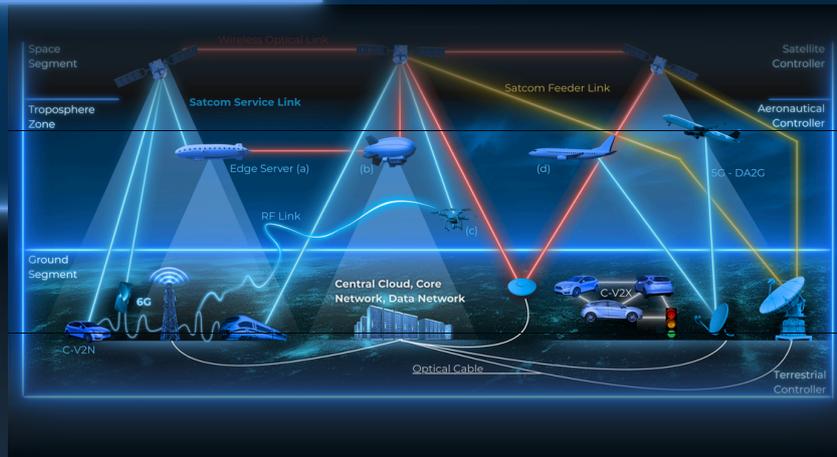


# CONNECTING LAND, SKY, AND SPACE: THE NEXASPHERE PROJECT NEWSLETTER 2

NexaSphere is a Horizon Europe project developing a unified three-dimensional (3D) communication network that brings together terrestrial, airborne, and spaceborne connectivity. Across aviation, automotive, and rail use cases, the project is advancing architectures, orchestration, and technology building blocks for seamless multi-connectivity in the 6G era.



## Project snapshot

In 2025, the consortium progressed from project set-up to a consolidated technical baseline: governance and procedures were established, use cases and system requirements were captured, and the first system architecture and interface definitions were delivered. Two plenary meetings (Athens and Naples) helped align partners across the full 3D edge-cloud continuum stack.

### ◆ KEY ACHIEVEMENTS (JUL-DEC 2025)

#### MILESTONE MS1 – PROJECT GOVERNANCE AND PROCEDURES ESTABLISHED

- Interim review of WP1 set-up: project management handbook, scientific/technical plans, risk management, and the data management plan.
- Main contributing partners highlighted: SPI, DLR, 8BELLS.

#### MILESTONE MS2 – SYSTEM DESIGN AND REQUIREMENTS DELIVERED

- Consolidation of use cases, preliminary system requirements and KPIs; delivery of system architecture, interfaces specification, and first techno-economic analysis.
- Main contributing partners highlighted: OHB, SPI, STLA, RAIL, UNINA, AER, DLR, OTE

### ◆ DELIVERABLES SUBMITTED IN 2025

IN 2025, THE CONSORTIUM SUBMITTED FIVE KEY DELIVERABLES THAT FORM THE FOUNDATION FOR THE TECHNICAL WORK AND FUTURE DEMONSTRATIONS:

- D1.1 Project Management Handbook, Scientific/Technical Plans, and Risk Management (Mar 2025)
- D1.2 Data Management Plan for NexaSphere (Jun 2025)
- D2.1 Use cases, Preliminary System Requirements Analysis, and KPIs (Aug 2025)
- D2.2 System Architecture, Interfaces Specification, and Preliminary Techno-Economic Analysis (i) (Dec 2025)
- D7.1 Project website, dissemination, standardization plan and communications strategy (Jun 2025)



### KICK-OFF - PLENARY MEETINGS

#### NexaSphere wrapped up the Kick off meeting

Safran Passenger Innovations hosted the NexaSphere KoM on 21 and 22 January 2025



#### NexaSphere Kick-off Meeting (Munich area, Germany)

– 21–22 Jan 2025. Hosted by Safran Passenger Innovations; aligned on project vision, objectives, workplan, and governance, with key presentations by the project coordinator, technical coordinator, and project manager.

**1st Plenary Meeting – Athens, 9–10 July 2025**  
(technical alignment and roadmap consolidation).

#### NexaSphere wrapped up the 1st plenary meeting

NexaSphere 1st plenary meeting took place on 9th and 10th of July, hosted by our partner OTE in Athens, Greece.



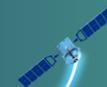
#### NexaSphere wrapped up the 2nd plenary meeting

NexaSphere 2nd plenary meeting took place on 27th and 28th of November by our partner UNINA in Naples, Italy



#### 2nd Plenary Meeting – Naples, 27–28 November 2025

(deep dive into edge-cloud continuum design, orchestration, AI-driven serverless, and overall system architecture).



### EVENTS AND OUTREACH



**SNS JU Call 3 Webinars (online) – 14–17 Feb 2025.** EU SNS JU webinars introducing newly launched Call 3 projects; agendas and recordings available, covering project activities and ambitions across key 6G research streams

**12th ASMS Conference & 18th SPSC Workshop (Sitges, Spain) – 26–28 Feb 2025.** Top satellite communications event focused on Non-Terrestrial Networks (NTN) in future 6G systems; co-organized by DLR and CTTC with scientific support from ESA and the University of Bologna



**NexaSphere participated in ASMA | SPSC 2025**  
NexaSphere Project Coordinator, Babak Mafakheri, delivered a presentation outlining the project.



