

# EU C-PNT system of systems proposal

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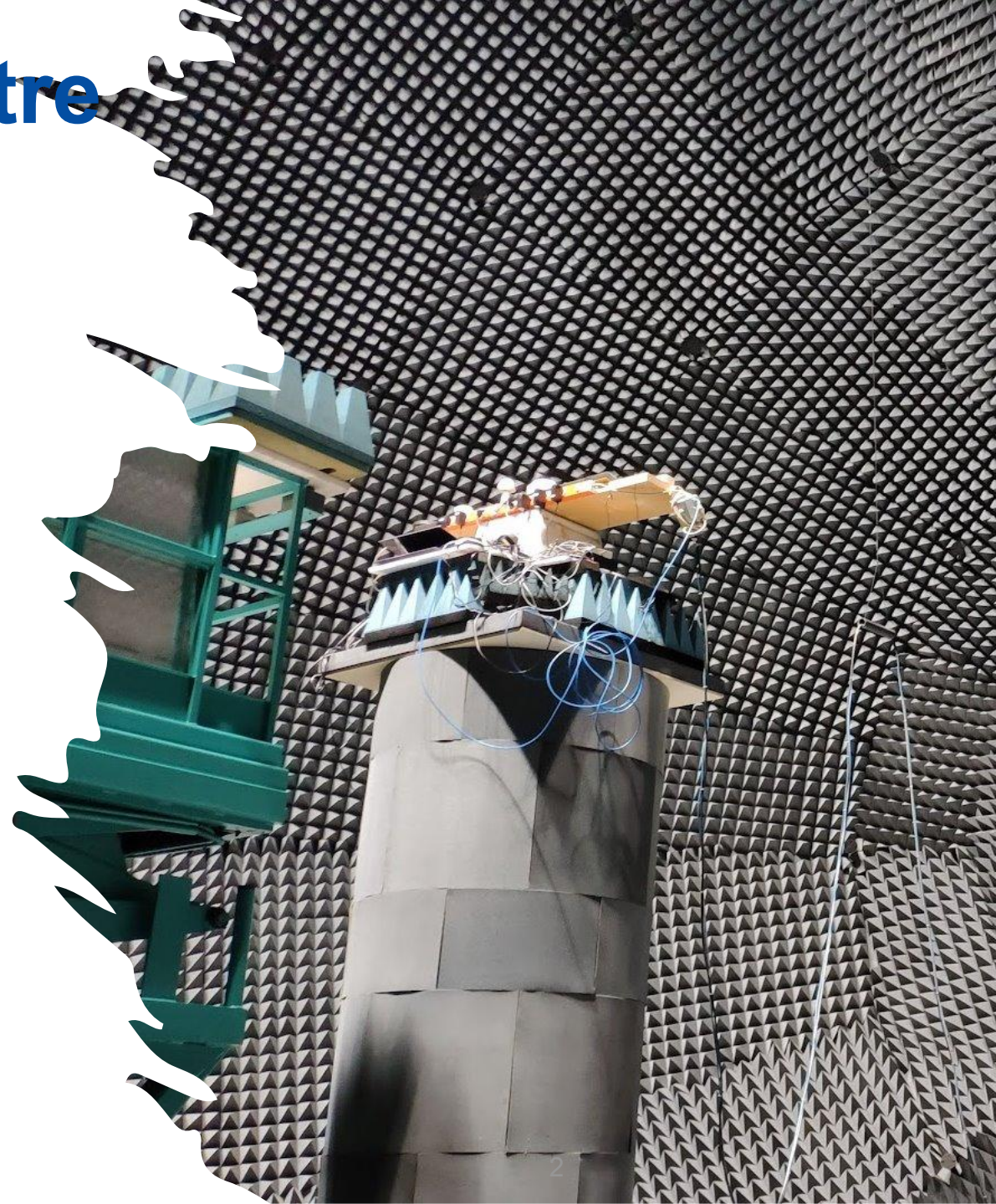
10/03/2026 BTFS 2026

# EC Joint Research Centre

In-house scientific and technical service of the European Commission.

HQ in Brussels and with research facilities in 5 Member States.

Provides independent and policy neutral, evidence-based knowledge and science support to EU policies, including EU Space.



