SIGCOM in Numbers

- Created in 2009
- Total estimated **budget** 2024 ~ ca 11MEuros

**Head**: Prof. Symeon Chatzinotas

Personnel: 86
- 2 Prof. (2 IEEE Fellows)
- 5 Research Scientists (permanent)
- 5 Research Scientists (contract)
- 28 PostDocs
- 26 PhDs
- 14 Research Fellows
- 3 Research Specialists
- 3 Support Personnel

R&D — SIGCOM — **Tech. Transfer**

https://www.uni.lu/snt-en/research-groups/sigcom/

Main Areas:
- Wireless Comms & Networking
- Non-Terrestrial Networks
- Quantum Communications

uni.lu | SnT
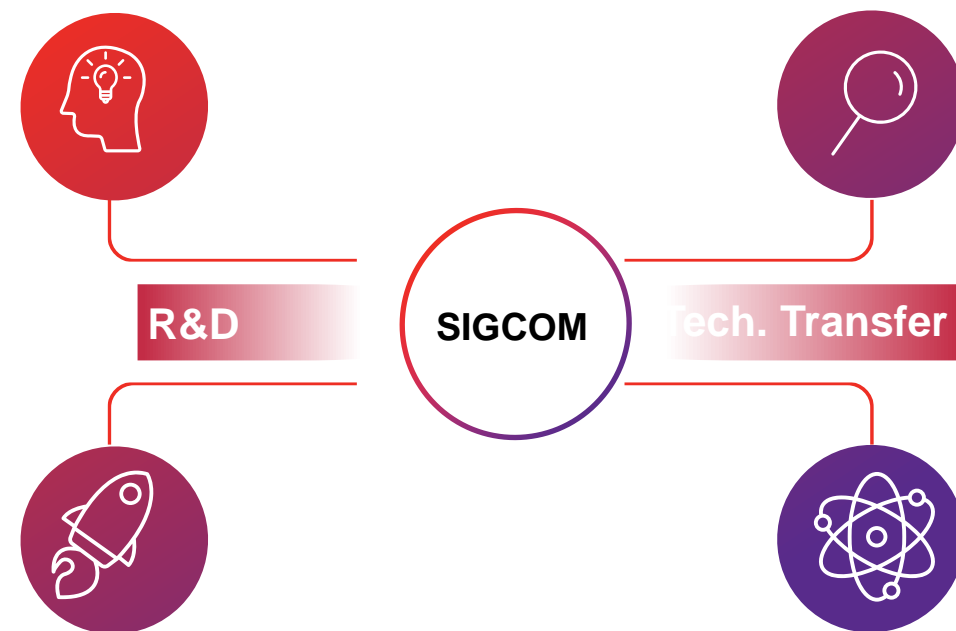
SIGCOM projects on Wireless / SatComs

