

D7.2: Dissemination, Communication Report and Exploitation strategy

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Abstract	This document describes the 5G-STARDUST communication and impact creation activities carried out during the first half of the project, and the Exploitation strategy devised. Thanks to a close monitoring of KPIs and achievements, this document provides an overview of the activities implemented based on the strategy and plans outlined in D7.1 and the plan for the second half of the project.
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v0.4	28/06/2024	Final version	Galileo Disperati (MAR)

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* R: Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

DATA: Data sets, microdata, etc.

DMP: Data management plan

ETHICS: Deliverables related to ethics issues.

SECURITY: Deliverables related to security issues

OTHER: Software, technical diagram, algorithms, models, etc.

EXECUTIVE SUMMARY

5G-STAR DUST's Work Package 7 (WP7), is the main vehicle for dissemination, communication, exploitation, and impact creation within the project. As such, it defines all the required actions to ensure that the project's work, solutions, and results are disseminated, demonstrated, and communicated among the appropriate stakeholders at the right venues to timely impact, improve, and drive innovation management activities. It also orchestrates the project's liaisons and standardisation activities (which are detailed in a separate document - D7.3, the "Standardisation Interim Report") and outlines 5G-STAR DUST's exploitation and sustainability plan. This deliverable describes, in particular, how the project has followed, in the first half of its run, a comprehensive and effective approach to dissemination, communication, community building activities, and towards the development of an exploitation strategy, following up on what envisioned and defined in D7.1 (Dissemination and Communication Plan).

During the first half of the project, the consortium has harvested fruitful results from a wide range of dissemination promotion and engagement activities. The different communication channels and dissemination tools identified at the beginning of the project were used in order to promote the main news, activities and results of 5G-STAR DUST. The key results are listed as follows:

- 5G-STAR DUST has participated in 13 relevant external events and presented itself to relevant stakeholders.
- 5G-STAR DUST set-up the dissemination and communication framework, including brand guidelines, website and social media launch and multimedia promotional tools, such as videos, flyers and posters.
- 7 scientific publications have been published or submitted, presenting 5G-STAR DUST's progress.
- In total, 5G-STAR DUST has widely promoted its results and activities to more than 100.000 stakeholders; including subscribers to social media channels, website visitors and through exposure on other relevant initiatives and projects, such as the European Smart Networks and Services Joint Undertaking (SNS JU).
- 5G-STAR DUST was featured in 3 news articles on specialised press publications.
- Over 2,800 unique visitors browsed through the 5G-STAR DUST website.
- 5G-STAR DUST and its individual partners organised and co-organised a total of 4 events, often in close collaboration with related EU-funded projects within the overall SNS JU context.

For the second half of the project, the strategic perspective of the 5G-STAR DUST impact creation effort will continue to serve the overall success of the project and maximize the dissemination and communication effect within the communities of target stakeholders. Such effort includes:

- Continuation of the active promotion of project activities through different channels (such as project website, social media, newsletter, mailing lists of relevant other initiatives and projects).

- Participation to conferences and events.
- Organisation of ad hoc workshops and webinars.
- Publication of scientific articles and presentations in international peer-reviewed journals and conferences.
- Further development of the devised exploitation strategy.

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ABBREVIATIONS

SNS JU	European Smart Networks and Services Joint Undertaking
TN	Terrestrial Networks
NTN	Non-Terrestrial Networks
GDPR	General Data Protection Regulation
URLLC	Ultra-Reliable Low Latency Communications
TSN	Time-Sensitive Networking
AI/ML	Artificial Intelligence/Machine Learning
IoT	Internet of Things

1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

D7.2 serves on one hand the purpose of a dissemination, communication report for activities for the first half of the project, thus provides in detail the dissemination and communication activities performed during the first half of the project (January 2023 to June 2024). On the other hand, it presents the exploitation strategy devised within the same reporting period.

The document also presents a series of actions planned for the second half of 5G-STARDUST's run (July 2024 to December 2025). The grounding of such activities was clearly defined and guided by both the Description of Action (DoA) and the aforementioned deliverable D7.1.

1.2 DOCUMENT COMPOSITION

The sections of the D7.2 are arranged as follows, following the introductory **Section 1**:

- **Section 2** recaps objectives and stakeholders, then depicting outreach and impact creation activities and tools used during the first half of the project (M1-M18);
- **Section 3** describes the plans for future activities and events (M19-M36);
- **Section 4** focuses on the liaisons and cluster activities with other initiatives, with emphasis on SNS JU;
- **Section 5** focuses on the assessment of the activities' results;
- **Section 6** breaks down the project's exploitation plan;
- **Section 7** draws conclusions on the overall conducted and planned activities – and the connected results.

2 COMMUNICATION AND DISSEMINATION ACTIVITIES M1-M18

2.1 OBJECTIVES AND STAKEHOLDERS

5G-STARLUST's mission is to design, develop and demonstrate a deeper integration of Terrestrial Networks (TN) and Non-Terrestrial Networks (NTN) in order to deliver a fully integrated 5G-NTN autonomous system with novel self-adapting end-to-end connectivity models for enabling ubiquitous radio access. This would address – as key points to be mentioned - the needs and demand for cost-effective connectivity in un(der)served areas; adaptation to diverse verticals' requirements and to time-varying network operations (e.g., data traffic loads and topology changes); cost-effective and scalable integration of satellite with terrestrial infrastructures to efficiently manage the deployment and operation of massive capacity networks.

Outreach and impact creation activities are central to follow these overall 5G-STARLUST goals. They are being closely monitored and coordinated to ensure a broad visibility and an effective engagement of all targeted stakeholders in the networking domain. These actions are coordinated by Martel with active contributions from all consortium partners, following the objectives below:

- Ensure 5G-STARLUST's broad visibility by spreading knowledge about the project and its results, as well as establishing a distinctive and recognizable identity that will support exploitation and sustainability efforts.
- Reach, stimulate and engage a critical mass of relevant stakeholders to ensure that the results of the project are effectively showcased, leading to validation, improvement and possibly further adoption of the developed technologies and concepts, especially towards target vertical sectors.
- Facilitate exploitation of the project's outcomes and promote the development of innovative solutions based on the 5G-STARLUST methodology and concepts.
- Continuing to ensure close coordination with fellow SNS JU projects – and other relevant initiatives in the networking/telecommunications industry.

2.2 ONLINE DISSEMINATION

2.2.1 Website

Launched at the beginning of the project (M2), the 5G-STARLUST website (www.5g-starlust.eu) has been developed to act as an information hub presenting the project's goals, activities, and achievements. To this purpose, content has been constantly updated and featured as follows:

- General information about the project, its vision and objectives
- Introduction of the consortium
- News items, press releases, press clipping and newsletter sub-sections
- List of relevant events

- A repository of resources, such as publications, presentations/talks, promotional materials, videos, and public deliverables
- Contact information and links to social media accounts
- An acknowledgment to SNS JU and a page dedicated to the initiative, offering a brief overview and links to fellow projects at work under the SNS umbrella

The website is being periodically updated according to the progress of the project – counting **13 news articles published** so far, offering insight on the consortium, its activity and the ecosystem they operate within. Until today (end of June 2024), the website counts around 2,800 unique visitors, who generated around **7,440 page views** on an **average visit duration of 03'17"**. Drilling down into specific pages, the most popular pages - alongside the homepage – are a cluster of pages dedicated to events (for a total of over 550 views) and the “About the project” page, counting a total of 489 views.

