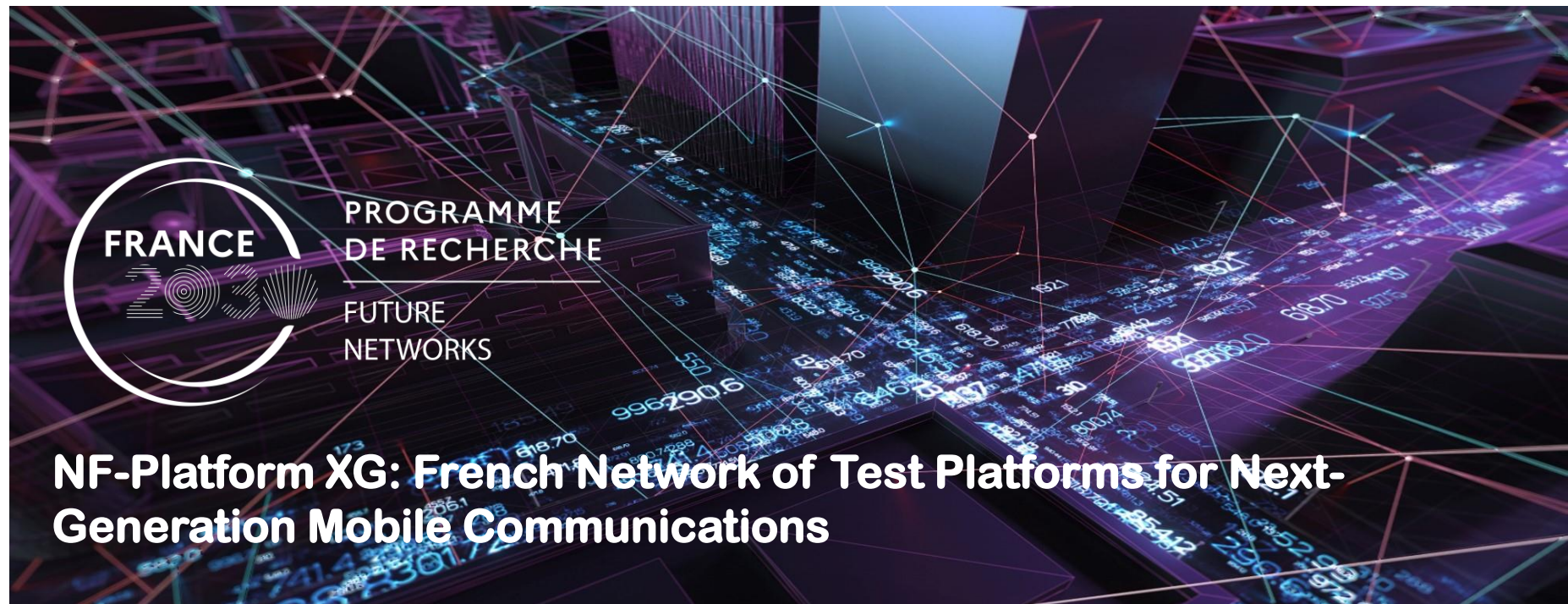




PROGRAMME
DE RECHERCHE
FUTURE
NETWORKS

NF-Platform XG: French Network of Test Platforms for Next-Generation Mobile Communications

General Introduction

Our main objective

Building a network of platforms at the highest technological level, open to the xG community, to meet various characterization and experimentation needs, and to establish proof-of-concept demonstrations serving the research goals of our partners.

An organization in three sets:

RF-Net (Radio Frequency Test Facility Network)

- Characterization of Components and Hardware Subsystems

SLICES-FR (Network infrastructure for high-performance networking and computing)

- Deployment of xG network infrastructures for the evaluation of technological building blocks across multiple use-case scenarios

NGC-AIoT (Next Generation Cellular – AI and IoT)

- Deployment of IoT networks and associated processing/computing (edge computing / AI)

INTRODUCTION RF-Net

What is RF-Net?

- RF-Net is the academic network dedicated to metrology resources for radio frequency characterization.

Mission

- Develop, maintain, and provide cutting-edge metrology infrastructure.
- Support research and development of hardware components for future networks.

