



# A STEP TOWARDS 6G-NTN

IEEE WiSEE

NTN6G Workshop Panel Session:  
"The Road to Unified 6G Networks"

*Aveiro, Portugal 08/09/2023*

Benjamin Barth

*DLR*



Co-funded by  
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**6G SNS**



DLR

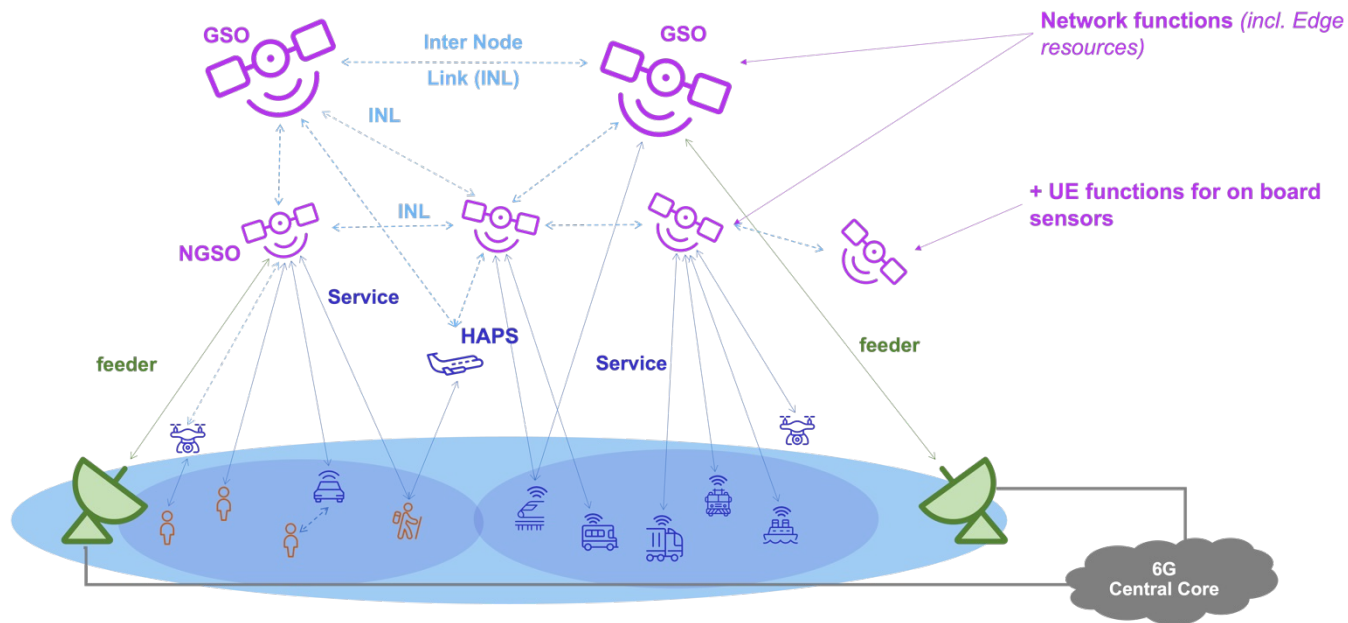
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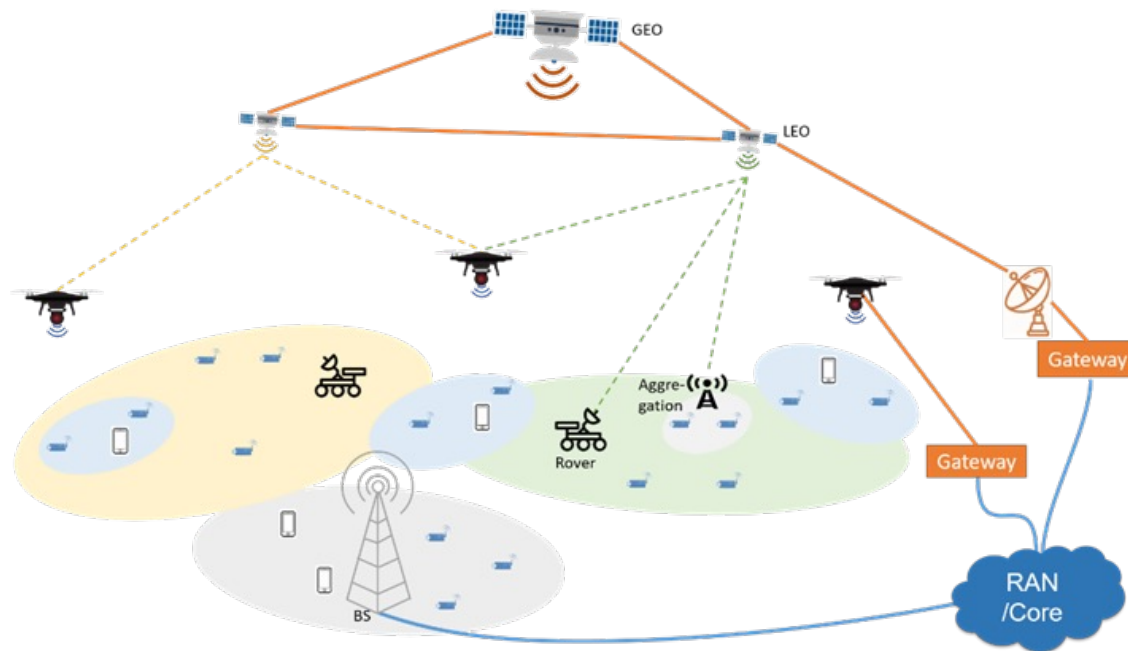
## DLR at a glance