The figures below provide the aforementioned plus some additional details: Figure 1 (Traffic overview and visit duration), Figure 2 (Top visited pages) and Figure 3 (Visits per country).

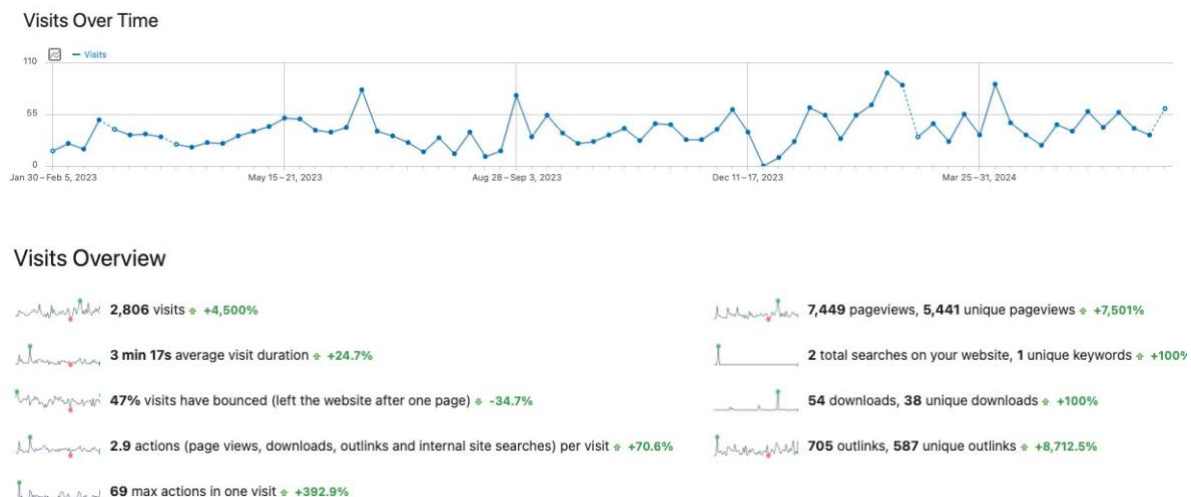


Figure 1: 5G-STARDUST website – Traffic overview and visit duration

PAGE URL	PAGEVIEWS	UNIQUE PAGEVIEWS	BOUNCE RATE	AVG. TIME ON PAGE
/index	2,920	1,971	44%	00:01:08
event	555	415	45%	00:01:43
2023	526	387	53%	00:01:30
about-the-project	489	352	46%	00:01:20
deliverables	378	310	79%	00:01:16
consortium	320	259	34%	00:01:16
presentations	299	246	74%	00:01:39
news-articles	352	244	31%	00:00:33
scientific-publications	211	189	56%	00:00:36
2024	219	148	50%	00:00:46

Figure 2: 5G-STARDUST website – Top visited pages

	Switzerland	597
	France	320
	Spain	270
	Italy	242
	Germany	241

Figure 3: 5G-STAR DUST website – Visits per country

All information and e-mails collected are protected under the General Data Protection Regulation (GDPR). Contact is and will continue to only be made with people who have submitted inquiries. Similarly, the newsletters are and will continue to be sent out only to individuals who have explicitly requested to receive them. Any person who has subscribed can request for their e-mail address to be removed from the list. The website provides information on the data kept and how they are used in alignment with the GDPR under the Privacy Policy link (footer of the webpage).

Any additional information on the project website can be found in Section 3.2 of D7.1.

2.2.2 Social Media channels

5G-STAR DUST established its presence on social media channels to regularly promote the project activities and output while encouraging a wider promotion of the networking solutions at the core of its work. The project has built a fair follower/visitor base on several social media channels, namely Twitter/X, LinkedIn, and YouTube, which are all linked to the project's website.

Twitter/X

5G-STAR DUST uses Twitter/X as a social network to cover real-time news/announcements, cross-share relevant and interesting initiatives, and to establish meaningful connections with targeted groups of stakeholders, including policy makers, industry, and the general public. So far, the project's account (https://x.com/5G_Stardust) has reached **133 followers** (including project partners, similar projects, interested stakeholders, etc.). In total, around 120 tweets have been posted. The project also follows 53 accounts: mostly projects and initiatives in similar fields or of similar nature in which partners have been involved or have been connected to.



Figure 4: 5G-STAR DUST Twitter page

LinkedIn

LinkedIn allows the project to network with individuals and organizations within the networking/Satcom/telecommunication industries/ecosystems and beyond, share crucial information about project activities, and stay up to date on the latest developments in the field. The [LinkedIn page](#) has gathered **434 followers** so far. Similarly to Twitter/X, the LinkedIn account is mostly used to share the latest progress of the project, echoing key promotional messages from the project website and sharing relevant news from the project's partners, pertinent projects and the European Commission – but also via re-posting into relevant groups.

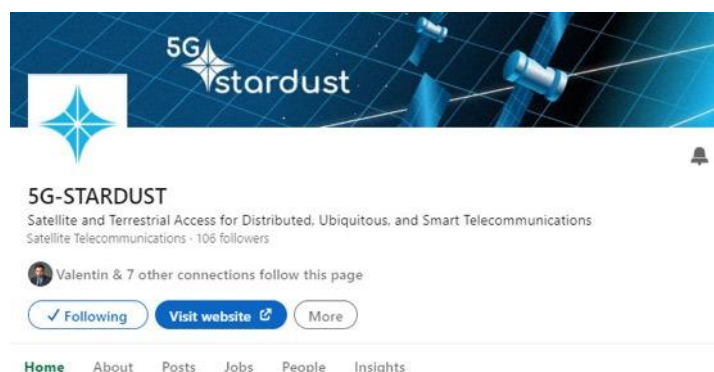


Figure 5: 5G-STAR DUST LinkedIn page

YouTube

5G-STAR DUST has also created an [account on YouTube](#), one of the leading video-sharing platforms. This channel has been opened at the early project stages to disseminate the first project video. The consortium plans on creating at least 3 more videos for the project – according to the previously established plans – continuing to use the channel as its main distribution platform - echoing content on Twitter/X, LinkedIn, and in-person events. At the time of writing, the channel generated **157 views**.

More details on the video content created for the project will be found in the following Section 2.3.

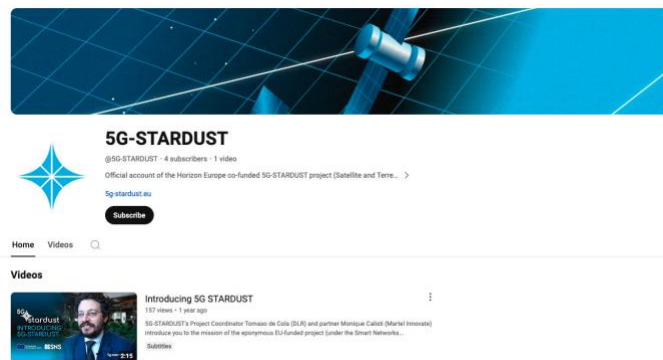


Figure 6: 5G-STARДУST YouTube channel

2.3 PROMOTIONAL MATERIALS

As anticipated in D7.1, WP7 also planned and created a wide range of promotional online and offline items in support of 5G-STARДУST’s communication and dissemination. These materials serve to document and communicate the progress, findings, and outcomes of the project and contribute to the dissemination of knowledge, providing valuable insights to stakeholders and handy overviews for the wider community. Here below, a breakdown of all such items generated in the first half of the project.

