

RESTART – Network and service orchestration for B5G systems

Background

Beyond 5G/6G networks are expected to converge towards highly distributed communication networks natively embedding multiple layers of computing resources (between micro data-centers to individual hosts that are located close to (or co-located with) the access networks), which will serve diverse applications with demanding QoS requirements, such as ultra-low latency and ultra-high reliability. Network automation (using NFV/SDN technological paradigms) and optimized resource orchestration are key enablers to support the dynamic deployment of virtualized network/computing slices over such converged infrastructure, which are tailored for specific services with distinct QoS requirements. However, existing centralized management and orchestration approaches pose critical limitations in terms of scalability, flexibility, and sustainability, as the size and complexity of this convergence infrastructure grows.

Topic description

The proposed research plan aims at developing novel solutions for distributed network and service orchestration in B5G/6G systems that can serve a massive number of extremely heterogeneous and dynamic network slices that cross multiple technological domains (i.e., device, RAN, core, edge, and cloud) in highly dynamic and uncertain environments. Examples of expected research outcomes are the design of: (i) novel AI/ML-driven network and edge orchestration algorithms in B5G networks; (ii) energy-efficient mechanisms to aggregate and disaggregate shared resources when scaling up and down network slices; and (iii) protocols and APIs to integrate the proposed algorithms in the ETSI reference architecture for orchestration, network and service management (e.g., NFV, MEC, ZSM). Proposed solutions will be evaluated both through modeling/simulation, and experiments with prototypes deployed in the SLICES-RI infrastructure, an European test platform on Digital Science (<http://slices-ri.eu>)

Type of prospect positions

We plan to open positions at the level of Researcher on this topic.

Funding and partnerships

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Candidate profile

Ideal candidates should have obtained a PhD degree in Computer Science, Computer Engineering, Telecommunications Engineering, or closely related disciplines, and a proven track record of excellent

scientific publications. Preferably, the PhD should be in one of the relevant research areas: network function virtualisation, algorithms and tools for network and resource orchestration, distributed computing, 5G networks. Good knowledge of virtualization technologies (e.g., Kubernetes) and orchestration tools (e.g., ONOS) is preferable but not a prerequisite.

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