- Research Institution
  - Space Administration
    - Project Management Agency

# 6G NTN Projects at DLR KN



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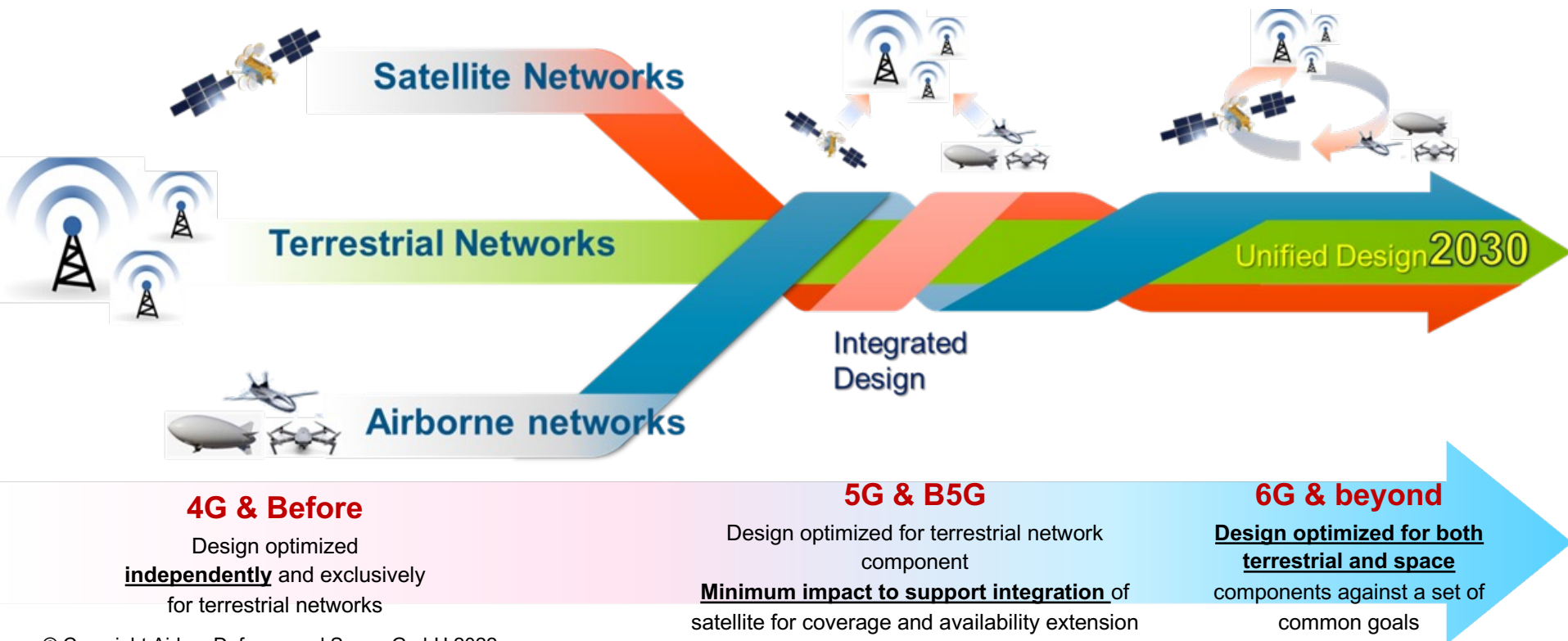
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# Unified 3D Networks



