# Proposed Focus Topic for 2023 KDT Call

## “6G Integrated Radio Front-End for TeraHertz Communications”

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# Bottom-up Calls and Focus topics

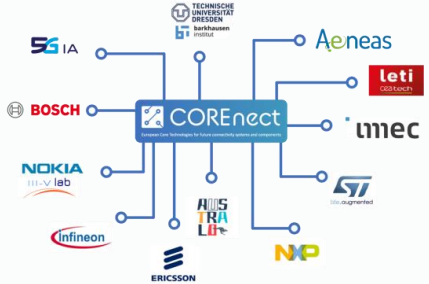
- Bottom-up Calls
  - Based on the ECS Strategic Research and Innovation Agenda
  - All topics are eligible
- Focus Topics
  - Focus Topics in KDT are topics in the ECS-SRIA that require a special attention for the sake of the Competitiveness of Europe in the ECS field and to which a specific part of the call will be dedicated to improve the coverage of the specific technology domain.
  - These can be
    - Topics addressing market / value chain gaps
    - High impact topics building on R&D strength
    - Societal goals

# Focus topic background

- Strategic importance of mastering the future connectivity infrastructure recognized by all advanced regions of the world.
  - race towards definition of 6G systems has already started.
- Need for Europe to secure its presence in the overall connectivity value chain
- Microelectronics is a key enabler for competitive solutions
- Europe strengths
  - Major telecom system manufacturers and leading suppliers of derived IC technologies
  - Strong analog design competences
  - Know-how on packaging and 2.5/3D integration.
- This Focus Topic builds on these strengths to:
  - Develop a competitive, secure and trustworthy supply chain for future telecommunications systems
    - ensuring European strategical control over several critical parts of that chain
  - Maintain and extend European leadership in microelectronics and connectivity
  - Reinforce European position towards standardization activities.
- Based on COREnect roadmap of microelectronics for communications platform
- Current draft refined with inputs from the microelectronics and telecom communities
  - Including the connectivity chapter writers from the ECS SRIA

# COREnect in a Nutshell

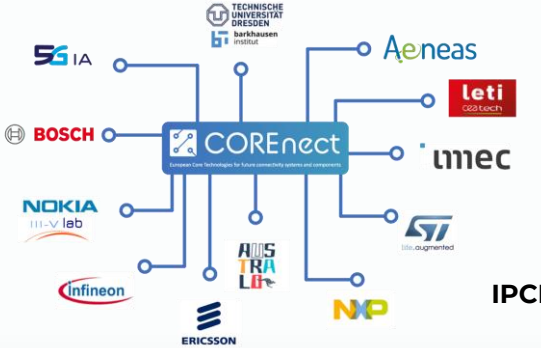
- **COREnect —European Core Technologies for future connectivity systems and components**
  - Project duration: July 1st, 2020 – June 30th , 2022
  - Coordinator: Technische Universität Dresden
  - 12 Partners from 7 countries
- **Major objectives**

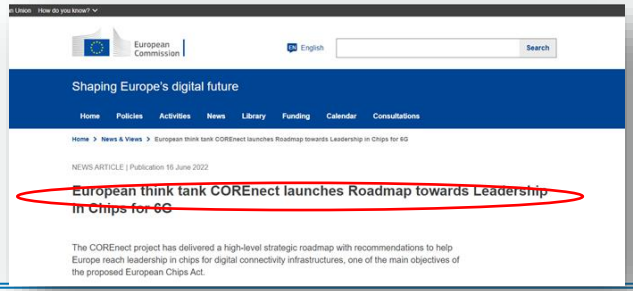



| | |
|---|---|
| Objective #1 | Bring European major players in microelectronics and telecommunications together, ***developing a strategic roadmap of core technologies*** for future connectivity systems, decreasing European dependence on other continents and building technological sovereignty in 5G and beyond 5G. |
| Objective #2 | ***Establish a connection and collaboration*** between the Smart Networks and Services (SNS) community and the Key Digital Technologies (KDT) community at the strategic research & innovation agenda level; |
| Objective #3 | ***Promote COREnect results to stakeholders in both private and public sectors*** and create the condition for one or more European champion(s) in the domain of core technology for attaining technology sovereignty in future connectivity systems. |