**Aircraft Interiors Expo (Hamburg, Germany) – 8–10 Apr 2025.** Global marketplace for cabin interiors and inflight entertainment/connectivity (IFEC), bringing airlines and suppliers together to showcase next-gen passenger experience solutions.

### EVENTS AND OUTREACH



**NexaSphere wrapped up its participation at EUCNC | 6G Summit 2025**

Organizing a workshop, poster sharing, Partner participation, etc

**EuCNC & 6G Summit – 3–6 Jun 2025.** Major telecom conference spanning 5G deployment to 6G exploration, including experimentation/testbeds and applications; supported by IEEE ComSoc, EURASIP and EurAAP and attracting a large international community.

**Thinknet 6G Event “NTN, Security & Resilience” (Weßling, Germany) –19 Sep 2025.** Consortium presence at an event focused on secure and resilient NTN integration, including European initiatives such as IRIS<sup>2</sup> and related standardization topics.



**NexaSphere was featured in NTN, Security & Resilience event**

The NexaSphere Project, alongside other European Commission-funded projects, showcased its leadership in research and innovation in NTN.

**NexaSphere at the 5th NTN Workshop: Towards a Unified TN-NTN System in Berlin.**



Tomaso De Cola in his presentation “The Ultimate 6G Runway for NTN Takeoff”, presented NexaSphere and its contribution to advancing next-generation TN-NTN integration within the future 6G landscape.

**5th NTN Workshop: Toward a Unified TN-NTN System (Berlin, Germany) – 6 Nov 2025.** “NexaSphere: The Ultimate 6G Runway for NTN Takeoff” was presented to a broad audience comprising mobile and satellite network operators, system integrators, technology providers, and representatives from academia.

## EVENTS AND OUTREACH



**IEEE Future Networks World Forum (FNWF'25) (Bangalore, India) – 10–12 Nov 2025.** The NexaSphere aviation use case and its initial simulation results were presented in the publication “Towards Cloud-Native RAN for 6G NTN-Based Connectivity in Aviation”.

**Dubai Airshow 2025 – 19th Edition (Dubai, UAE) – 17–21 Nov 2025.** The NexaSphere project and its avionic antenna design were showcased at a booth dedicated to partner RFMicrotech during the event.



**Athens INFOCOM World 2025 Conference Expo (Athens, Greece) – 26 Nov 2025.** The NexaSphere vision and objectives, innovations and impact, use cases, and proof-of-concepts were presented in the Science Section Workshop of the event



## PUBLICATIONS (2025)

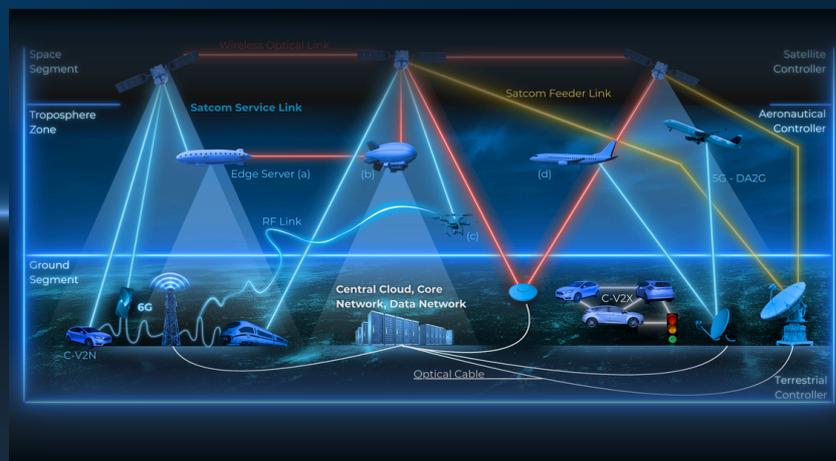
- Gajanin, Rastko, Cynthia Marcelino, and Stefan Nastic. “**Performance Isolation for Serverless Functions.**” IEEE Transactions on Services Computing 18, no. 6 (Nov.–Dec. 2025): 4408–4424. <https://doi.org/10.1109/TSC.2025.3619151>.
- Veisi Goshtasb, Farzad, Pedro B. Velloso, Tomaso de Cola, Babak Mafakheri, and Stefano Secci. “**Non-Terrestrial Disaggregated RAN: Prospective Architectures and Performance Insights.**” IEEE Network (2025). <https://doi.org/10.1109/MNET.2025.3569497>.
- Gravara, Milos, Andrija Stanisic, and Stefan Nastic. “**A Novel Compound AI Model for 6G Networks in 3D Continuum.**” Paper presented at the EuCNC & 6G Summit 2025, 2025. arXiv:2505.15821. PDF: [https://nexasphere.eu/wp-content/uploads/2025/06/CompoundAI\\_EuCNC\\_TUW.pdf](https://nexasphere.eu/wp-content/uploads/2025/06/CompoundAI_EuCNC_TUW.pdf).
- Helcig, Michael A., and Stefan Nastic. “**FedCCL: Federated Clustered Continual Learning Framework for Privacy-focused Energy Forecasting.**” In 2025 IEEE 9th International Conference on Fog and Edge Computing (ICFEC), pp. 50-57. IEEE, 2025
- De Cola, Tomaso, and Babak Mafakheri. “**Paving the Way Towards an NTN-Native 6G Ecosystem: The NexaSphere Approach.**” Paper presented at the EuCNC & 6G Summit 2025 Workshop “Terrestrial and Non-Terrestrial Networks Unification Towards 6G,” Poznań, Poland, June 3–6, 2025. PDF: [https://nexasphere.eu/wp-content/uploads/2025/05/De\\_ColaT-WS-8B-final.pdf](https://nexasphere.eu/wp-content/uploads/2025/05/De_ColaT-WS-8B-final.pdf)
- Marcelino, C., Pusztai, T., & Nastic, S. (2025). “**Roadrunner: Accelerating Data Delivery to WebAssembly-based Serverless Functions.**” In Proceedings of the 24th International Middleware Conference (Middleware 25).