Print

As a follow-up to [the first project poster](#) - created in January 2023, in preparation for the participation to ETSI Conference 2023 (as detailed in D7.1) – WP7 worked in close collaboration with coordinating partner DLR to create an update, which was finalised in March 2024 for a showcase at the April 2024 ETSI Conference on “Non-Terrestrial Networks, a Native Component of 6G”. The second project poster expands the content of its predecessor by offering further details on the lab demonstration, targeted use cases, and defined architecture.

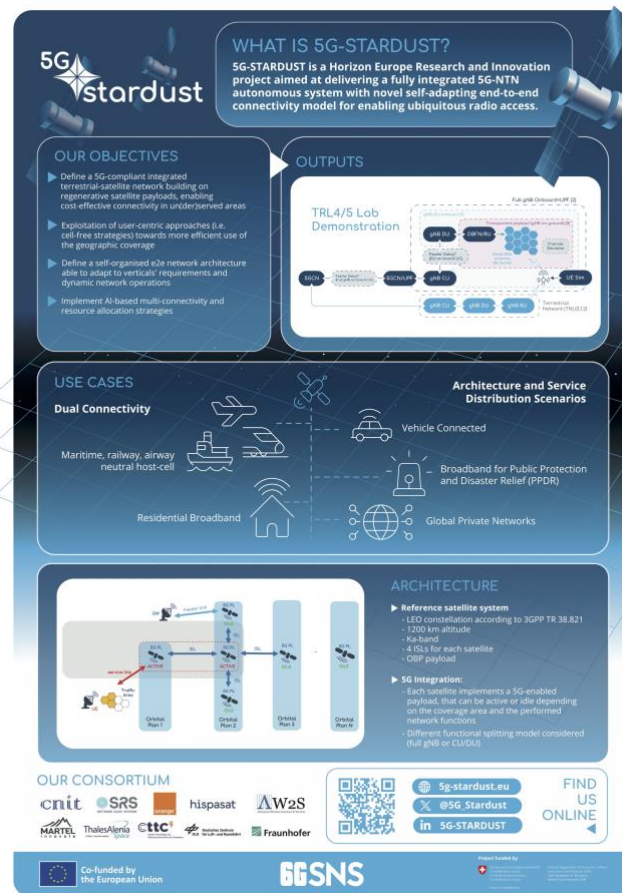


Figure 7: 5G-STARDUST's second project poster

A third update to the **project flyer** has also been created – the previous version dating back to February 2023, revised in May 2023 to fit the 6G SNS acknowledgement guidelines more closely (as reported in D7.1). The flyer update was motivated by a change in the QR-code present on its back cover (due to a change of tools/provider, on Martel's part) and the branding change that affected Twitter/X within the reporting period; this latest version was finalised in time for distribution at MWC 2024 (M14).



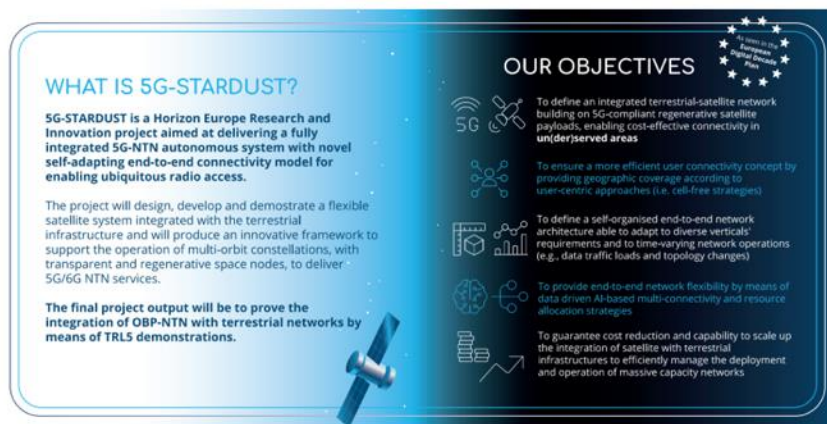


Figure 8: Updated 5G-STARDUST Project Flyer

Video

As briefly touched upon in D7.1 (prior to its release), the **first project video** (entitled “Introducing 5G-STARDUST”) was shot, edited and published on project website, YouTube and social media channels in February 2023. The footage contained in the piece was captured at ETSI Conference 2023 and features Project Coordinator Tomaso de Cola (DLR), talking about 5G-STARDUST’s standardization ambitions and activities. In the second half of the video, a shorter statement of project partner Monique Calisti (Martel) is also featured, bringing the perspective of consortium participants and underlining the importance of the envisioned activities for the field of telecommunications at large, through the synergy with the other projects of the SNS JU initiative. At the time of writing, the video counts over **150 views**.



Figure 9: Screenshot from the video “Introducing 5G-STARDUST”

2.4 NEWSLETTER, PRESS RELEASES AND PRESS COVERAGE

Newsletter

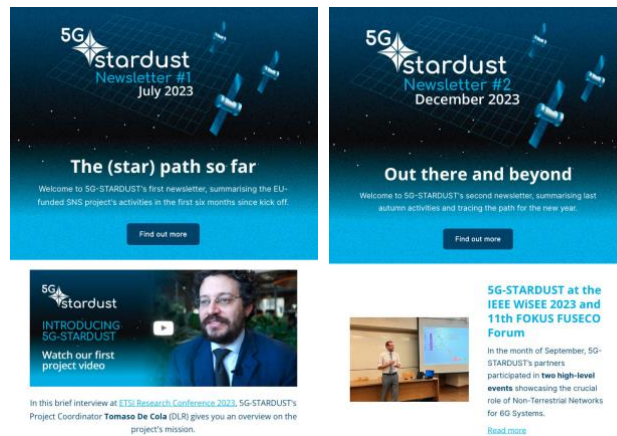


Figure 10: Screenshots of the 5G-STARLUST newsletters

2 Newsletters have been edited and distributed to stakeholders through 5G-STARLUST's MailerLite account, as well as made available on the project website. So far, **27 stakeholders have subscribed** to receive 5G-STARLUST's bi-yearly newsletters. In terms of content and further analysis on the efficiency of the communication:

- The 1st newsletter (July 2023) was sent to 20 subscribers (95% opens / 15% clicks); the issue introduced the project's vision, objectives and consortium members, covered highlights from the first six months of the project's activities (in particular those connected to events) and promotion of future events. It also included the video created by SNS JU to present the fellow projects in its Phase 1 roster and a link to the initiative's 2023 Journal, which included a feature on 5G-STARLUST.
- The 2nd newsletter (December 2023) was sent to 27 subscribers (60% opens / 18% clicks); the second issue wrapped up the year with a recap of the continuous participation to high-level ecosystem events, promoted the internal workshop on the project's system architecture and the first project video, finally closing with winter holiday season wishes and a list of events for 2024.

A **3rd newsletter** is being prepared at the time of writing and will be issued at the end of July 2024. It will feature a recap of the latest events (organised and participated in, including our beginning-of-summer run at EuCNC and PSCE Conference), highlight the recent feature on the 2024 SNS journal, and give a shout-out to fellow SNS projects' initiatives (such as ecosystem events and the 6G4Society Citizen Survey); it will also include information on coming events.

Press releases & Press clipping

To date, 1 press release was issued in conjunction with the project kick-off meeting - published on the official 5G-STARLUST website and effectively disseminated to specific media outlets through the [Prowly](#) tool - as detailed in D7.1. Task 7.1 intends to increase releases in the second half of the project, to boost the envisioned announcements for events organised and participated to. All press releases will continue to be made available on the [dedicated section of the project's website](#).