# Involving SNS and ECS communities


**COREnect Expert Groups**





**IPCEI on Microelectronics II**



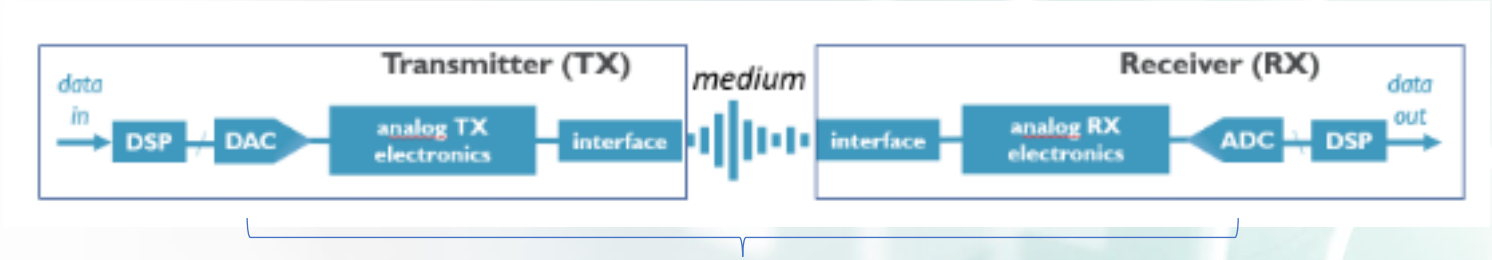
100+ experts have been involved in the COREnect Expert Groups

54 organizations from both inside and outside COREnect for the roadmapping activities

# Technical content (1/2)


- Semiconductor technologies targeting THz connectivity (III-V on Si, FD SOI, RF SOI, advanced BiCMOS)
  - cost-effective deployment,
  - Ft and Fmax of 500 GHz and beyond
  - combination with CMOS.
- Antenna and packages at THz, including substrate-integrated waveguides (SIW), meta-materials for antennas, meta-materials for intelligent reflective surfaces and meta-surfaces.
- Advanced packaging, PCB and heterogeneous 2.5D/3D integration technologies
- High power, high efficiency heterogeneous integration of III-V and silicon MMICs

# Technical content (2/2)




- Architecture and design tools and methodologies for radio front-end modules for THz communications and joint communications and sensing, including chip-package-antenna co-design, test, validation, and verification solutions.
- Novel phased-array antenna and/or system architectures, incl. hybrid beamforming, MIMO, sub-arrays, spare arrays, for efficient THz phased-array scaling for arrays with >>100 elements
- Beamforming for sub-THz and THz to overcome the high path loss of THz bands that can be integrated by 6G networks to meet the new demanding KPIs.
- Efficient heat management solutions for THz MMICs and front-end modules and systems

# Other key points (1/2)

- TRL 5-6 - IA
- Important aspect: Cost and energy efficiency
- Contribution to standards
- Synergies
  - Within the Call: All selected proposals will be implemented as “Horizon Europe linked actions”
    - Dissemination activities, joint workshops, common contribution to standardisation activities, etc…
  - Involvement of telecommunication equipment suppliers in the consortium will be positively evaluated

# Other key points (2/2)

- Synergies (cont'd)
  - With Smart Network and Services JU (R&I Work Programme 2023-24*):
    - Complementary research
      - E.g., Stream B, Research for revolutionary technology advancements, in preparation for 6G and revolutionary advancements of IoT, devices and software
      - Includes "Microelectronics-based Solutions for 6G Networks", scheduled for 2023
    - Integration of outcomes in future SNS Calls
      - E.g., Stream C, Enablers and Proof of Concepts used to further develop and consolidate experimental infrastructure
      - Includes "SNS Microelectronics Lighthouse", scheduled for 2024
    - The official release of the SNS call for 2023 is expected during January 2023. For more information you can contact the SNS JU Office and the 6G Smart Networks and Services Industry Association (6G-IA)

*pending approval from the SNS JU GB

# Next steps

- Final selection / endorsement of focus topics by KDT Governing Board
- Call publication by early February 2023 at https://www.kdt-ju.europa.eu/
- Webinar organized on December 15th

**R&I Goals and Opportunities for Micro-Electronics in 6G Networks**

**December 15 @ 10:00 am - 11:15 am CET**

The 6G-IA, together with AENEAS, is organising a open webinar on :

**R&I Goals and Opportunities for Micro-Electronics in 6G Networks**

**On Thursday 15 December 2022 at 10:00 CET**

(to download an ics file for your Calendar please Click Here)

The purpose of the webinar is to summarise the European policies and goals for Micro-Electronics in 6G Networks and to discuss the related 2023 calls for projects in this area in both the KDT JU and the SNS JU programmes.