## PUBLICATIONS (2025)

- Marcelino, Cynthia, Sebastian Gollhofer-Berger, Thomas W. Pusztai, and Stefan Nastic. “**Cosmos: A Cost Model for Serverless Workflows in the 3D Compute Continuum.**” In 2025 IEEE International Conference on Smart Computing (SMARTCOMP), 106–113. Cork, Ireland, June 16–19, 2025. IEEE, 2025. <https://doi.org/10.1109/SMARTCOMP65954.2025.00072>.
- Reisecker, M., Marcelino, C., Pusztai, T., & Nastic, S. (2025). “**Gaia: Hybrid Hardware Acceleration for Serverless AI in the 3D Compute Continuum.**” In Proceedings of the IEEE/ACM 12th International Conference on Big Data Computing, Applications and Technologies.
- Marcelino, Cynthia, Leonard Guelmino, Thomas Pusztai, and Stefan Nastic. “**Databelt: A continuous data path for serverless workflows in the 3D compute continuum.**” Journal of Systems Architecture (2025): 103577.
- Pusztai, Thomas W., Jan Hisberger, Cynthia Marcelino, and Stefan Nastic. “**Stardust: A Scalable and Extensible Simulator for the 3D Continuum.**” In 2025 IEEE International Conference on Edge Computing and Communications (EDGE), 44–53. Helsinki, Finland, July 7–12, 2025. IEEE, 2025. <https://doi.org/10.1109/EDGE67623.2025.00014>.
- Marcelino, Cynthia, Noah Krennmair, Thomas W. Pusztai, and Stefan Nastic. “**Lumos: Performance Characterization of WebAssembly as a Serverless Runtime in the Edge-Cloud Continuum.**” In Proceedings of the 15th International Conference on the Internet of Things (IoT ’25). Vienna, Austria, November 18–21, 2025. <https://doi.org/10.1145/3770501.3770515>.
- Mafakheri, Babak, Farzad Veisi Goshtasb, Mohamed Hafidi, Tomaso de Cola, and Leonardo Goratti. “**Towards Cloud-Native RAN for 6G NTN-Based Connectivity in Aviation.**” In 2025 IEEE Future Networks World Forum (FNWF). Bangalore, India, November 10–12, 2025. <https://doi.org/10.1109/FNWF66845.2025.11317176>.





## FEATURE STORY: WHAT NEXASPHERE MEANS FOR THE FUTURE OF CONNECTIVITY

NexaSphere’s vision is a ‘3D network of networks’ that treats terrestrial, airborne, and satellite connectivity as one coordinated system, enabling multi-path, multi-band, and multi-orbit communication where it matters most: high-mobility transportation and smart communities.

By combining radio and optical links, and by extending orchestration from core cloud to edge and even onboard nodes, NexaSphere aims to deliver the building blocks for resilient, high-capacity, and energy-aware connectivity. This includes system-level architecture and interface definitions, AI-assisted resource management and orchestration, and vertical proof-of-concept pathways in aviation (in-flight connectivity), automotive (data management and optimization), and rail (seamless TN/NTN integration for critical and passenger services). The result is a blueprint for connectivity that is adaptive by design—able to select the right link at the right time, with end-to-end service continuity

## QUOTE CORNER

"In 2025, NexaSphere progressed from project set-up to a solid technical baseline, defining key use cases, system requirements, and the initial architecture. The milestones achieved this year position the project to advance its technologies and move confidently toward the integration and validation of our three exciting proofs of concept—Aviation, Automotive, and Railways—in the next phase."

— Dr. Babak Mafakheri (Project Coordinator)

## FLOOKING AHEAD

In 2026, NexaSphere will continue maturing the architecture and enabling technologies, with a focus on integration work that prepares the three proof-of-concepts for testing and validation. Upcoming public outputs include early results on radio-optical developments, communication strategies, and edge/cloud continuum building blocks, as well as technical specifications and testing methodologies for the PoCs. ivity that is adaptive by design—able to select the right link at the right time, with end-to-end service continuity