The table here below lists instead all 5G-STARDUST features on publications, which have also been made available in the [“Press clipping”](#) section of the project’s website (selected pages of such publications are also present in Annex A of this document).

Table 1: Press coverage in the first half of the project

Publication	URL	Lead partner involved
SNS Journal 2023	https://smart-networks.europa.eu/the-sns-journal-2023-has-been-released/	MAR, DLR
Innovation News Network	https://www.innovationnewsnetwork.com/5g-stardust-unleashing-5g-networking-potentials-from-the-sky/39799/	DLR
SNS Journal 2024	https://smart-networks.europa.eu/sns-journal-2024/	MAR, DLR

2.5 SCIENTIFIC PUBLICATIONS

5G-STARDUST’s partners have been active in submitting scientific papers to conference publications and scientific journals: within the first half of the project, **7 papers** have been produced. The papers are listed on the project’s website – and available for download in PDF format, when allowed - in a [dedicated section](#).

Table 2: Scientific publications M1-M18

Title	Authors	Venue
5G-STARDUST: The Potentials of 5G-Advanced from the Sky	Tomaso de Cola	EuCNC 2023
Network Sliced Distributed Learning-as-a-Service for Internet of Vehicles Applications in 6G Non-Terrestrial Network Scenarios	David Naseh, Swapnil Sadashiv Shinde, Daniele Tarchi	Journal of Sensor and Actuator Networks
Measuring Service Continuity in Integrated TN/NTN for 5G-Advanced and 6G	Fanny Parzysz, Alessandro Guidotti, Alessandro Vanelli-Coralli	EuCNC 2024

An SDN-Based Solution for Mega-Constellation Routing	Marius Corici, Hauke Buhr, Hemant.Zope, Manar Zaboub	PIMRC 2024
Kolmogorov-Arnold Networks (KANs) for Time Series Analysis	Cristian J. Vaca-Rubio, Luis Blanco, Roberto Pereira, and Mărius Caus	2024 IEEE International Workshop on Machine Learning for Signal Processing
Random Access Schemes for Beam Hopping Satellite Systems	Marius Caus, Xavier Artiga, Musbah Shaat, Alessandro Guidotti	European Wireless 2024
Coherent vs. Non-Coherent Joint Transmission in Cell-Free User-Centric Non-Terrestrial Wireless Networks	Carmen D'Andrea, Tommaso Foggi, Amina Piemontese, Alessandro Ugolini, Stefano Buzzi, Giulio Colavolpe	The 25th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC 2024) – <u>Submitted, awaiting confirmation</u>

2.6 EVENTS

2.6.1 Events organised

Workshops at IEEE WiSEE Conference 2023

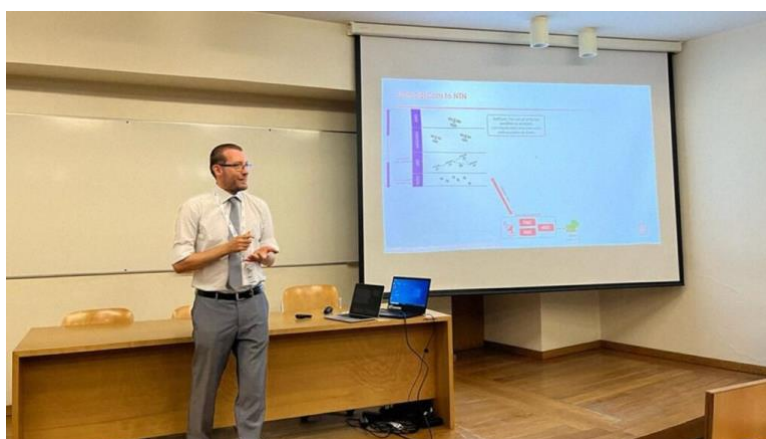


Figure 11: Alessandro Guidotti (CNIT) onstage during one of the IEEE WiSEE Conference workshops

In swift fulfilment of the plan outlined in D7.1, 5G-STARLUST's partners **organised 2 workshops** at the [IEEE WiSEE Conference 2023](#) (held in Aveiro, Portugal) as early as September 8, 2023.

- Project Coordinator Tomaso de Cola (DLR), together with partners Alessandro Guidotti (University of Bologna, CNIT) and Mohammed El Jaafari (Thales Alenia Space France), co-chaired the **“Non-Terrestrial Networks for 6G Systems (NTN6G)” workshop** alongside representatives of other SatCom ecosystem projects and initiatives such as EAGER and 6G-NTN; as part of the workshop's programme,

Guidotti also gave a keynote speech on “The evolution of NTN from 5G to 5G-Advanced and the path to 6G”. The in-workshop session dubbed “The Road to Unified 6G Networks”, saw instead the participation of DLR’s Benjamin Barth, with a presentation entitled “A step towards 6G-NTN”. As another feature of the workshop, Guidotti’s colleagues from University of Bologna Carla Amatetti and Riccardo Campana also presented a tutorial entitled “NB-IoT over NTN: Technology Overview, Challenges, and Potential Solutions”.

- The second workshop co-organised by our partners was entitled “**Glue Technologies for Extreme Application Scenarios (GText)**” and once again featured a tutorial from University of Bologna (Bruno De Filippo and Riccardo Campana), on “AI for Non-Terrestrial Networks”.

It must be noted that the event represented a key showcase for the project, as it brought together investigators from the National Aeronautics and Space Administration (NASA), the Canadian Space Agency (CSA) and the European Space Agency (ESA) as well as other space agencies and aerospace and space defense industries and researchers.

The slide decks for all aforementioned presentations were made available for browsing and download in the [dedicated section](#) of the project website.

The event was widely promoted on social media – including posting in specific relevant LinkedIn groups – and promotion was consequently echoed through the SNS JU network (not only social media but via an invite distributed through the initiative mailing list).

11th FUSECO Forum



Figure 12: A snapshot of the 11th FUSECO Forum

Project partner Fraunhofer FOKUS organised the 11th FUSECO Forum (14-15/09/2023) in its premises, in Berlin, Germany. The highly industry-oriented event mirrored the state of affairs for 5G, lessons learned from the initial 5G operator rollouts, and the standardization refocusing on non-public/campus networks. Driving the new momentum in the standardization brought by Open RAN, URLLC, TSN, NTN, AI/ML, and insights gained from campus network deployments with a critical assessment of further 6G technologies, the FUSECO Forum included a new technologies tutorial bringing the 5G NTN and the lessons learned from the first 5G-STAR DUST use cases, architecture and requirements in the front of a large industry audience.

srsRAN project workshop

In October 2023, partner SRS organised the first srsRAN project workshop at the VT Executive Briefing Center in Arlington, VA (US). This two-day event featured keynote presentations, panel sessions, demonstrations and a hands-on workshop. All funded projects involving SRS, including 5G-STAR DUST were presented over the course of the event. The event was attended by over 200 partners and users across academia, industry and governmental entities.

2.6.2 Events attended

5G-STAR DUST's partners have attended or participated to **13 external events** so far, giving keynote presentations and promoting the projects goals and achievements. The table here below summarizes the events attended. These participations have been reported in the [news section](#) and the [events calendar](#) of the project's website and have been promoted through the social media channels and newsletters.