HISTORY OF THE NETWORK'S CREATION

Origins of RF-Net

- **RF-Net** was born from prior reflections and an opportunity seized in 2021 with the launch of the **PEPR 5G and Future Networks** program (.
- In **September 2021**, the **French government** appointed **CEA, CNRS**, and **IMT** as coordinators of the **PEPR 5G and Future Networks** project.
- **RF-Net** is CNRS initiative



PARTNERS: CNRS Labs

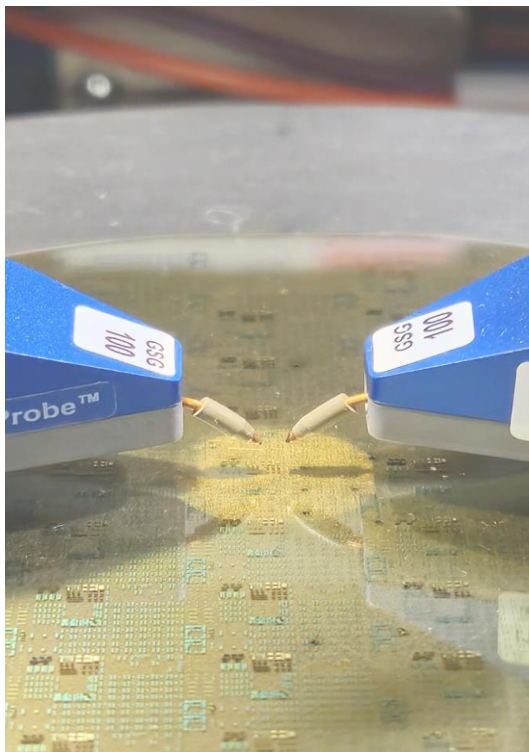
CORE GROUP OF RF-Net

- IEMN, UMR CNRS 8520
- IETR, UMR CNRS 6164
- IMS, UMR CNRS 5218
- LAB-STICC, UMR CNRS 6285
- XLIM, UMR CNRS 7252

Lab-STICC



The network is expected to expand by 2027 (additionnal CNRS Labs)

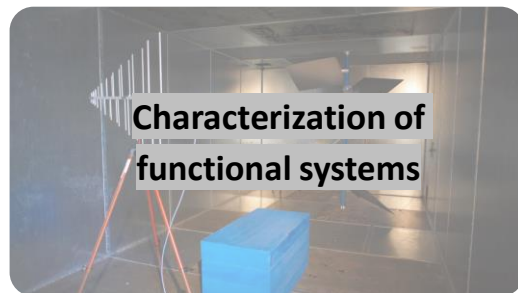
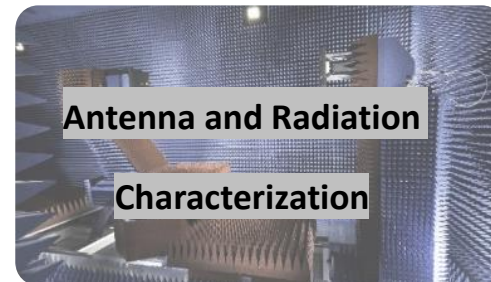
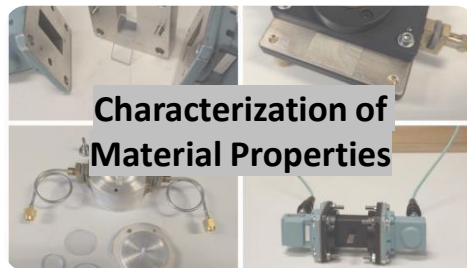


CURRENT RESOURCES OF RF-Net

Key Figures :

- **Types of Characterization:** Over 70 types of characterization and corresponding resources
- **Equipment :** Over €30 million worth of equipment
- **Occupied Area :** ~4,000 m²
- **Staff :** Over 20 persons (full time), with multiple actors operating independently after training

CHARACTERIZATION COVERED BY RF-NET



CHARACTERIZATION COVERED BY RF-NET

I. Characterization of Material Properties

Characterization of materials under specific environmental conditions, characterization of dielectric materials, characterization of magnetic materials, and characterization of complex materials. **It involves extracting the intrinsic properties of materials (complex permittivity and permeability, saturation magnetization, hysteresis loop, etc.) and spans frequency ranges from a few Hz up to the THz range.**

