



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 4 - Telecommunications

**PARTENARIATO PNRR Research Field: NEXT-GENERATION RADIO ACCESS NETWORKS
FOR SMART RADIO ENVIRONMENTS**

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

**Motivation and objectives of the research
in this field**

This research project is in the framework of
RESTART
PARTENARIATO ESTESO RESEARCH AND
INNOVATION ON FUTURE TELECOMUNICATION
SYSTEMS AND NETWORKS TO MAKE ITALY MORE
SMART
CUP D43C22003080001
Decreto di Concessione D.D. 1549 del 11/10/2022

Recent advancements in hardware manufacturing allow considering new types of devices able to manipulate the type of propagation seen along the channel between the user and the network access point. This opens a new degree of freedom when deploying mobile radio networks' services, as the radio link behavior can be programmed to better adapt to service requirements, user environment, and processing capabilities. Therefore, controlling these new RAN devices affects the environmental conditions perceived by electromagnetic waves. In parallel, mobile radio network architectures are undergoing a radical shift towards a service-based, multi-tenant, virtualized, decentralized, programmable, and smart ecosystem, which allows to better share available resources according to an open RAN paradigm. Therefore, the aim of this research is to investigate how this complex and



	heterogeneous radio environment can be managed by using smart approaches that make an efficient use of available network resources.
Methods and techniques that will be developed and used to carry out the research	This research will make the PhD student familiar with virtualized RAN and CN solutions, SDR devices, and OpenRAN implementations. Optimization algorithms for network planning and resource allocation will be developed. Machine Learning techniques can be applied to resource management problems.
Educational objectives	The PhD student will interact with the international community of researchers in computer networking, both from academic and industrial world. In this lively and stimulating environment, and supported by ANTLab (www.antlab.polimi.it) research group, the PhD student will become a skilful researcher, with expertise in wireless network optimization.
Job opportunities	This research opens the doors to a career in the engineering of future wireless networks, characterized by an increasing complexity in the interaction between device operations and surrounding environment. Potential job opportunities include advanced research centers, R&D departments of international companies, startup founder, and academic career.
Composition of the research group	2 Full Professors 3 Associated Professors 1 Assistant Professors 5 PhD Students
Name of the research directors	Ilario Filippini

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--



Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

The funding for the scholarship comes from the project RESTART Spoke 3 – Milano Structural Project S6: 6GWINET

LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: Università di Bologna, Politecnico di Torino, Università Federico II di Napoli, CNR, Fondazione Ugo Bordoni, CNIT, Vodafone Italia, Athonet

EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student
5.707,13 Euro

TEACHING ASSISTANTSHIP: (availability of funding in recognition of supporting teaching activities by the PhD student)

There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

COMPUTER AVAILABILITY: individual use

DESK AVAILABILITY: individual use

D.D. 341 del 15/03/2022 Avviso pubblico per la presentazione di Proposte di intervento per la creazione di "Partenariati estesi alle università, ai centri di ricerca, alle aziende per il finanziamento di progetti di ricerca di base" – nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 "Istruzione e ricerca" – Componente 2 "Dalla ricerca all'impresa" – Investimento 1.3, finanziato dall'Unione europea – NextGenerationEU