# Project Overview

**Full name:** *Satellite and Terrestrial Access for Distributed, Ubiquitous and Smart Telecommunications*

**Stream:** *A-01-02 Ubiquitous Radio Access*

**Project Coordinator:** *Tomaso De Cola, DLR*

**Technical Manager:** *Mathieu Arnaud, Thales Alenia Space (F)*

 **11**  
partners

**7**  
countries 

 **36**  
months



# PROJECT AMBITION

**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.*

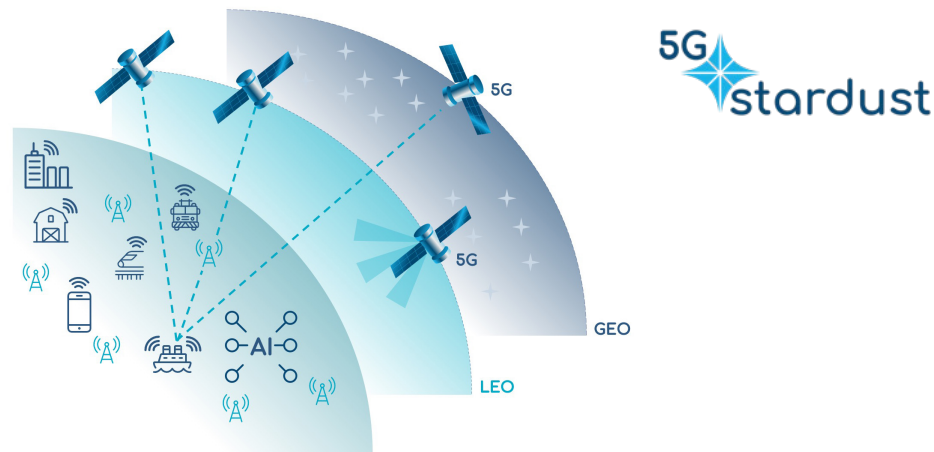
# Project Objectives



- Study, design, a **5G-based satellite network**, implementing onboard processing and storage capabilities towards effective networking and mobile computing in the sky.
- Define, design **data-driven management system components**, building on AI/ML based solutions for resource allocation and service provision in highly dynamic integrated hybrid networks.
- Design, implement, and demonstrate **E2E services over a fully integrated TN-NTN** advanced network architecture with regenerative space nodes.
- 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.