>60 Projects in the past 11 years

10 EC projects
(FP7 & H2020 & Horizon
Europe & ERC & CHISTERA)

>20 National projects
(3 bilateral with
Belgium, France, UK)
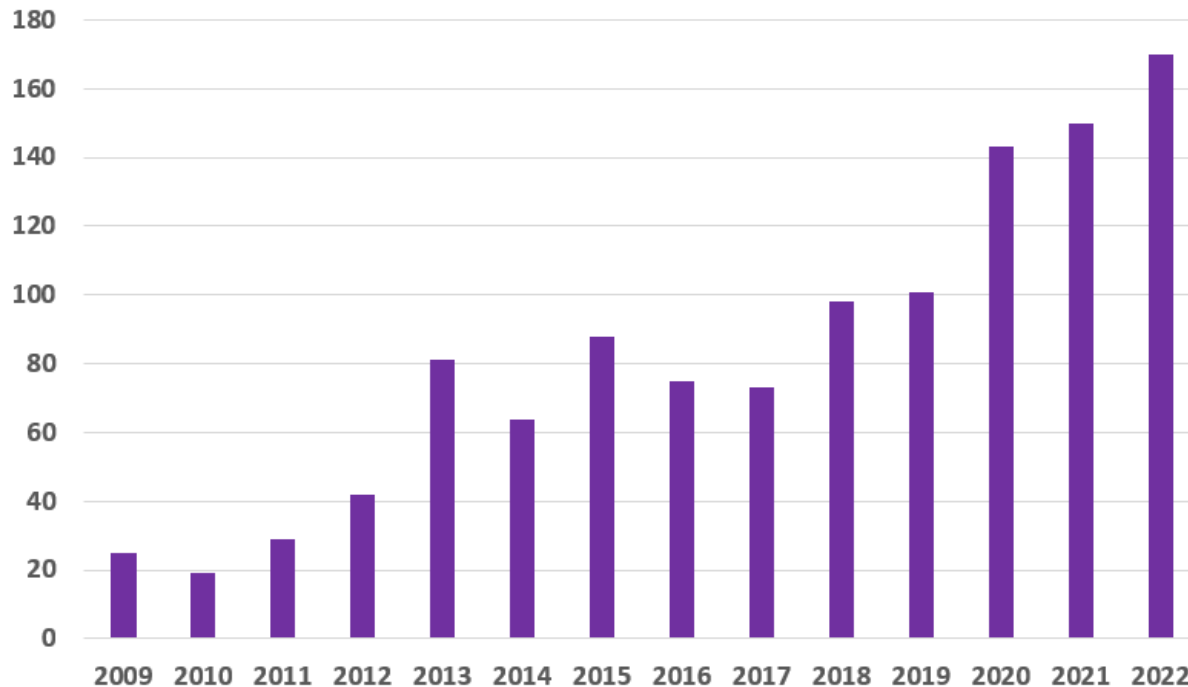
>30 ESA projects

Coordinators of HORIZON-JU-SNS-2022-STREAM-B-01-03 ETHER project

SIGCOM track record on Wireless / SatComs

Number of SIGCOM publications the past 14 years

Distinctions
 2014 IEEE ComSoc, Distinguished Contributions to Satellite Communications Award
2018 EURASIP Group Technical Achievement Award

Best Paper Awards
2015 CROWNCOM
2017 ICSSC
2018 EUSASIP JSC
2021 IEEE 5GWF
2022 WCNC

2014 FNR Best Thesis Award
2019 FNR Outstanding Scientific Publication Award

4 ERC grants (2 ERC Advanced Grants, 2 ERC PoC)

48 opportunities/invention disclosures

57 patent families

6G Research Areas

❑ Use Cases
- **IoT verticals (i.e. Industry 5.0, smart cities, E-health etc.)**
- **Unmanned Aerial Vehicles/Drones**
- **Integrated Satellite-Aerial-Terrestrial Networks**
- **Quantum Communications and Key Distribution**
- **Spectrum Management and Coexistence**
- **Tactile Internet**
- **Autonomous Transportation (i.e., self-driving vehicles)**

❑ Analytical Tools and Algorithms
- **Machine Learning/Artificial Intelligence**
  - Active learning, reinforcement learning, federated learning
  - Hybrid model-based and data-driven models
- **Graph Theory and Graph Signal Processing**
- **Convex/Non-Convex Optimization and Matlab-Based System-Level Simulators**