Table 3: Events attended M1-M18

Event	Date, location	Type of audience	Approx. audience size	Activities	Partners involved
ETSI Research Conference	6-8 February 2023, France	Researchers, industry	170	Presentation from Project Coordinator	DLR, Thales Alenia Space
SNS Lunchtime webinar	20 February 2023, Online	Researchers, industry, policy makers, EC representatives, EU-funded projects	>70	Presentation from Project Coordinator	DLR
MWC 2023	27 Feb-2 Mar 2023, Spain	Industry, researchers, journalists	100,000	Networking, promotional material	DLR, CTTC, Hispasat, Fraunhofer, Orange
SatNex School	18-20 April 2023, Italy	Ph.D. students	20-25	Presentation from Project Coordinator	DLR
EuCNC and 6G Summit 2023	6-9 June 2023, Sweden	Policy makers, researchers, industry, EC representatives, EU-funded projects	50	Presentation at NTN Workshop	Thales Alenia Space

2023 Glue Technologies for Space Systems Technical Panel Ph.D. Summer School: Frontier Technologies for Future “Space 2.0” Communications	August 30, 2023, online	Ph.D. students	30	Lecture, presentation	CNIT
IEEE WiSEE	6-8 September 2023, Portugal	International space agencies, aerospace and space defense industries, researchers	100	NTN Workshop and “Glue Technologies for Extreme Application Scenarios (GTEExt)” co-chair, keynote	DLR, CNIT, Thales Alenia Space
FOKUS FUSECO Forum	14-15 September, 2023 Germany	Industry	>100	Presentations, Panel participation	Fraunhofer, CNIT, DLR
MWC 2024	26-29 February 2024, Spain	Industry, researchers, journalists	100,000	Individual partners booths, flyers distribution	CTTC, Hispasat, Thales Alenia Space, Orange, SRS AW2S
ETSI Conference on “Non-Terrestrial Networks, a Native Component of 6G”	3-4 April 2024, France	Researchers, industry	>200	Project presentations, poster presentation	DLR, CNIT, Thales Alenia Space
What’s stopping a ‘network of networks’ working in practice? – A 6GWorld webinar	30 April 2024, Online	Researchers, industry	>70	Panel participation, project discussed	Orange
EuCNC and 6GSummit 2024	3-6 June 2024, Belgium	Policy makers, researchers, industry, EC representatives, EU-funded	>70	Workshop, Special session panel, presentations	DLR, CNIT

		projects			
PSCE Conference 2024	4-5 June 2024, Austria	Policy makers, researchers, industry	80	Poster presentation, presentation	Thales Alenia Space, CTTC

3 COMMUNICATION AND DISSEMINATION PLAN M19-M36

5G-STAR DUST's dissemination and communication plan will continue to be coordinated by Martel, as WP7, T7.1 and T7.2 leader, with the contribution and support of all partners. Activities will be run both at consortium level and at partners' level, based on each organisation expertise, existing network and relevant exploitation plan. At the core of the work to be conducted are, of course, organisation of and participation to events, and publications' submissions.

3.1 PLANNED WORKSHOPS AND EVENTS

At the time of writing, WP7 is organising a potential booth at FOKUS FUSECO Forum, which will be held in Berlin, Germany in November 2024. The envisioned showcase would be project-branded, but the plan would be for it to also carry promotional material from the fellow SNS projects 6G-NTN and ETHER - given that WP7 leader Martel is also running dissemination and communication in those projects, granting easy access to such material for the representatives at work on 5G-STAR DUST. Follow-up participation to the 2025 editions of MWC, ETSI Conference and EuCNC will naturally be in the project's sights (the latter in particular, in terms of workshop proposals' submissions) with detailed plans to be formulated in the early months of 5G-STAR DUST's second half.

3.2 TARGETED EXTERNAL EVENTS AND PUBLICATIONS

The table below presents a list of events for which participation in the second half of the project has been planned, already secured, or that will be in 5G-STAR DUST's radar for communication and dissemination activities:

Table 4: Events targeted M19-M36

Event	Date	Location
IEEE MEDITCOM	8–11 July 2024	Spain
European Microwave Week 2024	22-27 September 2024	France
IEEE VTC Fall 2024	7-10 October 2024	US + remote
ISSST 2024	14-16 October 2024	UK
FOKUS FUSECO Forum	7-8 November 2024	Germany
12th Advanced Satellite Multimedia Systems Conference + 18th Signal Processing for Space Communications Workshop	26-28 February 2025	Spain
Mobile World Congress 2025	3-6 March, 2025	Spain

EuCNC and 6GSummit 2025	3-6 June 2025	Poland
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The table below presents instead the list of publications (Journals and Conferences) planned or targeted for the second half of the project:

Table 5: Targeted scientific publications M19-M36

Publication	Submission to
WP3 High Level Architecture Concepts with a large consortium participation. Title “Self-Organizing Mega-Constellation Architecture”	IEEE Access (currently under internal review)
T5.1 Publication on TN-NTN multi-3GPP connectivity	Submitted to 6Gnet
WP4 journal publication on the preliminary analyses on user-centric beamforming	IEEE Access or IEEE Transactions on Aerospace and Electronic Systems

4 SYNERGIES

4.1 SNS JU & SNS OPS



Figure 13: 5G-STARLUST's representatives at the SNS JU joint workshop and booth at EuCNC 2023

As stated in D7.1, 5G-STARLUST is a member of the Smart Networks and Services Joint Undertaking (SNS JU) under its Phase 1's Stream A (Smart communications components, systems and networks for 5G mid-term evolution systems). This Public-Private Partnership aims to foster and advance industrial leadership in Europe regarding 5G and 6G networks and services. As a member, 5G-STARLUST attends monthly **SNS JU Communication Task Force Meetings** involving representatives of all fellow Stream A projects - and beyond - where information about the respective and joint/common activities is exchanged and orchestrated, which has led – and is continuously leading - to active collaboration with the other projects.

Let us break down some key concrete results of this synergy, for the reporting period:

- 5G-STARLUST is featured among the SNS projects on the [6G SNS website](#) and communication materials, **and it's actively contributing to and echoing SNS JU social media efforts.**
- The participation to the **SNS Lunchtime Webinar** (February 2023), which introduced the SNS projects.
- The participation to the **“Aligning European NTN Convergence and Integration” Workshop** at EuCNC & 6G Summit (6-9 June 2023, Gothenburg, Sweden) alongside SNS JU projects 6G-NTN, ETHER, and 6G-SANDBOX.
- Direct support of fellow SNS project 6G-XR's open call promotion (at the time of its launch) and of 6G4Society project's Citizen Survey (which will continue in July 2024 through our next newsletter).
- Promotion of **SNS Journal 2023 and 2024** via social media, website and newsletter (upcoming July 2024 issue, in the case of the latter).
- Participation to the Eurescom and ESA-led workshop for this year's edition of EuCNC & 6G Summit (3-6 June 2024, Antwerp, Belgium), entitled **“Non-Terrestrial Networks and Terrestrial Networks unification – from Vision to Reality”**; the

presentation held at this event, delivered by our Project Coordinator Tomaso de Cola (DLR), being a joint effort involving 6G-NTN, ETHER, and 6G-SANDBOX.

- On the same day, 5G-STARLUST was also featured in the EuCNC workshop titled **“Architectural Considerations Enabling the IMT 2030 Framework by European 6G R&D Activities”** as part of another synergic presentation on “Ubiquitous Connectivity for the Unconnected”, crafted once again in collaboration with 6G-NTN, ETHER and 6G-SANDBOX.

4.2 OTHER RELEVANT INITIATIVES AND PROJECTS

In this section we offer instead a summary of the other initiatives the project has connected and collaborated with – and of their respective mission - with some updates from what previously presented in D7.1.

