5G-STARDUST:
The Potentials of 5G-Advanced from the Sky

EUCNC 2023 & 6G Summit

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Co-funded by the European Union

6GSNS

Project Overview (1/2)

Project name: 5G-STARDUST (www.5g-stardust.eu)

Satellite and Terrestrial Access for Distributed, Ubiquitous and Smart Telecommunications

- Co-funded by EU: Smart Networks and Services Joint Undertaking (**SNS JU**) - under the European Union's Horizon Europe research and innovation programme
- **Stream:** *A-01-02 Ubiquitous Radio Access*

Objective:

To design, develop and demonstrate a deeper integration of TN and NTN: Deliver a fully integrated 5G-NTN autonomous system with novel self-adapting end-to-end connectivity models for enabling ubiquitous radio access

Project Overview (2/2)

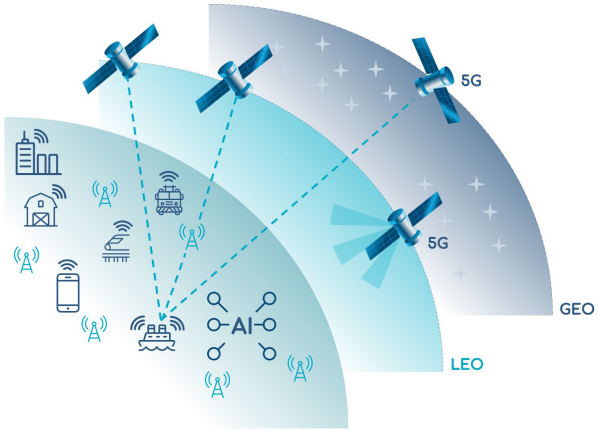
Consortium: **11** *partners* **7** *countries*

Project Coordinator: *Tomaso De Cola, DLR*

Technical Manager: *Mathieu Arnaud, Thales Alenia Space*

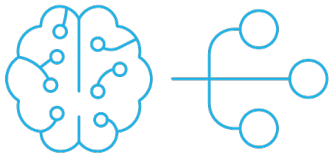
5G-STARDUST's key objectives (1/3)

- Study, design, a **5G-based satellite network**, implementing **onboard processing and storage capabilities** towards effective networking and mobile computing in the sky.
- To ensure a more efficient user connectivity concept by providing geographic coverage according to user-centric approaches (i.e. cell-free strategies).



5G-STARDUST's key objectives (2/3)

- 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).
- To provide end-to-end network flexibility by means of **data driven AI-based multi-connectivity** and **resource allocation** strategies.

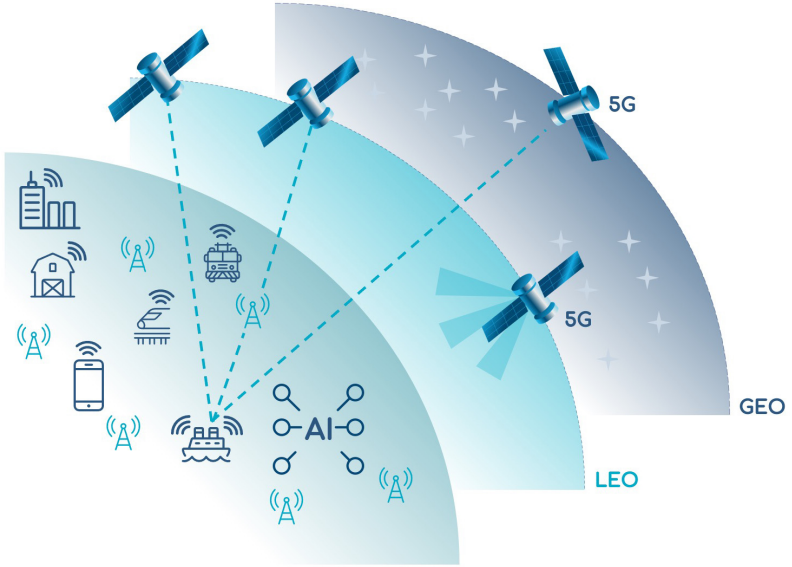


5G-STARDUST's key objectives (3/3)