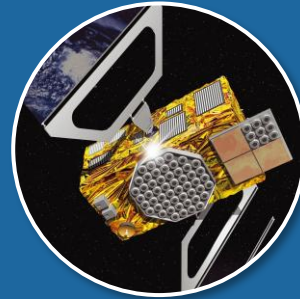
# JRC unit E2 focus

## EU SPACE, Connectivity and Quantum Activities



### SECURE CONNECTIVITY AND RADIO SPECTRUM

Support to the Union Secure  
Connectivity Programme  
(IRIS<sup>2</sup>) and the EU Radio  
Spectrum Policy Programme



### POSITION, NAVIGATION AND TIMING TECHNOLOGIES

Support to the Galileo, EGNOS  
and to Complementary PNT  
technologies, including LEO-PNT  
and Fused-PNT

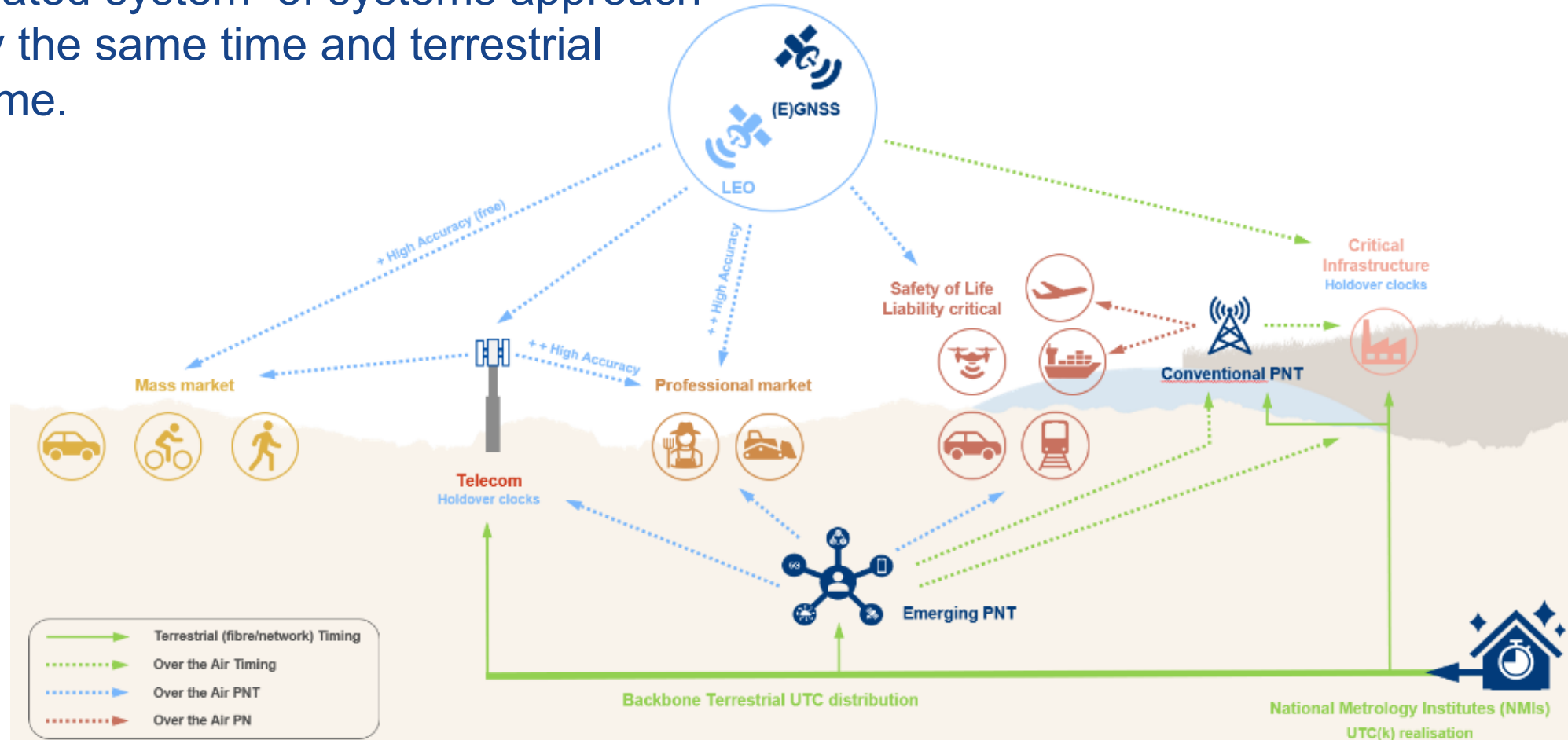


### QUANTUM COMMUNICATIONS

Support to the European Quantum  
Communications Infrastructure  
(EuroQCI)

# EU CPNT ecosystem

ERNP proposes to combine space and ground assets (TRL9), **underpinned by an independent terrestrial UTC backbone**, to create a resilient continuous PNT (C-PNT) utilising federated system of systems approach connected by the same time and terrestrial reference frame.



