



#3 MARCH

Dear colleagues, partners, and satellite innovation enthusiasts,

Welcome to the third edition of our HARMONY project newsletter. Many new advancements have occurred since our last release in December 2023. The year 2024 has brought a wave of renewed inspiration for the HARMONISTS. Our PhD students continue their research on space systems while also promoting satellite science worldwide.

The HARMONY project is gaining momentum!

[Visit our website to know more about the HARMONY PhDs!](#)

Retrospective

The Harmony team continues to foster knowledge exchange. Our two PhD candidates, Dany MESTAS and Dorian CHENET, have completed their secondment at Thales Alenia Space France and have returned to the Bundeswehr University (UniBW) in Munich and Thales Alenia Space España (TASE) in Madrid, respectively. Their rich interactions with experts will further their research in distributed systems.

Over the past three months, the Harmony consortium has achieved notable research outcomes. We are pleased to announce the acceptance of two paper submissions: the first, authored by harmonist Alessandro MASTROPRIETO and the Nano Avionics team, titled **"The Role of MBSE and CE in the New Space Economy,"** has been accepted for the 2024 workshop on Model Based Space Systems and Software Engineering (**MBSE2024**), scheduled for May 28th and 29th.



TASE - Madrid Dorian

The second article, "Optimized MIMO Feeder Link Architectures for 6G NGSO Mega-Constellations," authored by Oscar MARTINEZ and the Chair of Signal Processing at the Bundeswehr University in Munich, has been accepted for the IEEE International Conference on Communications (ICC2024), to be held in Denver from June 9th to 13th. Additionally, a collaborative submission by three of our harmonists, Giulio ORLANDO, Alessandro MASTROPIETRO, and Oscar MARTINEZ, titled "MBSE Approach for Future 6G TN-NTN Distributed Networks," has been submitted to the International Astronautical Congress (**IAC2024**).



British Science week - Aymeric

On another note, the Harmony outreach events are off to a strong start. Oscar MARTINEZ's online webinar presentation at the end of December 2023, provided a comprehensive overview of his work on distributed feeder links (public link here: [6GNTN23 and NTN Challenges and Solutions](#)). Moreover, Harmonist, Aymeric CAILLEUX, currently affiliated with Heriot-Watt University in Edinburgh, took the initiative to participate in the British Science Week 2024. He demonstrated interesting fundamental wave principles in an educational manner to children. Aymeric also shared the purpose, objectives and consortium of the HARMONY project with the curious attendees.

This event, held in Glasgow from the 14th to the 17th of March, offered an exceptional opportunity to instill curiosity and excitement about space science and technology especially among young minds.

Voices of HARMONY



Working in TAS-F in Toulouse this past year has been really stimulating. New ideas are always welcomed, and discussions can be really deep. Identifying weak points of my work is not always easy, as I am not specialized in all the topics I am in contact with, but all experts here are very accessible. This significantly speeds up the design and thought process. Sometimes a 5 minute discussion around a coffee can save days of research!

My topic is very open-minding. I used to only work on one type of component as an RF engineer. Here in my research, I need not only to explore technical details of the technologies I focus on, but also the context around it. To properly design an Inter-Satellite Link antenna, I had to explore the requirements for the ground segment, the orbital characteristics, the satellite (size, power, data-rate ...) up to the internal component design (antenna,

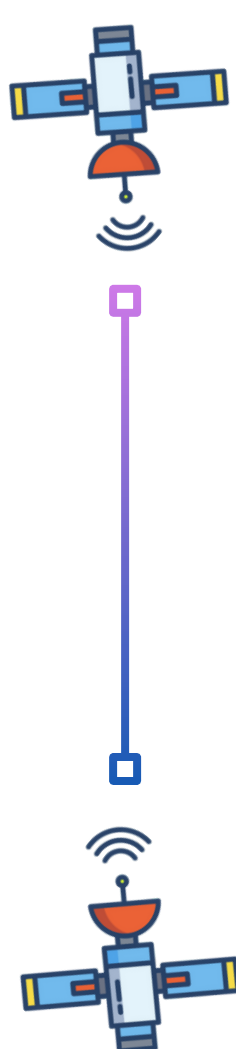
power amplifier, ...). I had to understand the entire chain to accurately grasp the technical requirement of my subject. Looking towards the future, I enter into the design phase of my thesis. I hope to continue learning and improving in my work. As my work so far has been about establishing a solid foundation for my designs, I feel ready to face the what will come next.

Alex EVRARD - PhD Candidate



Commitment

The HARMONY project is deeply rooted in European priorities, particularly aiming to foster "an economy that works for people". The entire consortium is committed on the space market advancement and all its associated sectors. HARMONY recognizes the pivotal role of satellite missions in shaping the future; the project focuses on delivering enhanced services to improve the quality of life for individuals worldwide. Moreover, the Harmony project lies at the heart of the current paradigm shift of New Space, it has the potential of transforming the market and promises economic prosperity that attracts investment. In this dynamic landscape, the HARMONY project acts as an accelerant for collaboration between European aerospace companies and academia.



This strategic partnership draws on the diversity of Europe's space industry to foster innovation and increase EU's competitiveness. Furthermore, by cultivating talent and fostering multi-sector partnerships, HARMONY will also offer highly qualified experts to the space industry who will continue the development of more efficient satellite systems. Notably, HARMONY's significant work on distributed architectures stands as an essential piece of contemporary space research. By pioneering innovative approaches to distributed systems, the project is contributing to the expansion of satellite technology. These efforts in this domain not only take part on advancing the boundaries of scientific knowledge but also hold the potential to revolutionize how we conceive and operate systems in space.

HARMONY ideas aim to enhance satellite missions' efficiency, ultimately improving the quality of life on a global scale.

Looking Ahead

We hope that our third newsletter has given you useful information and a summary of the HARMONY ongoing activities. We are excited about the upcoming second network-wide event in Rennes, France, scheduled from June 3rd to 7th! Stay tuned for more updates in the next newsletter.

The journey to the future begins with the spark of innovative ideas.

Kind regards,

The HARMONY Team

Thank you!