❑ Technological Enablers
- **Cell-Free Communications**
  - Cell-free Massive MIMO/ Distributed antenna systems
- **Smart Radio Environments**
  - Reconfigurable intelligent surfaces
  - Backscatter communications
- **Machine-Type Communications**
- **Ultra-Reliable and Low-latency Communications**
- **Edge Computing and Caching**
- **Radio Access Network (RAN) Slicing**
- **Network Softwarization and Virtualization**
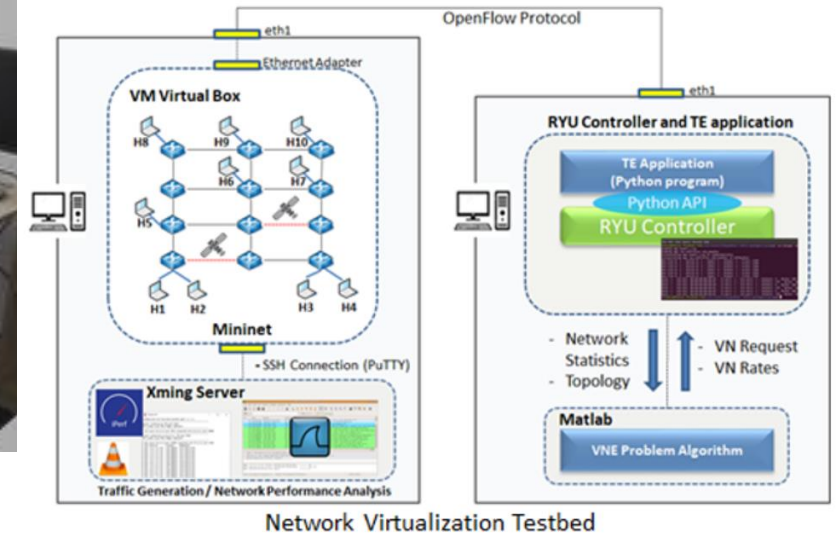 - Software defined networking
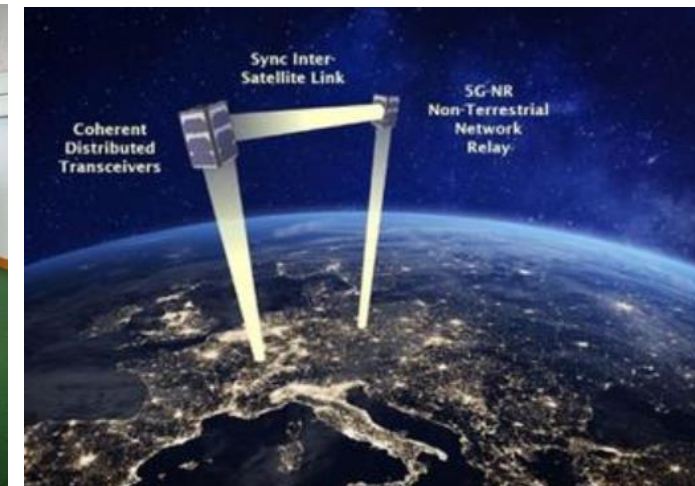 - Network function virtualization

uni.lu | SnT

SIGCOM – Experimentation

- ❑ SDR CommLab
- ❑ SDN Lab
- ❑ 6GSPACE Lab

Objectives:
- ❑ Proof of Concept/Market
- ❑ Lab Demonstration
- ❑ Patenting/Licensing
- ❑ Spin-off

Lab Description

- ❑ **SDR CommLab**:
- ❑ Focus on wireless communication systems for testing and validating digital signal processing algorithms
- ❑ End-to-end/Proof of Concept through real-time wireless communication testbeds for modeling, design, and testing of DSP algorithms
- ❑ Applications related to: interference management techniques for satellite communication, emulation of satellite communication systems, spectrum sensing for Cognitive Radio (CR) technologies, Spectrum Monitoring and Multiple-Input Multiple-Output (MIMO) systems

- ❑ **SDN Lab**:
- ❑ Use of a network virtualization testbed
- ❑ Experimentation platform, based on SDN
- ❑ validation of new autonomous network-slicing algorithms and their performance evaluation in integrated terrestrial-satellite systems

- ❑ **6GSPACE Lab**:
- ❑ Testing, validation and space operations demonstration for:
  - ❑ Earth-orbiting satellite communications and PNT
  - ❑ Earth-Moon communications and PNT
- ❑ Evaluation of different small satellite formation control and cooperation configurations for non-terrestrial 5G networks
- ❑ Realistic emulation of a space mission control room for communications and remote control of lunar rovers
- ❑ AI acceleration of satellite and space communications using COTS AI chipsets

HORIZON-JU-SNS-2024

Calls and topics we are interested in and can contribute to:

❑ **HORIZON-JU-SNS-2024-STREAM-B-01-01**
  ❑ New design approaches for 6G system architecture systems
  ❑ Native and trustworthy integration of AI for telecommunications

❑ **HORIZON-JU-SNS-2024-STREAM-B-01-02**
  ❑ Novel techniques for integrated sensing and communication
  ❑ Machine learning empowered physical layer evolutions
  ❑ Cell-free and extreme exploitation of MIMO technologies potentially including reconfigurable surfaces
  ❑ Key functionalities and technologies for 6G RAN system design
  ❑ Seamless integration of multiple frequency bands

❑ **HORIZON-JU-SNS-2024-STREAM-B-01-03**
  ❑ 3D networking for 6G networks
  ❑ Unified NTN service provision

❑ **HORIZON-JU-SNS-2024-STREAM-B-01-04**
  ❑ Integration of secured 6G communications via Quantum key distribution and post-quantum cryptography support