Please note that this is proposal and not a policy.

PROGRAMME OF THE  
EUROPEAN UNION

EUROPEAN  
COMMISSION

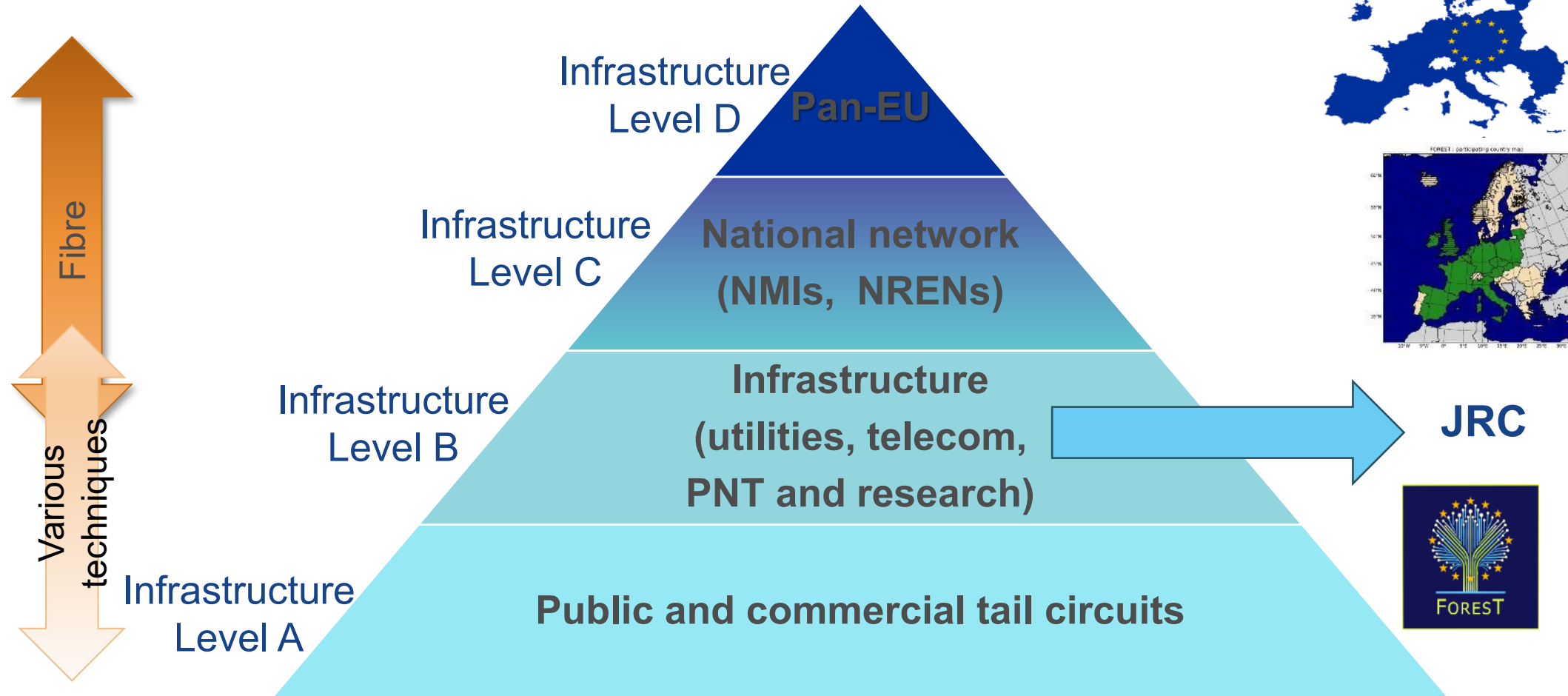
EUROPEAN  
RADIO NAVIGATION  
PLAN 2023



RESILIENCE/MONITORING



# ERNP EU C-PNT from NMIs to end users



## Objectives:

Meet the accuracies of Galileo Time Service (GTS) - 1000, 100, 30 ns Maximum Tolerable Error (MTE) to UTC  
Interconnect the national T&F networks for a more resilient and precise time distribution in EU **to enable a neutral time distribution**



**European Microwave Signature Laboratory – EMSL**  
20-meter diameter anechoic chamber for large-scale experiments in radiated mode

# JRC Timing test bed

## Motivation:

- Support to EU-SPACE

  - Galileo G2 will offer a dedicated timing service

  - Development of C-PNT ecosystem

- Enabler for stakeholders engagement

- To develop collaboration with CERN beyond quantum technology.