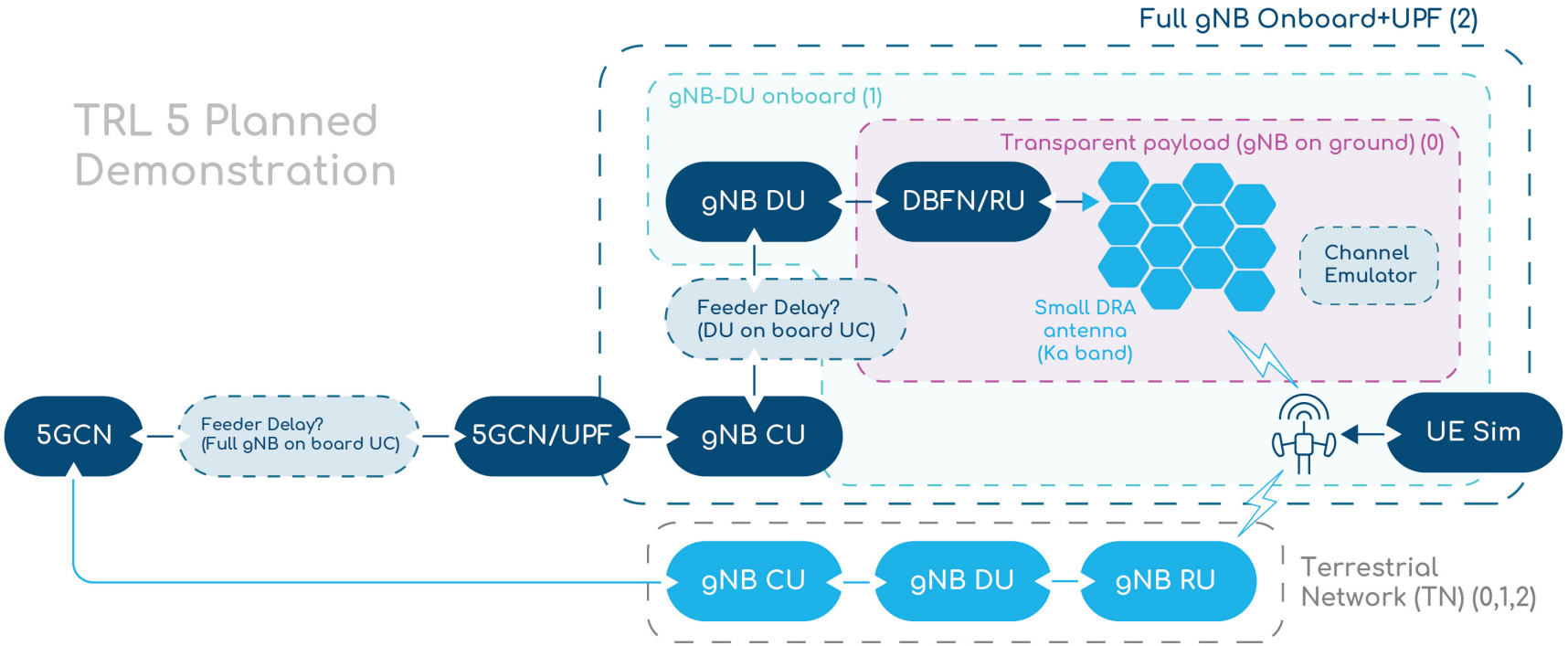
- To guarantee cost reduction and capability to scale up the integration of satellite with terrestrial infrastructures to efficiently manage the deployment and operation of massive capacity networks.
- Contribute to the development of a **European Research and Technology roadmap** to ensure strategic positioning and global competitiveness of Europe in integrated TN-NTN communications.

Key Technologies

- Regenerative payloads for GEO and NGSO systems
- Unified radio interface for cost-effective converged TN/NTN multi-tenant networks
- Softwarised self-organised network architecture
- E2E AI-Driven Network Design



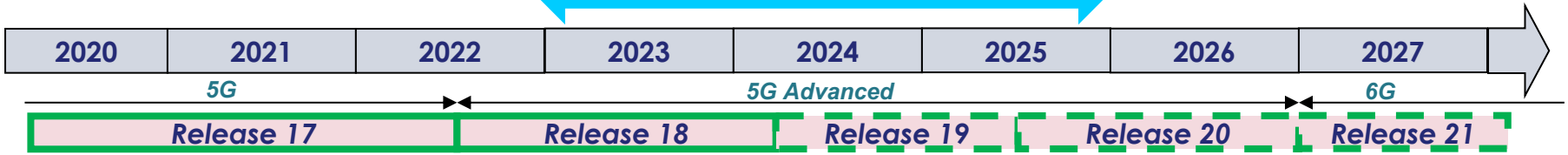
TRL 5 Planned Demonstration



Timeline

5G stardust

5G stardust **36** *months*



Assuming 18 months releases

Satellite backhaul

Transport networks with static bandwidth and latency	**Transport networks with variable bandwidth and latency**

Satellite connectivity to smart phones

(5G NR): **sub-6GHz, transparent payload**	(5G NR): Coverage & mobility enhancements	*(5G NR): other enhancements (e.g. **regenerative payloads**)*	*5G NR: **further** enhancements ?*

Satellite connectivity to IoT devices

(4G NB-IoT/eMTC): **sub-6GHz, transparent payload**	(4G NB-IoT/eMTC): enhancements (mobility, MAC, discontinuous coverage)	*(4G NB-IoT/eMTC): other enhancements (e.g. **store & forward**)*

Satellite connectivity to “VSAT”

(5G-NR): in **10 GHz bands**	*(5G-NR): other enhancements (e.g. **IAB/VMR**)*

6G: Service requirements for NTN	*6G: Study on the support of NTN component*	*6G: Define features for the support of NTN component*

5G stardust

THANKS FOR YOUR ATTENTION

GET IN TOUCH

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