

CEA- LETI – RADIOCOMMUNICATION SKILLS

Communication Systems

(Resource allocation, Channel Access, RF/Digital integration)

Physical Layer

(Signal Processing, Channel coding, MIMO)

Radio-Localization

(Ranging metrics, Solver algorithms, Cooperative techniques)

Proof of concept

(ASIC, FPGA, MCU, Embedded software, Analog & Digital)



POSSIBLE AREAS OF INVESTIGATION FOR ICT-19

- **Impact of slice orchestration on lower layers (RAN & backhaul)**
 - PHY/MAC/RRM evaluation for URLLC slice support, possibly in shared spectrum.
 - MAC & RRM: Deterministic and near-zero jitter access?
 - RRM : manage time & spatially varying interference, while meeting the SLA requirements of the considered vertical (eg.V2X).
 - Evaluation of application scenarios involving adaptive mMTC/URLLC PHY/MAC integration to support vertical application constraints (eg. battery lifetime and latency).
 - Integration of advanced PHY/MAC/RRM in pilots tailored to accommodate vertical specific requirements and context (below and above 6GHz, including mmW access points for MU-MIMO access, extension to satellite communications)

- **Long range high speed 5G-backhaul evaluation for deployment in rural areas operated in sub 6GHz bands, addressing multiple slices (mMTC, eMBB and URLLC) in a multi-tenant context.**

- **Evaluation and impact assessment of 5G localization capabilities according to slice orchestration**
 - Evaluation of Localization KPI of 5G NR applied to multiple vertical services. This includes sub-GHz and mmWave (resp. for mMTC and eMBB/Backhaul),
 - Impact assessment of onboard sensor geo-referencing and mapping on service orchestration for composite services

RECENT ACHIEVEMENTS

- **PHY layer:**
 - New BF- OFDM based waveform
 - Turbo-FSK for mMTC
- **MAC layer**
 - 5G Enhanced Dynamic Spectrum Access, licensed and non-licensed
 - Dynamic channel selection through Machine-Learning algorithm
 - MAC optimisation for mMTC deployments in the context of the factory of the future
- **RRM layer**
 - Reinforcement learning based radio resource management:
- **Radio geolocation**
 - Exploitation of the intrinsic potential of 5G mmWave waveforms
 - Localization with new 5G radio waveforms, LPWA narrowband
 - Cooperative geo-referencing and mapping over 5G V2X communications:
- **Field trials**
 - BF-OFDM @3,5GHz
 - BF-OFDM for rural areas (TVWS)
 - Turbo-FSK for low power wide area (LPWA)

FPGA implementation



CONTACT DETAILS

- For further info

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