## Development so far:

- C-PNT test campaign (2022-23)

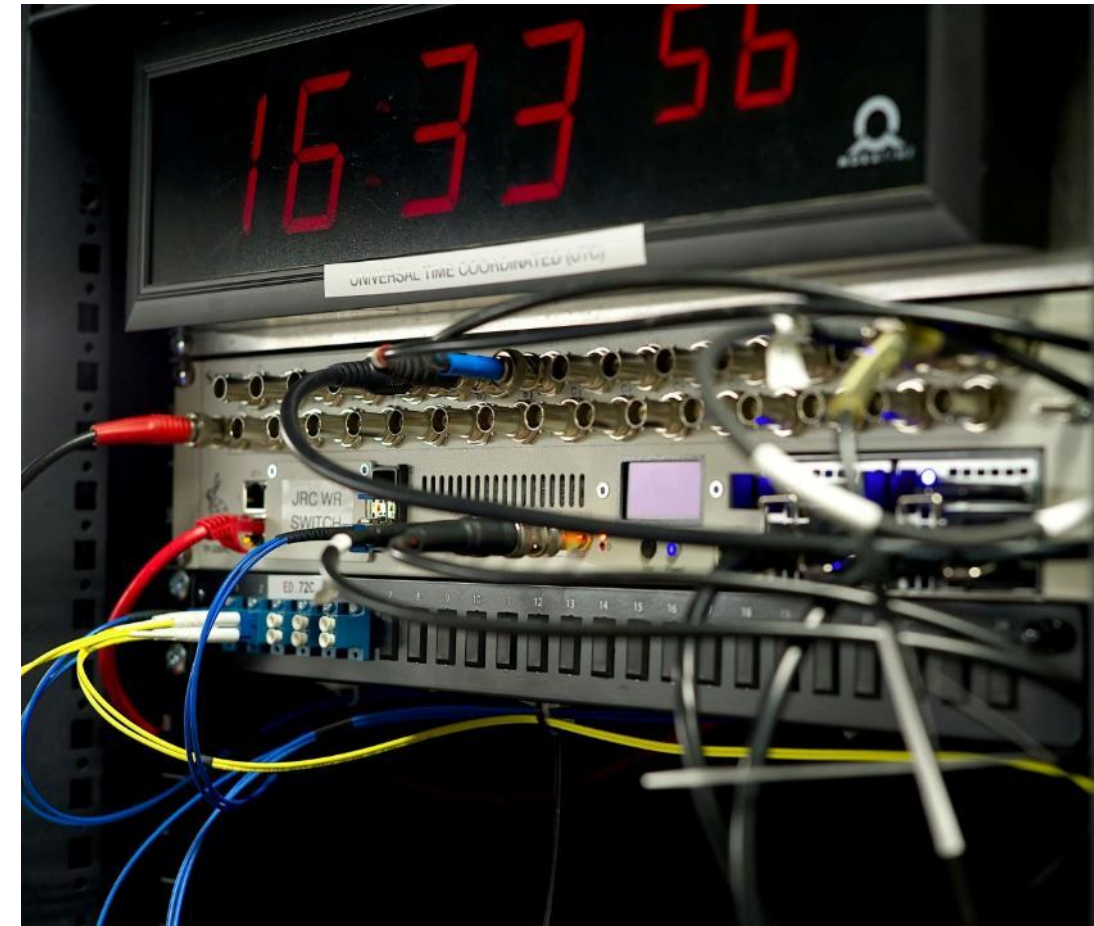
- Contribution to GNSS timing receivers standard (CEN/CENELEC) (2024)

- Absolute and relative calibration of GNSS equipment in cooperation with BIPM (2025)**