[The 6G Smart Networks and Services Industry Association \(6G-IA\)](#) is the voice of European Industry and Research for next generation networks and services. Its primary objective is to contribute to Europe's leadership on 5G, 5G evolution and SNS/6G research. While the European Commission represents their public side, the 6G-IA represents the private side in both the 5G Public Private Partnership (5G-PPP) and SNS JU. The 6G-IA brings together a global industry community of telecoms & digital actors, such as operators, manufacturers, research institutes, universities, verticals, SMEs and ICT associations. In the reporting period, cross-posting between the initiative and 5G-STARLUST took place, with WP7 making sure to tag and re-post the 6G-IA, given its inherent connection to SNS JU-

[The European Space Agency \(ESA\)](#) is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. Cooperating and partnering with ESA is a great opportunity to tackle the main stakeholders and researchers in the space and satellite domains. As stated above, 5G-STARLUST has sought out all relevant chances to engage with ESA through some of the aforementioned events the project took part in.

[One6G](#) is a membership organization focused on evolving, testing and promoting next generation cellular and wireless technology-based communications solutions. By supporting global 6G research and standardization efforts, the goal is to accelerate its adoption and overall market penetration, while addressing societal and industry-driven needs for enhanced connected mobility. The shared network of the One 6G initiative, alongside the knowledge base represents additional inputs for the project (both on technical and business-related manners), and a chance to create broader awareness amongst of 5G-STARLUST's key stakeholders.

[Alliance for the IoT and Edge Computing Innovation \(AIOTI\)](#) aims to lead, promote, bridge and collaborate in IoT and Edge Computing and other converging technologies research and innovation, standardisation and ecosystem building, providing IoT and Edge Computing deployment for European businesses creating benefits for European society. They cooperate with other global regions to ensure removal of barriers to development of the IoT and Edge Computing market while preserving European values, including privacy and consumer protection.

[6G-NTN](#) is a 6G SNS-funded project that aims to design and validate NTN's key technical, regulatory, and standardisation enablers for the integration of TN and NTN components into

6G, focusing on multidimensional network infrastructure, multi-constraint RANs, and multi-user terminals. As dissemination and communications in the project are also run by WP7 leader Martel, there's a direct line for collaboration and mutual support, as materialised in joint workshops and showcase activities.

ETHER is a 6G SNS-funded project that aims at developing solutions for a Unified Radio Access Network (RAN) and for the energy-efficient, AI-enabled resource management across the terrestrial, aerial and space domains, while creating the business plans driving future investments in the area. The connection with ETHER is also of immediate nature due to Martel being partner in the project, thus resulting in the involving of ETHER in workshops and showcases' co-organisation.

6G-SANDBOX is a 6G SNS-funded project bringing a complete and modular facility for the European experimentation ecosystem (in line and under the directions set by SNS JU), which is expected to support for the next decade technology and research validation processes needed in the pathway towards 6G. Common themes and partners connected us with it over the course of the first half of the project, in a fruitful collaboration which made 6G-SANDBOX a regular contributor of common presentations and workshops, as stated above in the section.

6G-XR is a 6G SNS-funded project on a mission to strengthen European leadership in 6G technologies by enabling next-generation XR services and infrastructures that will provide beyond-state-of-the-art capabilities towards the 6G era. Beyond the thematic/ecosystem connection, the shared Martel communication and dissemination leadership between 6G-XR and 5G-STAR DUST greatly facilitates cross-posting and mutual support (which started within the reporting period) as highlighted above.

6G4Society is a 6G SNS-funded project aiming to ensure that societal and sustainable values are properly embedded into the development of 6G technology, bringing a sociological perspective to technological development. Kickstarted later on in the reporting period, the project connects to 5G-STAR DUST's efforts not only by bringing to the mix another essential angle, but also as its communication is led by Digital For Planet, which Martel has a direct line with, adding to the already extensive "echo chamber" system in place.

5 IMPACT ASSESSMENT

The consortium has kept a close eye on the KPIs set at the beginning of the project, to monitor the Dissemination & Communication Results. The table below offers details on the currently achieved and planned KPIs.

Tool/Activity	Indicators	Target (M36)	Status at M18
Website	Total visits (yearly)	1500	2,800
Social media	# followers (by project end) on Twitter	300	133
	# followers (by project end) on LinkedIn	100	434
	#visits to YouTube channel (by project end)	500	157
Press releases	#published press releases (by project end)	≥ 3	1
News items on the website	#published news items (yearly)	≥ 12	13
Newsletter	#newsletters sent out	6	2
Flyers/brochures Posters/roll-ups	#developed flyers/brochures (incl. digital brochures)	3	1 (+update)
	#produced posters/roll-ups	≥ 2	2
Videos	#produced videos	≥ 4	1
Events (attendance, incl. Online events)	#attended events (by project end)	≥ 15	13
Events (organisation)	#organised events (by project end)	≥ 2	4
	#participants in each event	60+	>300

6 EXPLOITATION PLAN

An exploitation plan outlines strategies for maximizing the impact and utility of a project's results. In the context of research and innovation projects, particularly within Horizon Europe, an exploitation plan aims to ensure that the findings, technologies, or products developed are effectively utilized, commercially viable, and beneficial to society. This involves identifying potential markets, stakeholders, and applications, and creating pathways to bring the project's innovations from development to real-world use. An effective exploitation plan also includes measures to protect intellectual property, secure funding, and establish partnerships to support long-term sustainability and growth.

For the purpose of this deliverable, we will center the exploitation plan on the basis of the architectures previously defined. It is important to note that this plan may be subject to change because the necessary technologies depend on the outcomes of the various work packages currently in progress.

Use Case 1: Satellite Coverage for Sparse Populated Areas

Objective:

Provide connectivity in regions where terrestrial coverage is unfeasible due to terrain challenges or economic unviability.

This will bring numerous advantages on the general development of remote areas, helping to have ubiquitous coverage - leading to one of the 6G key goals - and to bring new opportunities and improve access to essential services detailed here below.

- **Economic development:** connectivity may spur economic activities by enabling local businesses to reach broader markets, access to online banking and use of e-commerce platforms.
- **Remote work:** connectivity in remote areas can enhance remote work, contributing to the local economy and reducing urban migration.
- **Education:** students and teachers will gain access to online resources; connectivity will enable the participation to online courses, which will expand the educational opportunities.
- **Healthcare:** connectivity will facilitate remote consultations, diagnosis and follow-up care.
- **Emergency and disaster management:** connectivity enhances the effectiveness of early warning systems for natural disasters, and helps to improve the coordination and response during emergencies providing critical communications channels.
- **Agriculture:** connectivity can boost the smart farming activities providing the framework for more efficient use of land resources.
- **Tourism:** improved connectivity can attract tourists, also helping to promote local business.

Exploitation Strategy:

- **Market Identification:** target rural areas with sparse populations.
- **Partnerships:** collaboration with local governments and telecom operators that have insights of the areas in which the regular deployment is not feasible due to terrain difficulties or economic unviability.

Use Case 2: Energy Saving via Satellite

Objective:

Utilize satellite communication to reduce energy consumption in terrestrial networks during low traffic periods.

The integration of satellites with terrestrial networks can lead to a more efficient energy use by offloading traffic of the terrestrial networks, reducing the infrastructure needs and optimizing the network management.

- **Optimizing network management:** satellites can help to balance the load of terrestrial networks ensuring that the most efficient energy path is used for data transmission, especially during hours with low traffic periods where the traffic can be redirected to Non-Terrestrial Networks (NTN), which will end up reducing the energy consumption of the Terrestrial Network (TN) segment.
- **Extended network coverage:** satellites can provide coverage in underserved areas, eliminating the need to build an extensive Terrestrial infrastructure, which requires significant energy for construction and maintenance.

