

# 5G NR NTN and NB-IoT NTN - ESA support

## GSMA TSG#53, September 2023

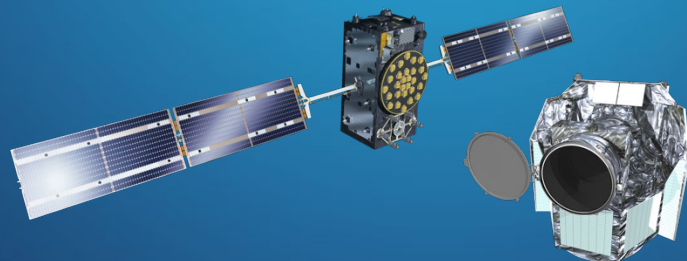
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ESA Satellite Communications

# The European Space Agency (ESA)



**Make  
Space for  
Europe**



**5 500+**

ESA Workforce

**85+ missions**  
developed, tested and  
operated

**22 Member States**

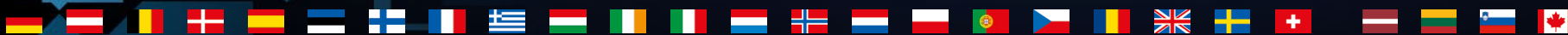
- + 5 Associate Members,  
including Canada
- + 4 Cooperative Member



**7.08 billion € budget**

for 2023

13 € per European  
17% budget increase  
at CM22





# ESA SPACE FOR 5G and 6G



Underpins the  
Digital Economy

Seamless

Improves  
your daily life

EXPAND  
5G SPACE

Ubiquitous

Inspires  
future generations

Resilient

A WORLD WHERE SPACE ENABLES GLOBAL SEAMLESS  
CONNECTIVITY FOR INDUSTRY AND SOCIETY





# What do we do?

ECSAT – UK (Harwell)



ESTEC – NL (near The Hague)



We fund research and developments in satcom via a program called **ARTES** (Advanced Research in Telecommunications Systems, [artes.esa.int](https://artes.esa.int))



We fund developments or studies in **ground segment, space segment, payload and system** – including **in-orbit validation**

We support European companies with **patents, test facilities**, advice on **regulatory** matters and **technical trade-off's**.



**August 2022**

The SSIG was first created as the Standardization Special Interest Group on 8th January 2018 through the ESA ARTES contract “Support to Standardisation of Satellite 5G Component”. The purpose of these revised terms of reference is to reconfirm the name, vision, membership, scope of activities, expected outcomes and governance of this informal group.

The diagram illustrates the structure of the 5G-PPP Global Initiative. At the top, a red line connects a head-and-brain icon to a Euro symbol (€), which then points down to the 'Technical preparations Coordination & Financing' box. The ESA logo is shown in a box on the left, with a red line connecting it to a head-and-brain icon and a Euro symbol (€), which then points down to the '5G 3GPP' logo. A blue arrow points from the 'Technical preparations Coordination & Financing' box down to the '5G 3GPP' logo. A blue arrow also points from the right side to the '5G 3GPP' logo. At the bottom, the text 'A GLOBAL INITIATIVE' is displayed.

# Early ESA initiatives for satellite in 5G

- Starting as early as 2015 with talks with various stakeholders to include satellite in future 3GPP releases
- NB-IoT tests over satellite in 2017
- Full-fledged support and developments started in 2020

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## 2 5G MASTER PLAN

The 5G Master Plan (see 5G Master Plan document) covers all activities being coordinated as part of the 5G SPL. In order to achieve the 5G SPL objectives, the 5G Master Plan is composed of four main elements:

### 5G Essential

**5G Essential** consists of the key advanced technology building blocks of the future hybrid 5G networks (terrestrial and satellite).

### 5G Infrastructure

**5G Infrastructure** consists of projects aimed at developing elements (products and services) of 5G space networks and their integration with terrestrial 5G networks.

### 5G Flagships

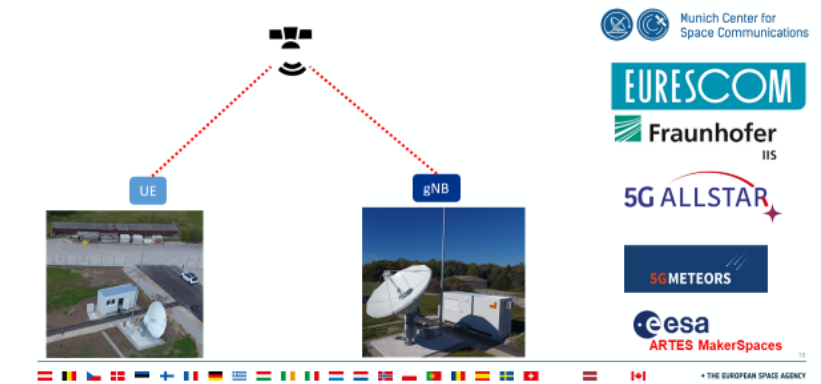
**5G Flagships** consists of industry-initiated projects to develop and demonstrate the convergence of 5G networks with satcom operators, mobile network operators and industry vertical market stakeholders in many different use cases and markets.

### 5G Applications

**5G Applications** are the set of studies and developments focusing on 5G user pilots and trials across a range of markets and applications.

Figure 1: 5G Master Plan- Main elements

## First demonstration of pre-standard 5G NR NTN waveform



# Ongoing relevant ESA initiatives for 5G NTN



gNB in-orbit

NB-IoT NTN eNB in orbit

Continued standardisation support

Testing NR NTN over transparent LEO

5G NTN automotive-specific developments

5G NTN Hubs/Labs in ECSAT and ESTEC



Field tests and demonstrations

GSMA AND EUROPEAN SPACE AGENCY LAUNCH NEW COMMUNICATIONS INNOVATION PARTNERSHIP

Wednesday 12 July, 2023



New Collaboration Will Look to Accelerate Advancements in Satellite and Terrestrial Communications Network Integration

12 July 2023, OXFORDSHIRE: The GSMA and European Space Agency (ESA) today signed a Memorandum of Intent (MOI) to bring the mobile and satellite industries closer together to collaborate on developing new, innovative satellite and terrestrial networks technologies.

ESA appreciates initiatives in TSG, defining NTN test cases addressing both LEO, MEO and GEO scenarios (GSO/NGSO).

Near-future ESA-funded activities can be steered to:

- Contribute to definition of Test Cases in TSG
- Establishment of testbeds supporting Test Cases (beyond those addressed by regular Test & Measurement equipment)
- Channel emulators to support NTN specific use cases
- *Plugfest-alike* interoperability events
- Use of ESA 5G Hubs and Testlabs
- Establishment of an in-orbit reference eNB or gNB