2_VX.0</i>
	<p>7. Expected size <250 MB</p> <p>8. Location of Data Zenodo (exact link to be provided).</p> <p>9. Digital Object Identified (DOI) TBD (DOI from Zenodo)</p> <p>10. Access status Open Data</p> <p>11. Embargo No embargo period foreseen for this dataset</p> <p>12. Funding Statement This project has received funding from the European Union's Horizon Europe Framework Programme (HORIZON) under G.A No 101070581. The results of this dataset reflect only the creator's view and the Commission is not responsible for any use that may be made of the information it contains.</p> <p>13. Work Package WP2</p> <p>14. Related publications Bibliographical details of publications based on the dataset will be listed, with links to abstracts and, where possible, full text.</p> <p>15. Dataset Citation A 'ready-to-use' citation reference for the dataset will be provided – incorporating the core descriptive elements.</p> <p>16. Keywords SPRINTER, Simulation, C-band, tunable optical transceivers, burst mode receiver</p> <p>17. Version number (TBD)</p>
Data sharing	<p>♦ Repository The research data will be deposited and maintained in Zenodo, the research data repository launched by CERN and OpenAIRE.</p> <p>♦ Date of Repository Submission TBD</p>
Archiving and preservation	<p>For redundancy, besides uploading the data on Zenodo it will be also maintained on a university-owned storage server at ICCS (PCRL group). The server offers real-time data mirroring through RAID (redundant array of independent disks) and weekly backups to external disk drives. The dataset will be preserved for at least 5 years after the project end and the associated costs will be covered by ICCS through own funds.</p>

5.1.3 Data Set 03. Simulation studies of SPRINTER hybrid mmWave/FSO transceivers_SPRINTER_WP2_VX.0

Data set Reference Name	<i>DS 03. Simulation studies of SPRINTER hybrid mmWave/FSO transceivers_SPRINTER_WP2_VX.0</i>
Description	<i>This set comprises the obtained simulated results of the performance evaluation of the hybrid FSO/mmWave transceivers operating back-to-back or after wireless transmission. The results will be in the form of eye diagrams, constellation diagram and bit error ratio curves based on the error vector magnitude estimations.</i>



Data set	<i>DS 03. Simulation studies of SPRINTER hybrid mmWave/FSO transceivers_</i>
Reference Name	<i>SPRINTER_WP2_VX.0</i>
Standards and Metadata	<p>In the absence of a well-defined metadata standard for this type of data, a simple README file will be used. This will be generated in raw text format and will describe basic details that will help people to find the data, including who created or contributed to the data, its title, date of creation and under what conditions it can be accessed. Documentation will also include details on the methodology used as well as file and folder naming conventions. The following fields will be used:</p> <ol style="list-style-type: none"> 1. Dataset Title <i>DS3. Simulation studies of SPRINTER hybrid mmWave/FSO transceivers</i> 2. Name(s) of dataset creator(s) <i>ICCS staff</i> 3. Description of Data <i>This set of data contains simulation results like eye diagrams BER curves and constellation diagram for different operation conditions</i> 4. Data Source <i>This dataset is a primary output of SPRINTER project.</i> 5. Creation Date <i>TBD</i> 6. Format <i>TXT, TSV, CSV, JPEG</i> 7. Expected size <i><250 MB</i> 8. Location of Data <i>Zenodo (exact link to be provided).</i> 9. Digital Object Identified (DOI) <i>TBD (DOI from Zenodo)</i> 10. Access status <i>Open Data</i> 11. Embargo <i>No embargo period foreseen for this dataset</i> 12. Funding Statement <i>This project has received funding from the European Union's Horizon Europe Framework Programme (HORIZON) under G.A No 101070581. The results of this dataset reflect only the creator's view and the Commission is not responsible for any use that may be made of the information it contains.</i> 13. Work Package <i>WP2</i> 14. Related publications <i>Bibliographical details of publications based on the dataset will be listed, with links to abstracts and, where possible, full text.</i> 15. Dataset Citation <i>A 'ready-to-use' citation reference for the dataset will be provided – incorporating the core descriptive elements.</i> 16. Keywords <i>SPRINTER, Simulation, FSO, mmWave</i> 17. Version number <i>(TBD)</i>
Data sharing	<ul style="list-style-type: none"> ◆ Repository The research data will be deposited and maintained in Zenodo, the research data repository launched by CERN and OpenAIRE. ◆ Date of Repository Submission



Data set Reference Name	DS 03. Simulation studies of SPRINTER hybrid mmWave/FSO transceivers_ SPRINTER_WP2_VX.0
Archiving and preservation	TBD For redundancy, besides uploading the data on Zenodo it will be also maintained on a university-owned storage server at ICCS (PCRL group). The server offers real-time data mirroring through RAID (redundant array of independent disks) and weekly backups to external disk drives. The dataset will be preserved for at least 5 years after the project end and the associated costs will be covered by ICCS through own funds.