Exploitation Strategy:

- **Energy Management Systems:** develop intelligent switching systems to transition to satellite communication during low demand.
- **Cost-Benefit Analysis:** highlight reduced operational costs and environmental benefits.
- **Scalability:** promote the solution to urban and suburban areas for broader impact.
- **Partnerships:** Satellite operators and terrestrial operators should collaborate in order to identify the regions that can benefit the most by reducing the energy consumption.

Use Case 3: Service Continuity in Airways

Objective:

Combining satellite connectivity with 5G Terrestrial Networks (TN) ensures seamless connectivity for passengers and crew by integrating a solution within aircrafts that maintains service continuity between TN and Non-Terrestrial Networks; this approach will leverage on the development of the technologies to provide reliable, high-speed internet access that will improve the in-flight experience for passengers and airlines.

Exploitation Strategy:

- **Market Identification:** airlines
- **Technology Integration:** install advanced communication systems in aircrafts, which allows seamless service continuity for users.
- **Testing and Validation:** conduct trials to ensure seamless handover between TN and NTN.
- **Market Expansion:** partner with airlines and in-flight service providers to offer enhanced connectivity services. Roaming agreements between TN and NTN should be considered.

7 CONCLUSIONS

The document at hand reported on communication and dissemination conducted in the first half of the 5G-STARDUST project, with a comparison of the progress against the set KPIs, in addition to presenting the plan for the second half of the project. The deliverable also outlined an exploitation plan to lead the way from M19 to M36.

Having relevantly advanced on all communication and dissemination-related KPIs (especially in terms of events), the project consortium is satisfied with the results achieved by WP7. The various types of promotional activities described in this document will continue to support the successful promotion of the work performed by the project consortium and uptake of its results, benefiting project stakeholders and the extended 5G-STARDUST and SNS JU communities.

To summarise a few key points that would be at the core of our upcoming actions to further boost outreach, as emerged by the complete review of activities conducted through this document:

- the consortium will strive to keep the steady pace of events participation and organisation;
- print communication material will be updated, as needed, to go hand-in-hand with that;
- an increase of press release and video output is needed;
- further development of the devised exploitation strategy will be conducted.

ANNEX A – PRESS CLIPPING

5G-STAR DUST

5G-STAR DUST's ambition is to deliver a fully integrated 5G-NTN autonomous system with novel self-adapting end-to-end connectivity models for enabling ubiquitous radio access.

OVERVIEW

The 5G-STAR DUST project has been originated from the Stream A call 01-02 from the first SNS call in year 2022 and dealing with ubiquitous radio connectivity, whereby the main objective is to achieve seamless integration between terrestrial and non-terrestrial networks in a variety of scenarios by aligning to the existing 3GPP specifications from Rel. 17 and Rel. 18. In particular, the main objective is to demonstrate the potentials of fully-regenerative non-terrestrial networks (mostly NGSO satellite systems) in a converged network ecosystem, whose unification is achieved by means of an affective self-organised network paradigm building on data-driven performance optimisation. To this end, a proof-of-concept (PoC) targeting TRL4-5 is under design, which will integrate the

main components of terrestrial and non-terrestrial network with the main goal to show end-to-end connectivity for exemplary scenarios and the consequent candidate services, which are further outlined in the next sections.

The 5G-STAR DUST project is mostly aligning to the 5G-advanced wave of 3GPP standardisation path (i.e. Rel. 17-19), but supposed also to provide inputs to the following 6G standardisation phase starting with Rel. 20. As such, specific synergies have been already established with the other ongoing projects dealing with NTN, i.e. 6G-NTN and ETHER, with which joint dissemination events have been already organised (i.e. NTN workshop at EuCNC'23) and future ones are under preparation as well.

CONCEPT/ARCHITECTURE

The underlying architecture builds on the concept of fully-softwarised self-organised network concept, hence allowing the integrated system to dynamically adapt to changing conditions of traffic and network topology, the latter being possibly resulting from satellite mobility. Then, the main innovation addressed in the project is the use of a fully-regenerative satellite architecture, which implements unprecedented onboard processing capabilities that go beyond what available nowadays in terms of local signal processing. In more detail, the objective is really to implement a full gNB in space and possibly also additional network functions (e.g. UPF) from the core network part in order to enable new services (e.g., edge computing in space) and in general to achieve a more flexible in-space network design.

In light of this, a special attention is devoted to the design of the space segment towards the allocation of the necessary network functions for the implementation of gNB onboard satellite. Under the assumption of a fully interconnected satellite network (i.e. neighbour satellites interconnected by means of inter-satellite links), the main concept exploited in the 5G-STAR DUST project is that all space nodes may embed a fully 5G/6G enabled payload, whose functionalities are however not always active and can stay idle for a certain time interval time. The reason for that relies on the fact that NGSO satellite illuminates for a large time of their daily orbit areas where there are no users, so that the corresponding 5G/6G functionalities can be switched off. On the other hand, as soon as the satellite is again offering service to the users in

the coverage area, the relevant network functions can be activated accordingly. Moreover, considering this architecture, it is also possible to think of a 5G

functional splitting achieved in space across neighbour satellite implementing different "parts" of a distributed gNB architecture.

USE CASES/ SCENARIOS

Based on the objective of providing ubiquitous wide-area wireless access, the 5G-STARUST project has defined and selected five scenarios and use cases representing both unserved zones and vertical industry. Scenarios with seamless and transparent experience for end users have been prioritised among others, identifying key social challenges (KVI) and analysing new market opportunities. The selected use cases are shortly outlined in the following points:

- Airway scenario: Aimed at providing 5G services to the passengers thanks to multi-orbital solutions using GEO and NGSO satellites, working on FR2 bands, offering ubiquitous coverage across numerous geographies.
- Residential broadband scenario: Aimed at providing 5G connectivity

to residential users in underserved areas using dual GEO/LEO satellites operating in FR2.

- Vehicle connected scenario: Aimed at providing 5G connectivity to vehicles to give him services such as Software over the air (SOTA), HD maps and NG eCall service.
- PPDR Scenario: Aimed at providing backup connectivity access via satellite and temporary coverage for first responders and extended coverage in case of uncovered areas for first responder agencies.
- Global private networks scenario: Aimed at providing coordinated global connectivity with NGSO satellites so as to achieve distributed 5G systems for private networks.

FIRST RESULTS

The project has just entered the design & development phase of the elements composing the end-to-end connectivity chain, so that the first research and integration results will be available in the second half of year 2024. The general vision is in any case to come up with a TRL4/5 PoC able to show the advantages stemming from the integration of regenerative satellite systems the counterpart terrestrial networks to boost the performance of 5G-based services in scenarios where

the terrestrial connectivity alone will not suffice. In that respect, the evolution to 6G with more demanding service requirements will make this evolutionary path building on the integration of 6G and NTN an absolute need for fulfilling demands of society and industry verticals. Such a vision will be then substantiated by dedicated demonstration of the so-procured PoC and in terms of dissemination as well as standardisation actions within Rel. 19 of 3GPP.