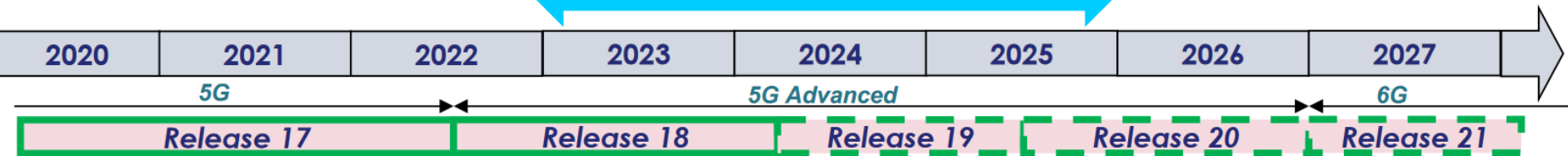
# KEY TECHNOLOGIES



- *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*

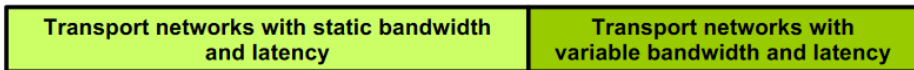
# Timeline

5G  stardust **36 months** 

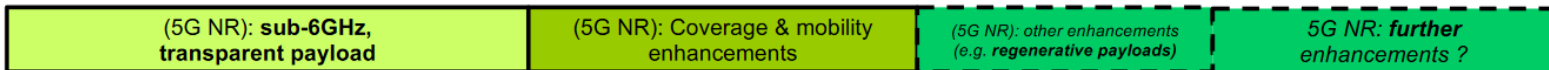


Assuming 18 months releases

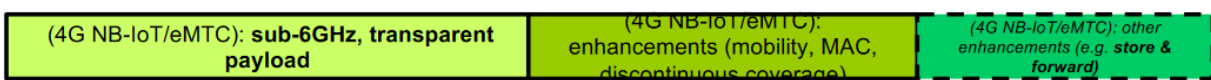
Satellite backhaul



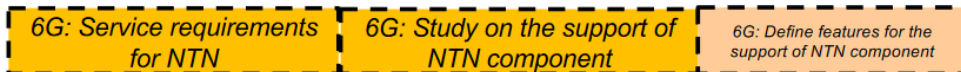
Satellite connectivity to smart phones



Satellite connectivity to IoT devices



Satellite connectivity to "VSAT"



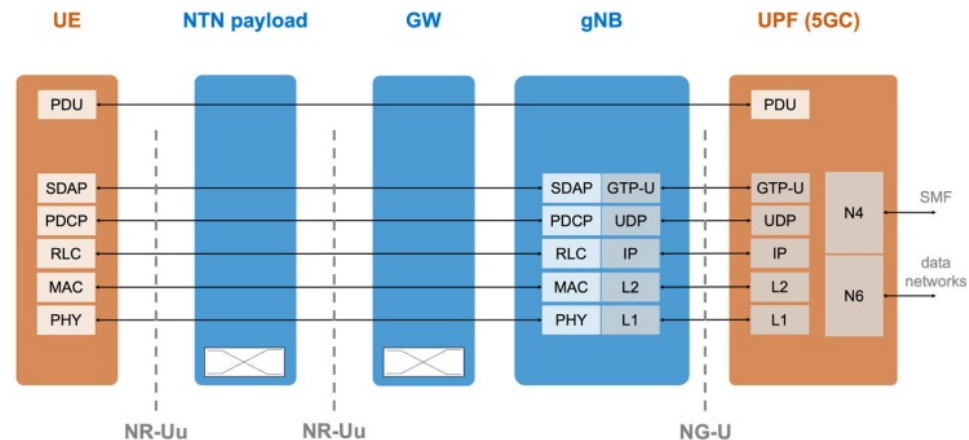
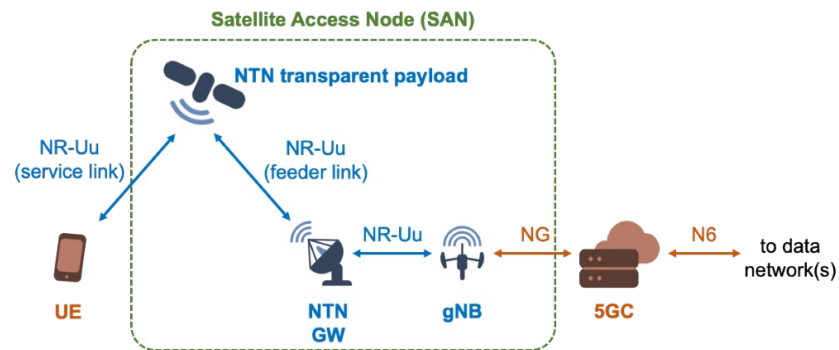
## USE CASES

- *Neutral-host cell (Maritime, Railway, Airway)*
- *Residential broadband*
- *Vehicle to network*
- *PPDR*
- *Global private networks*

