

## DC07

*Individual Research Project title* - **AI-native procedures and protocols for Ultra Massive MIMO**

*Lead beneficiary (place of employment)* – **VODAFONE INTELLIGENT SOLUTIONS ESPANA SA (VF)**, AVENIDA DE AMERICA 115, MADRID 28042, Spain **and UNIVERSIDAD CARLOS III DE MADRID (UC3M)**, CALLE MADRID 126, 28903 GETAFE (MADRID), Spain.

*Secondment at* - **TAMPEREEN KORKEAKOULUSAATIO SR (TAU)**, KALEVANTIE 4, 33100, TAMPERE, Finland.

*Supervisory team* - Academic: Prof. Ana García Armada (UC3); Industry: Ms. Lucia de Miguel (VF); Mentor: Prof. Mikko Valkama (TAU)

*Project tasks and objectives* - Design AI-native procedures and protocols for UmMIMO, including predictive channel estimation to reduce pilot overhead and optimize beamforming in very dense urban scenarios, and seamless space-time-frequency scheduling to overcome its exponential complexity. This work will consider AI not as an additional feature, but already embedded in the scheduler, and the implementation will be aligned with ORAN architecture, analyzing the feasibility to be developed as RIC-based applications.

*Expected Results* - New efficient channel estimation and scheduler including, multi-user MIMO strategy, time-frequency resource allocation and MCS selection. Performance analyzed in realistic conditions and best options prototyped for a proof of concept.

*Planned secondment objectives* - to study the inclusion in O-RAN of the ML algorithms on which TAU is working,

*Eligibility* - University master's degree and be eligible to enroll in a PhD program. Knowledge in fields related to Telecommunications (or closely related disciplines) is appreciated. A high level of English language is required. International experience is appreciated. Research experience and good communication skills are appreciated. Not have resided or carried out their main activity (work, studies, etc.) in Poland for more than 12 months in the 36 months immediately before the recruitment date. Non EU-candidates should have preferably an EU working permit.

*Evaluated criteria* –

- Study records, including Bachelor and Master
- Work & research experience
- Motivation
- Letters of recommendation
- Positive attitude, previous mobility experience, good communication skills
- English proficiency and other languages

*Preferred starting date*- June 2024 (as soon as possible)

*Trial period* – 6 months

*Target degree* - PhD degree from — **UNIVERSIDAD CARLOS III DE MADRID**

*Approximate gross salary –*

2 770 € for a fellow without family

3 270 € for a fellow with family (e.g., married/in recognized relationship/with children)

This gross salary is approximate. It has been derived from the funding provided by the Granting Authority by an adjustment based on the country's cost of living index, and worker-related costs for the beneficiaries (contracting entity), considering current legislation. Please note that these figures are estimate and subject to change based on prevailing circumstances.

*Working and living conditions –*

Detailed information about Spain: <https://www.oecdbetterlifeindex.org/countries/spain/>

Detailed information about Finland: <https://www.oecdbetterlifeindex.org/countries/finland/>

**VODAFONE ESPAÑA**, It is the Spanish subsidiary of the British multinational company Vodafone. The operator uses the commercial brand "Vodafone", through which it offers telephone, internet and television services (Vodafone TV) in Spain. It was launched as a trademark in Spain, on 2001, after the acquisition of Airtel by Vodafone. The subsequent acquisitions of Tele2 Spain on 2007, and Ono on 2014.3 consolidated it as the second multimodal operator in the country, and the second in mobile telephony. The company has recently been sold to the British investment fund Zegona.

Website: <https://www.vodafone.es/>

**UNIVERSIDAD CARLOS III DE MADRID**: It is ranked 35th in the world and 12th in Europe in the QS ranking of the 50 best universities in the world under 50 years old and is included in THE academic ranking of universities. The UC3M also stands out for the high employability of graduates, which reaches 90.6%

Webpage: <https://www.uc3m.es/home>

**TAMPEREEN KORKEAKOULUSAATIO** The Tampere Universities community comprises Tampere University and Tampere University of Applied Sciences. Together we are building a new model for higher education and research in Finland. Tampere Universities came into being at the beginning of 2019 when the University of Tampere and Tampere University of Technology were merged to create the new foundation-based Tampere University that maintains close collaboration with Tampere University of Applied Sciences.

Website: <https://www.tuni.fi/en>

*Additional information:*

Please check additional requirements for the PhD degree in UC3M:

[https://www.uc3m.es/ss/Satellite/Doctorado/en/Detalle/Estudio\\_C/1371323806437/1371210298470/Signal\\_Processing\\_and\\_Communications\\_Engineering#access](https://www.uc3m.es/ss/Satellite/Doctorado/en/Detalle/Estudio_C/1371323806437/1371210298470/Signal_Processing_and_Communications_Engineering#access)