Fiche doctorat

Titre : IoT Service Placement and Migration in Edge Computing of 5G Networks
Mots clefs : service placement, load distribution, edge computing, Internet of Things, quality of service.

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Description :

Over the past decade, the cloud computing model was broadly adopted in Information Technology (IT) domain. Despite its success, the cloud computing adoption has to overcome several challenges facing the emergence of the Internet of Things (IoT). First, the rapid growth in the number of IoT devices (e.g., sensors, actuators, mobile phones, and other access devices) generates very large volumes of data that may lead to traffic congestion on the network core, data center overload, and high financial cost. Second, the large physical distance between IoT devices and cloud data centers results in high communication delays, which may be unacceptable for some time-sensitive applications (e.g., high-quality video streaming, interactive mobile gaming, augmented reality, and mission-critical applications) requiring low end-to-end latency (e.g., 10 ms or even 1 ms). Third, it is difficult for applications deployed in the cloud to quickly adapt to changes in the local context (e.g., precise user location and local network conditions) of distributed mobile devices.

Aiming to address these cloud challenges, relatively recent research efforts introduced the concept of Edge Computing (EC), which extends the cloud computing capabilities closer to end-users (i.e., at the edge of networks). EC adds a new layer of distributed computing nodes between end-user devices and cloud

data centers. Therefore, applications running on EC can perform actions close to its users before connecting to the cloud, thus (i) reducing the network overhead, (ii) providing faster responses, and (iii) getting local contextual information most efficiently.

As promising as EC is, it also faces some issues. In particular, a relevant problem to be addressed is the Management and Orchestration (MANO) of resources. A role of MANO is to decide where and when to place multiple applications/services (i.e., whether on a node in the edge or within the cloud) according to infrastructure's resource constraints, applications' Quality of Service (QoS) requirements and other desired goals.

Motivated by the above facts, we intend to address the service placement problem in edge computing of 5G networks and propose new and innovative solutions to this issue.