5.1.4 Data set 04. DSP of SPRINTER mmWave transceivers_ SPRINTER_WP2_VX.0

Data set Reference Name	DS 04. DSP of SPRINTER mmWave transceivers_ SPRINTER_WP2_VX.0
Description	This data set will include the simulated results of the performance evaluation of the DSP of the mmWave transceivers operating in back-to-back (b2b) mode or after wireless transmission. These results will be eye and constellation diagrams, power magnitude spectra, bit error rate values.
Standards and Metadata	<p>In the absence of a well-defined metadata standard for this type of data, a simple README file will be used. This will be generated in raw text format and will describe basic details that will help people to find the data, including who created or contributed to the data, its title, date of creation and under what conditions it can be accessed. Documentation will also include details on the methodology used as well as file and folder naming conventions. The following fields will be used:</p> <ol style="list-style-type: none"> 1. Dataset Title DS4. Simulation studies of SPRINTER mmWave transceivers 2. Name(s) of dataset creator(s) ICOM staff 3. Description of Data This set of data contains simulation results like eye and constellation diagrams, power magnitude spectra for different operation conditions 4. Data Source This dataset is a primary output of SPRINTER project. 5. Creation Date TBD 6. Format TXT, TSV, CSV, JPEG 7. Expected size <250 MB 8. Location of Data Zenodo (exact link to be provided). 9. Digital Object Identified (DOI) TBD (DOI from Zenodo) 10. Access status Open Data 11. Embargo No embargo period foreseen for this dataset 12. Funding Statement This project has received funding from the European Union's Horizon Europe Framework Programme (HORIZON) under G.A No 101070581. The results of this



	<p>dataset reflect only the creator's view and the Commission is not responsible for any use that may be made of the information it contains.</p> <p>13. Work Package WP2</p> <p>14. Related publications Bibliographical details of publications based on the dataset will be listed, with links to abstracts and, where possible, full text.</p> <p>15. Dataset Citation A 'ready-to-use' citation reference for the dataset will be provided – incorporating the core descriptive elements.</p> <p>16. Keywords SPRINTER, DSP, Simulation, mmWave</p> <p>17. Version number (TBD)</p>
Data sharing	<ul style="list-style-type: none"> • Repository The research data will be deposited and maintained in Zenodo, the research data repository launched by CERN and OpenAIRE. • Date of Repository Submission TBD
Archiving and preservation	All the project material will be stored on ICOM's servers and in cloud storage as backup.

Table 3 summarizes the data sets identified as relevant for SPRINTER results validation and evaluation and are foreseen to be "Open access". In the following paragraphs these datasets are, described in detail.

Table 3. List of Open data sets relevant to SPRINTER research activities.

Data set name	WP related	Type
Data set 01: 'DS1. Simulation studies of SPRINTER 200Gb/s PSM4 transceivers '	WP2	Results
Data set 02: 'DS2. Simulation studies of SPRINTER 10Gb/s tunable transceiver'	WP2	Results
Data set 03: 'DS3. Simulation studies of SPRINTER hybrid mmWave/FSO transceivers'	WP2	Results
Data set 04: 'DSP of SPRINTER mmWave transceivers'	WP2	Results

6 SPRINTER RESTRICTED DATASETS

The datasets that are foreseen to be restricted are listed in the table 4 below.