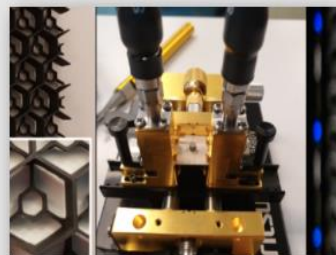
Platforms assigned to this characterization domain



CAMEL



PCMP



TECHYP



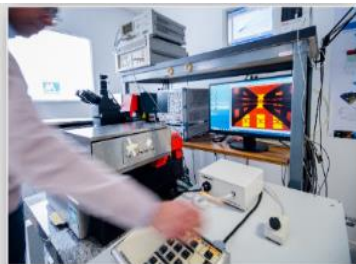
PLATINOM

CHARACTERIZATION COVERED BY RF-NET

II. Characterization of Active and Passive Components and Circuits :

Probe test stations: S-parameter measurements, large-signal (nonlinear) power measurements, noise measurements, time-domain measurements, specific measurements on voltage-/current-controlled components, and characterization of digital/logical signals

Platforms assigned to this characterization domain



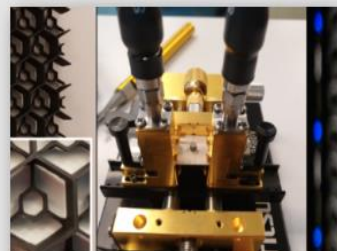
NANOCOM



CAMEL



PCMP



TECHYP



PLATINOM

CHARACTERIZATION COVERED BY RF-NET

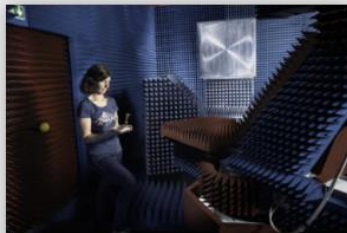
III. Antenna and Radiation Characterization :

Anechoic chambers: radiation patterns (2D and/or 3D), field mapping, electromagnetic imaging/diagnostics, S-parameters, and antenna-specific characterization measurements. Depending on the available configurations, the accessible frequency range can span from 100 MHz to 500 GHz.

Platforms assigned to this characterization domain



PCMP



M2ARS



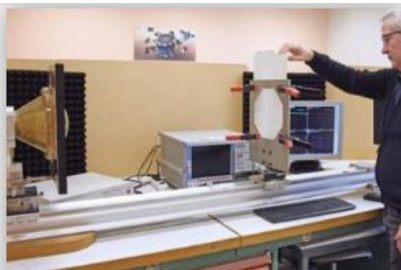
PLATINOM

CHARACTERIZATION COVERED BY RF-NET

IV. Characterization of Functional Systems

Electromagnetic compatibility (EMC) measurements (anechoic and reverberations chambers), TELECOM measurements, and energy efficiency characterization.

Platforms assigned to this characterization domain



CAMEL



PCMP



PLATINOM



QOSC

CHARACTERIZATION COVERED BY RF-NET

V. Characterization of Propagation Channels :

Channel sounding systems: Characterizations in various environments for propagation channels such as: LOS SISO, NLOS SISO, and MIMO, potentially integrating RIS-type devices up to sub-Thz range.

Platforms assigned to this characterization domain



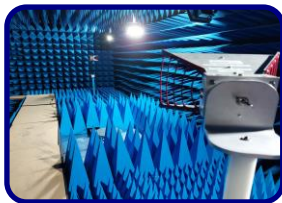
PCMP



CAMEL

RF-Net SHORT-TERM INVESTMENT PROJECTS

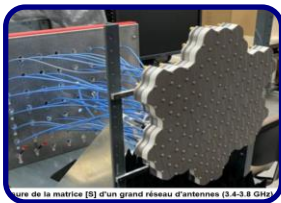
Some examples of future development



I. Antenna measurement
→ Adapt protocols to sub-THz frequencies



II. Channel sounding
→ Meeting the needs of cell-free and sub-THz



III. Intelligent Reconfigurable Surfaces (RIS)
→ Develop appropriate protocols and testing resources



IV. Active Components
→ Characterize at high frequencies (wide-gap semiconductors)



V. Materials
→ Perform measurements in a controlled environment (sub-THz)

Conclusion

RF-Net is open to collaboration