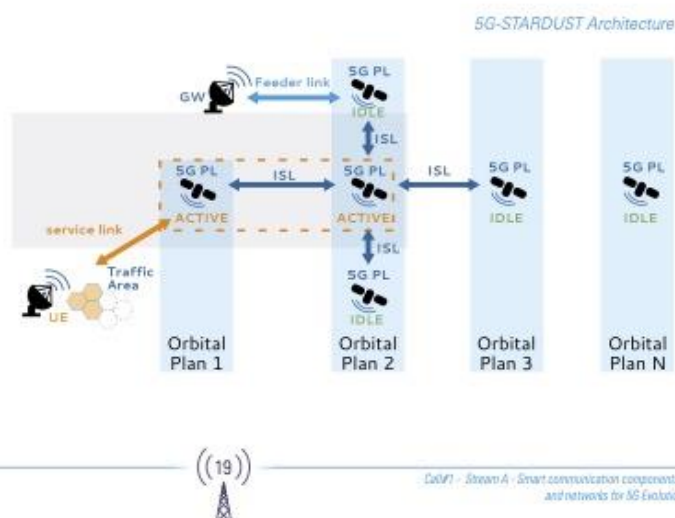
Satellite And Terrestrial Access For Distributed, Ubiquitous And Smart Telecommunications

5G stardust

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Verticals concerned:
Automotive, transportation, residential broadband, PPDR, and governmental

Project Consortium Members:
Thales Alenia Space, Hispasat, Orange France, SRS, AW2S, Fraunhofer FOKUS, CTT, CNIT, DLR, Martel

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5G-STARLUST: Unleashing 5G networking potentials from the sky

Technology 8th January 2024



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5G and 6G are targeting a unified telecommunication ecosystem, which necessitates the extension of traditional terrestrial infrastructure to the sky by integrating non-terrestrial networks into a unique technology picture.

The unprecedented quality of service figures demanded initially by 5G and later strengthened by the ambitious targets coming from 6G have radically transformed the telecommunication ecosystem.

More specifically, the usual approach building on the 'one-fits-all' design paradigm cannot meet the ambitious and diverse service requirements demanded by many verticals, whereby the terrestrial infrastructure alone cannot meet these goals. On the contrary, the convergence with non-terrestrial network counterparts, i.e. air- and space-borne systems such as **satellites**, is regarded today as a natural extension of usual network systems to fulfil all the expectations from industry and society. This trend is further confirmed by the standardisation approach taken in 3GPP towards the definition of 6G, where the co-existence of terrestrial and non-terrestrial networks is the key novel aspect compared to previous cellular generations. This new trend is determined by the need to provide connectivity with unprecedented quality of service figures in several sectors, which have historically suffered from limited or even total lack of terrestrial infrastructure, as in the case of remote areas or, even more importantly, in applications such as maritime, aeronautical, or disaster management sectors.

In this respect, the 5G-STARLUST project is expected to play an important role towards the materialisation of such a planned convergence between terrestrial and non-terrestrial networks in the short term, i.e. focusing on the realisation of the so-called 5G-advanced

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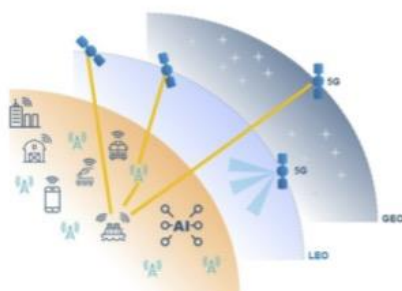
standardisation wave from 3GPP. In more detail, 5G-STARLUST is a European project funded by the Smart Network Service (SNS) Joint-Undertaking (JU) initiative as part of the Horizon Europe programme. The project has been selected for funding from the first SNS call year 2022 and contractually started on 01 January 2023. The project will then run for three years until 31 December 2025, with the ultimate goal of **demonstrating the achieved convergence between terrestrial and non-terrestrial networks** by means of advanced laboratory testbeds.

5G-STARLUST's goals

5G-STARLUST means 'Satellite and Terrestrial Access for Distributed, Ubiquitous, and Smart Telecommunications', and its main mission is to design, develop and demonstrate a deeper integration of TN and NTN. As such, the main planned outcome is to deliver a fully integrated 5G-NTN autonomous system with novel self-adapting end-to-end connectivity models for enabling ubiquitous radio access. More specifically, a few objectives have been defined in terms of consecutive milestones to fulfil the mission statement, as shortly outlined below:

1. To define an integrated terrestrial-satellite network building on 5G-compliant regenerative satellite payloads, enabling cost-effective connectivity in underserved areas;
2. To ensure a more efficient user connectivity concept by providing geographic coverage according to user-centric approaches (i.e. cell-free strategies);
3. To define a self-organised end-to-end network architecture able to adapt to diverse verticals' requirements and to time-varying network operations (e.g., data traffic loads and topology changes);
4. To provide end-to-end network flexibility by means of data-driven AI-based multi-connectivity and resource allocation strategies; and
5. To guarantee cost reduction and capability to scale up the integration of satellites with terrestrial infrastructures to manage the deployment and operation of massive capacity networks efficiently.

To reach these ambitious targets, 5G-STARLUST counts on a very diversified and competitive consortium bringing together expertise from academia, research institutions, satellite and terrestrial operators, and vendors and manufacturers from both satellite and terrestrial networks.



Examples of use

The overall objectives are considered a target to show the main building blocks necessary to achieve such a converged network system. More importantly, the final objective will be to demonstrate the suitability of the designed architecture for a number of uses, which have been conveniently subdivided into:

Dual connectivity

- Airway GEO and NGSO complement terrestrial coverage when aeroplanes leave the



airport. 5G broadband services for passengers with terrestrial and satellite, providing a homogeneous and transparent experience for users.

- Direct Access/LEO (IAB), helping to fast deploy networks to accelerate terrestrial 5G rural deployments or temporal gap filler. FWA from LEO/GEO with dual connectivity and common O&M with terrestrial and satellite, providing a homogeneous and transparent experience for users and a common management for the MNOs

Architecture and service distribution

- V2N communications to enhance three different services like over-the-air software updates, HD map updates, and NG eCall service to provide rapid assistance in serious accidents; using TN and LEO satellites to extend V2N coverage for underserved areas.
- PPDR communication in case TN infrastructure is damaged during a disaster event. NTN will provide temporary coverage for first responders. Also, extended coverage for first responder agencies is considered in case of uncovered areas. Direct and backhauled access to LEO satellites.
- Distributed 5G Systems for private networks. LEO onboarded with UPF, ensuring shorter global data paths, data retention, and potentially ultra-secure and ultra-reliable signalling centralised in the satellite environment.

To address all the planned scenarios, the project consortium is in the phase of defining a holistic architecture that adapts to the different scenario requirements by resorting to end-to-end network programmability concepts and an overall network self-organised paradigm. As such, the ultimate goal is to achieve a fully flexible and modular architecture whose main components will be configured and interconnected according to the main peculiarities of the targeted scenarios. More specifically, the overall layout of the architecture will be strictly aligned with the finalised specification of 3GPP Rel. 17 and the current ones under completion within Rel. 18. Further to this, the plan is to influence the planning of Rel. 19, with a special focus on regenerative satellites to exploit further networking options directly from the sky, i.e. relying on gNB placed onboard satellite system (either entirely or through CU/DU functional splitting) or by means of integrated-access backhaul (IAB) concepts.

In conclusion, 5G-STAR DUST is a very ambitious project aimed at demonstrating the potential of converging regenerative satellites with terrestrial infrastructures in a number of prospective scenarios. Last but not least, the project contributes to the standardisation of 3GPP to mature the current specifications part of the overall 5G-Advanced wave towards the conception of 6G network system elements.

5G-STAR DUST project has received funding from the Smart Networks and Services



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Please note, this article will also appear in the sixteenth edition of our quarterly publication.

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