Table 4. Restricted datasets in SPRINTER

Dataset Description	Related WP	Related deliverables	Dataset Owner
Evaluation of beamforming algorithms	WP2	D2.4	1. ICCS
3D mechanical modelling and thermal simulation of Sprinter modules	WP2	D2.3	7. PHIX
Analysis of radiation pattern of emitter/receiver antennas	WP2	D2.3	6. UC3M
Characterization and performance evaluation of VCSELs and PDs for Module-1b	WP3	D3.3	9. MLNX
Simulation of Polymer motherboards for the 200 Gb/s transceivers and the SDM-ROADM switch	WP3	D3.1, D3.2	2. FhG-HHI



Dataset Description	Related WP	Related deliverables	Dataset Owner
Simulation of the 4-fold O-band EML and PD arrays for the 200 Gb/s transceivers	WP3	D3.1	2. FhG-HHI
Layout of Polymer motherboards for the 200 Gb/s transceivers and the SDM-ROADM switch	WP3	D3.1, D3.2	2. FhG-HHI
Layout of the 4-fold O-band EML and PD arrays for the 200 Gb/s transceivers	WP3	D3.1	2. FhG-HHI
Characterization of Polymer motherboards for the 200 Gb/s transceivers and the SDM-ROADM switch	WP3	D3.1, D3.2	2. FhG-HHI
Characterization of the 4-fold O-band EML and PD arrays for the 200 Gb/s transceivers	WP3	D3.1	2. FhG-HHI
Design and fabricate high-performance integrated LNOI-MZM	WP4	D4.3	5. CSEM
Design and fabricate high-power, ultra-fast tunable ECLs and 1x16 OBFN for FSO/mmWave transceivers based on PZT actuators	WP4	D4.1, D4.3, D4.4	3.LXI
Simulation of InP add-ons (gain chips, phase modulators and photodiodes) for the 10 Gb/s and FSO/mmWave transceivers	WP4	D4.1, D4.4	2. FhG-HHI
Simulation of mmWave planar antennas	WP4	D4.2, D4.4	6. UC3M
Simulation of PolyBoards for the 10 Gb/s and FSO/mmWave transceivers	WP4	D4.1, D4.4	2. FhG-HHI
Simulation of InP THz emitter arrays for the FSO/mmWave transmitters	WP4	D4.1, D4.4	2. FhG-HHI
Layout of InP add-ons (gain chips, phase modulators and photodiodes) for the 10 Gb/s and FSO/mmWave transceivers	WP4	D4.1, D4.4	2. FhG-HHI
Layout of PolyBoards for the 10 Gb/s and FSO/mmWave transceivers	WP4	D4.1, D4.4	2. FhG-HHI
Layout of InP THz emitter arrays for the FSO/mmWave transmitters	WP4	D4.1, D4.4	2. FhG-HHI
Characterization of InP add-ons (gain chips, phase modulators and photodiodes) for the 10 Gb/s and FSO/mmWave transceivers	WP4	D4.1, D4.4	2. FhG-HHI
Characterization of PolyBoards for the 10 Gb/s and FSO/mmWave transceivers	WP4	D4.1, D4.4	2. FhG-HHI
Characterization of InP THz emitter arrays for the FSO/mmWave transmitters	WP4	D4.1, D4.4	2. FhG-HHI
Visual inspection of polymer-based antenna arrays	WP4	D4.3	2. FhG-HHI
Assembly and packaging of SPRINTER prototypes	WP5	D5.1, D5.2, D5.3, D5.5, D5.6, D5.7	7. PHIX
Circuit schematics of the electronic integrated circuits	WP5	D5.4	4. IMEC
Simulation studies of the electronic integrated circuit designs	WP5	D5.4	4. IMEC



Dataset Description	Related WP	Related deliverables	Dataset Owner
Layout of the electronic integrated circuits	WP5	D5.4	4. IMEC
Characterization of the electronic integrated circuits	WP5	D5.4	4. IMEC
PCB schematics and layout	WP5	D5.4	4. IMEC
Simulation studies of the PCBs	WP5	D5.4	4. IMEC
TSN system time synchronization network bootstrapping	WP6	D6.1	10. CMC
Wired network resource control and traffic management	WP6	D6.2	10. CMC
Wireless network resource control and traffic management	WP6	D6.3	10. CMC
SPRINTER prototypes evaluation in lab-settings	WP7	D7.2, D7.3, D7.4	1. ICCS
Characterization and performance evaluation of SPRINTER prototypes (Module-2 and Module-4)	WP7	D7.2, D7.3, D7.4	1. ICCS
Characterization and performance evaluation of SPRINTER prototypes (Module-1.a, 1.b and Module-3)	WP7	D7.5	11. TEI
Application scenarios: capture from motion and visual inspection	WP7	D7.6	12. FILL
Module-4 evaluation in lab-settings and in a relevant industrial environment	WP7	D7.4-D7.6	8. ICOM



7 ALLOCATION OF RESOURCES

There are no immediate costs anticipated to make the datasets produced FAIR. The open datasets will be deposited in the Zenodo repository and will be preserved for at least 5 years after the conclusion of the project and in-line with the Deposit Data Policy of the European Commission. Any unforeseen costs related to open access to research data in Horizon Europe are eligible for reimbursement during the duration of the project under the conditions defined in the G.A. Article 6 and Article 6.2.C.3.