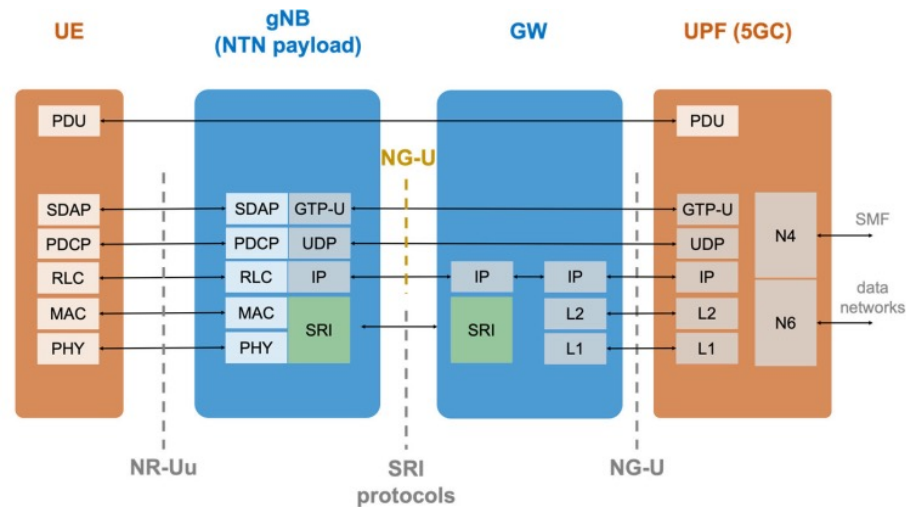
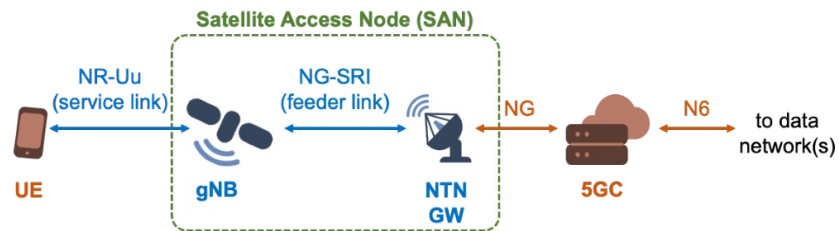
## ARCHITECTURAL OPTIONS

- *Transparent*
- *Regenerative*
- *IAB*

# 3GPP – Release 17

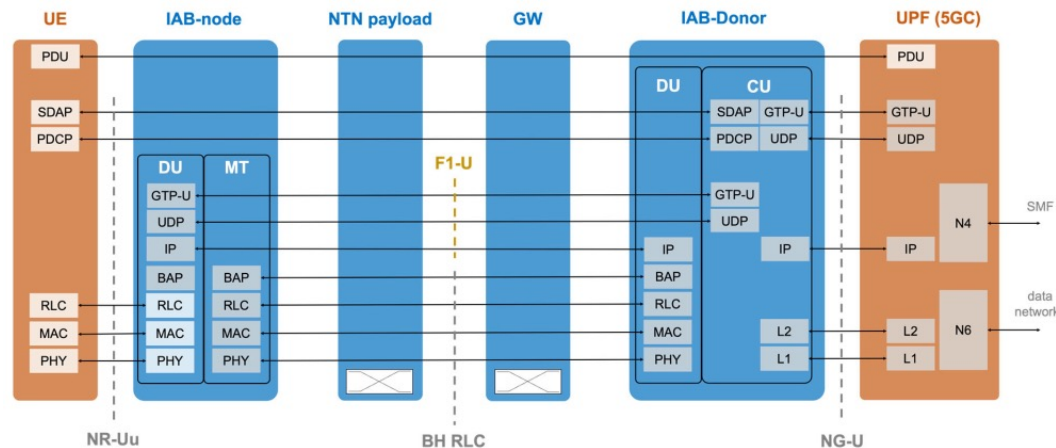
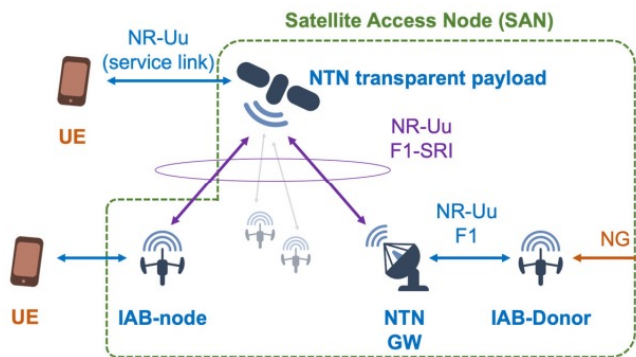