## Current work:

- Optical ns-level White Rabbit link with INRIM**

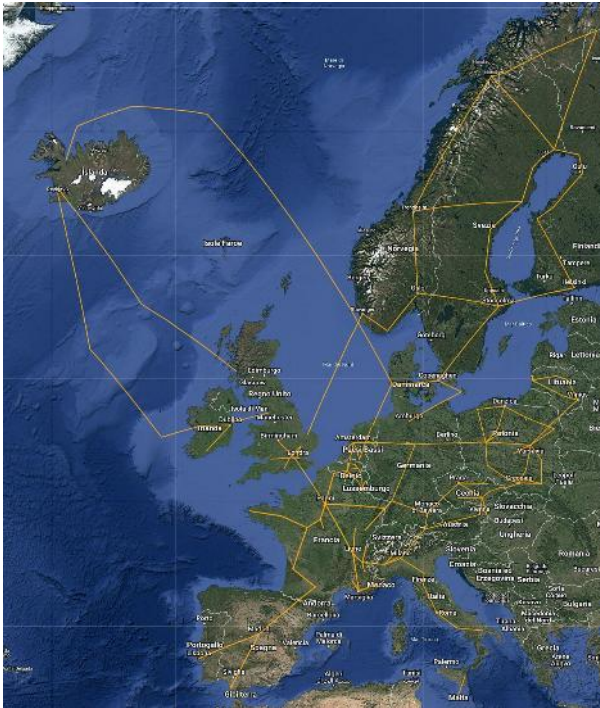
- Work on the C-PNT testbed**



# The status C-T infrastructure status

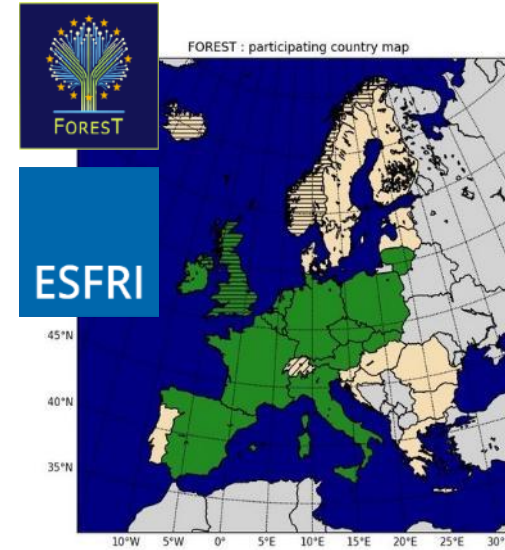
Level A-B

## Infrastructure Level D



## Infrastructure Level C

Country	Length (km)
<b>TOTAL</b>	<b>28 625</b>
AT	746
BE	1 000
CZ	2 141
DE	1 137
ES	0
FR	5 214
IE	892
IT	2 968
LU	0
MT	0
NL	760
PL	7 035
SK	---
UK	1 035
Cross-border	5 697



Market consultations for commercial providers  
Service roadmap via FOREST

GÉANT central route tbc  
2027

Engagement with  
EURAMET and BIPM

MS NRENs networks are  
predominantly scientific.

Stakeholders and market consultations  
Engagement with FOREST, CERN and  
commercial providers

# EU CPNT funding proposal 2027-34

Development of C-PNT (C-T and C-PN) ecosystem is fundamental for enhancing the EU's navigation and timing capabilities.

The European Competitiveness Fund (ECF) in article 59 proposes, for the incoming 2027-34 MFF: "a contribution to complementary PNT services, which shall increase the resilience in case of disruptions to the services provided by the PNT component."

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52025PC0555R%2801%29&qid=1754057198136>

# Conclusions

- The robust UTC timing backbone is essential for the EU PNT Ecosystem.
  - The European Commission is preparing to assess and decide on its contribution to C-PNT, with a priority focus on C-T to support the development of both existing and future Member State infrastructure
  - Proposed infrastructure is neutral, for commercial and scientific activities
  - JRC collaborates with National Metrological Institutes (NMIs) and National Research and Education Networks (NRENs), as well as international organizations such as CERN, EURAMET, and ITU-T.
- JRC is expanding its lab capacity as a critical enabler, open and available to European stakeholders.

We encourage Belgium and other Member States to **support** the European Competitiveness Fund (ECF) **proposal on the Council level**, allocating the necessary budget.



# Support slides

# C-T is a critical first step for the EU C-PNT

- **Aviation:** Surveillance-Broadcast (ADS-B) for air traffic control, navigation, landing, AI-supported control of drones (*10-100 ns*)
- **Maritime:** automatic identification system (AIS), guidance systems (*10-100 ns*)
- **Transport:** guidance systems, self-driving, dangerous goods (*10-100 ns*)
- **Finance:** high speed trading, regulatory compliance for financial institutions, banks, stock exchanges - transactions timestamping (MIFID II, SEC 613) (*10-100 ns*)
- **Telecommunications:** synchronization, 5G networks ultra-low latency and high-speed data transfer including NTN, base tower synchronization (internal market), TaaS to end user (change in network architecture), monitoring and coordination (network and internet operators, service providers), data centres and service (*1-100 ns*)
- **Entertainment:** digital television, digital radio, concerts, legal time distribution (*1000 ns +*)
- **Critical Entities (CE):** smart power grid, water/power management, CE resilience and monitoring (*10-1000 ns*)
- **Quantum applications:** computing, simulations and communication (e.g. for secure encryption key exchange) (*sub-ns*)
- **Scientific Research:** space observation, physics - quantum, particle accelerators (*sub-ns*)