ICCS (Project Coordinator) is responsible for the original definition of DMP. Its implementation, monitoring and update (D8.5 and D8.9) are under the responsibility of FILL (Leader of WP 8). All the consortium partners shall support the Data Management protocol by providing the types of generated data that have been described in the methodology of the DMP report.

Each SPRINTER partner should respect the policies set out in this DMP. Datasets must be created, managed and stored appropriately and in line with European Commission and local legislation. Dataset validation and registration of metadata and backing-up data for sharing through repositories is the responsibility of the partner that generates the data in the respective Work Package.

8 DATA SECURITY

The data storage facilities of the members of SPRINTER project are summarized in the table below.

Table 5. Description of data storage facilities of SPRINTER beneficiaries

Beneficiary Short Name	Description of Data Storage Facility
1. ICCS	University-owned server at ICCS (PCRL). The server offers real-time data mirroring through RAID (redundant array of independent disks) and weekly backups to external disk drives. The Data will be preserved for at least 5 years after the project end and the associated costs will be covered by ICCS through own funds. Data will be also stored at the ICCS's SharePoint Documents Repository devoted to SPRINTER by the project end.
2. FhG-HHI	Internal servers at FhG-HHI premises.
3. LioniX	The data storage is on a LioniX-owned server which has daily off-site backups. All original project data will be archived for at least 5 years after the project end. Data which is non-confidential and relevant for the partners will also be stored on the project SharePoint.
4. IMEC	The data will be stored on servers of the IDLab research group. These servers are located in a small data center which is only accessible by the system administrators. Automatic daily back-up procedures are in place and version control software (ClioSoft SOS) is used during the chip developments in Cadence to manage the progress and changes of the circuit schematics, simulations and layouts from multiple researchers. After the project end, the data will be preserved for at least 5 years and the associated costs are carried by the IMEC IDLab research group.



Beneficiary Short Name	Description of Data Storage Facility
5. CSEM	<p>All original data will be stored on CSEM OneDrive server which is linked to the SharePoint cloud and accessible through the Microsoft Teams platform, which is protected by two factor identities.</p> <p>Processed copies of the data will also be kept on CSEM servers and network drives.</p> <p>Furthermore, CSEM can provide the VPN access to a secure channel outside the organization, the SPRINTER consortium. Project data will be archived for 10 years, and this time can be extended based on request.</p>
6. UC3M	<p>All the project material will be stored on local hard drives and in UC3M high-capacity DELL EMC VNX2 5400 unified storage systems, managed by personnel from the SDIC Systems Infrastructure area. These storage systems are located on the Getafe and Leganés campuses and are interconnected with a 10Gbps link allowing data replication, mirroring, remote backup, disaster recovery.</p>
7. PHIX	<p>All original data will be stored on local hard drives (with regular backups) and archived on a local network such that these are available and accessible for all employees involved in the project. Processed copies of these data will be maintained on the PHIX servers and network drives. All data will be managed under the FAIR (Findable, Accessible, Interoperable and Reusable) principles during the project for the researchers in the team. Raw and processed files will be stored on local hard drives (with regular backups) and archived on a local network for at least 10 years and will be accessible to the SPRINTER consortium. For the information that is used in publications, PHIX will upload the non-confidential original data onto the SharePoint (and MS TEAMS Workspace) or provide download links to other researchers upon request. Digital archives with sufficient storage capacity with adequate data transfer bandwidth will be made available during the length of the project and thereafter.</p>
8. INTRACOM	<p>All the project material will be stored on ICOM's servers and in cloud storage as backup.</p>
9. MLNX	<p>The data will be maintained on a local server at MLNX HQ in Yokneam, Israel, as well as on a cloud storage server leased by MLNX. Both solutions offer daily backups and version control. The datasets will be preserved for at least 5 years after the project end and the associated costs will be covered by MLNX through own funds.</p>
10. CMC	<p>All the project material will be stored on local hard drives and in cloud storage as backup. Datasets or information that are part of project will not be stored.</p>
11. TEI	<p>All original data will be stored on local hard drives (with regular backups) and archived on a local network (Sharepoint and MS Teams) such that these are available and accessible to all TEI employees involved in the project. Data will be kept available for at least 5 years after the end of the project.</p>
12. FILL	<p>Data will be stored on local hard drives and internal servers at FILL premises with regular backups. The Data will be available and preserved for at least 5 years after project end and provided to consortium members upon request. Non-confidential data will be uploaded onto the SharePoint (MS TEAMS and PROOM) with download links. Selected data might be accessible to third party research partners. Associated cost will be covered by FILL.</p>

