Mobile Information Systems

Hindawi

Special Issue on

Advances on Radio Access and Core Networks of 5G Mobile Communication Systems

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The fifth generation (5G) of mobile communication systems is expected to simultaneaously support a wide range of vertical industries, each characterized by different features in terms of traffic types (e.g,. human- or machine-oriented), Quality of Service (e.g., high data rates, extremely low latency, and high-priority messages), and required functionalities (e.g., enhanced support of mobility). To support such heterogeneity, enhanced functionalities on the radio access are needed to support novel use cases (e.g., ultra low-latency and high-reliable transmissions). At the same time, flexibility in the management of both control and data planes needs to be guaranteed in the core network.

The provisioning of the abovementioned heterogeneity of services dictates a radical shift in the design of mobile communication systems. To this aim, disruptive paradigms are currently under consideration in the road to 5G. From a radio access point of view, decoupling approaches allow a device to simultaneously have multiple associations to different cells in terms of downlink/uplink and control/data planes; this improves capacity and reliability compared to the cell association in traditional mobile systems. By further enhancing the concept of decoupling, Software Defined Networking (SDN) and Network Functions Virtualization (NFV) are considered as main enablers of flexible 5G network architecture in both radio access and core segments by decoupling network functions and management from the underlying hardware. In addition, SDN and NFV enable the introduction of network slicing in 5G mobile communication systems where different verticals with heterogeneous requirements can be simultaneously supported by having multiple logical networks, each tailored to fulfil the requirements of a specific vertical, deployed over one single physical infrastructure.

The objective of this special issue is to bring together the state-of-the-art and novel contributions on network optimization, architecture design, and transmission procedures for 5G communication systems by considering downlink/uplink as well as control/data plane decoupling, SDN, NFV, and network slicing.

Potential topics include but are not limited to the following:

- Design and evaluation of solutions for network slicing (e.g., slice definition, architectural enhancements, slice selection, and slice migration) in 5G mobile communication systems
- Optimization of 5G mobile information systems for industrial networks (e.g., low-latency, high reliability, and traffic prioritization), including Industrial IoT
- Analysis and solutions of service delivery with guaranteed end-to-end QoS for low-latency use cases (e.g., tactile Internet, haptic communications, and teleoperations) over 5G mobile communication systems
- SDN/NFV (e.g., modularization and granularity definition of functions, interfaces among virtualized functions, service function chaining, and dynamic network topology) in the radio access and core networks of 5G mobile communication systems
- Placement of 5G network functions, by considering the impact fronthaul and backhaul availability has on function placement in both central and edge clouds and on cloud-RAN deployments
- Performance evaluation of SDN/NFV-based 5G networks in test-beds
- Artificial Intelligence (AI) and Machine Learning (ML) in 5G mobile information systems
- Design of functionality split solutions (e.g., PHY, PHY/MAC, and RLC/PDCP) for the protocol stack of 5G mobile communication systems
- Design, analysis, and evolution of decoupling solutions (e.g., control/user plane and downlink/uplink) for radio access and core networks of 5G mobile communication systems

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