# 3GPP – Release 18-20

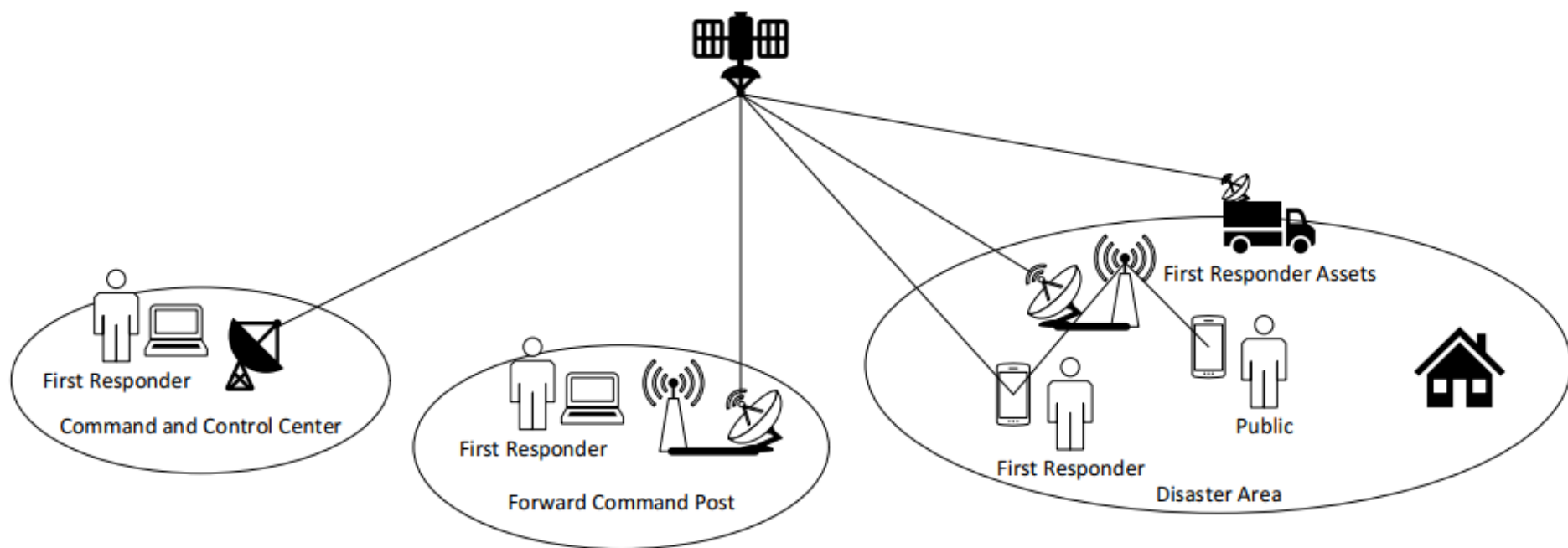




# 3GPP – Release 18-20 - IAB



# MCX Use Case



# MCX Requirements and Architectural Aspects

- Demanding requirements for communication system
  - Latency, data rate, reliability, coverage, speed, altitude, synchronization, security,
- Positioning services
- Prioritization
- Private networks, flexible resource allocation
  
- NTN-TN switching
- Regenerative payloads with full gNB or IAB
- Multi-connectivity

# The Consortium





**THANKS  
FOR YOUR  
ATTENTION**

## GET IN TOUCH



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Co-funded by  
the European Union



5G-STARDUST project has received funding from the Smart Networks and Services Joint Undertaking (SNS JU) under the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101096573.