9 ETHICAL ASPECTS

SPRINTER partners are to comply with the ethical principles as set out in the G.A. Article 14 which states that all activities must be carried out in compliance with:



- a) Ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity (European Science Foundation, 2011) — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct) and
- b) Applicable international, EU and national law including the EU Charter of Fundamental Rights and the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Supplementary Protocols.

The SPRINTER consortium will conduct this action adhering to the fundamental principle of research integrity —as set out in the European Code of Conduct for Research Integrity⁴.

This implies compliance with the following principles:

- **reliability** in ensuring the quality of research reflected in the design, the methodology, the analysis and the use of resources
- **honesty** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair and unbiased way
- **respect** for colleagues, research participants, society, ecosystems, cultural heritage and the environment
- **accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts and means that beneficiaries must ensure that persons carrying out research tasks follow the good research practices including ensuring, where possible, openness, reproducibility and traceability and refrain from the research integrity violations described in the Code.

SPRINTER project does not involve the use of human participants or personal data in the research and therefore there is no requirement for ethical review.

9.1 Confidentiality

SPRINTER beneficiaries must and will retain any data, documents, or other material as confidential during the implementation for the project. Further details on confidentiality can be found in the G.A. Article 13 along with the obligation to protect results in Article 16.

10 OTHER ISSUES

No other national/funder/sectorial/departmental procedures for data management are being used by the SPRINTER partners.

11 CONCLUSIONS

This document has provided the first version of the Data Management Plan defined by SPRINTER consortium in the first six months of the project. The DMP has identified several data sets which will be generated within the project and, for each of them, has defined the strategy for the documentation, open access sharing and maintenance of the associated data, according to the guidelines provided by the EC in the Horizon Europe programme.

This document will be updated during the project lifecycle, in order to reflect any possible changes and additions in the data sets, as well as any refinement in the strategy to maximize the sharing and re-use of the project outcomes. These possible changes should be also reflected in the periodic

⁴ <https://allea.org/code-of-conduct/>



reports of SPRINTER project. In particular, at least two further versions of the DMP will be released: one in M20 and the final version at the end of the project in M42.



Appendix I - Example Metadata File Template

This metadata file was generated on <insert date> by <insert name>

GENERAL INFORMATION

1. **Title of Dataset:**
2. **Dataset Identifier in Repository:**
3. **Responsible Partner:**
4. **Author Information:**
 Investigator Contact Information Name:
 Email:

 Supervisor Contact Information Name:
 Email:

 Co-Supervisor Contact Information Name:
 Email:
5. **Date of data collection:**
6. **Geographic location of data collection (where was data collected?):**

7. **Title of project and Funding sources that supported the collection of the data:**

SHARING/ACCESS INFORMATION

1. **Licenses/access restrictions placed on the data:**

2. **Link to data Repository:**

3. **Links to other publicly accessible locations of the data:**

4. **Links to publications that cite or use the data:**

5. **Was data derived from another source? If yes, list source(s):**

DATASET & FILE OVERVIEW

1. **This dataset contains X sub-dataset as listed below:**
 A. Datasheet name:
 B. Datasheet name:
 C. Datasheet name:
 D. Datasheet name:
2. **What is the status of the documented data? – “complete”, “in progress”, or “planned”**
3. **Plans to update the data**

METHODOLOGICAL INFORMATION

1. **Description of methods used for experimental design and data collection:** <Include links or references to publications or other documentation containing experimental design or protocols used in data collection>.....
2. **Methods for processing the data:** <describe how the submitted data were generated from the raw or collected data>.....



- 3. **Instruments and software used in data collection and processing-specific information needed to interpret the data:**
.....
- 4. **Standards and calibration information, if appropriate:**
.....
- 5. **Environmental/experimental conditions:**
.....
- 6. **Describe any quality-assurance procedures performed on the data:**



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