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Mobile Edge Computing: Opportunities, Solutions, and Challenges

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Abstract—The emergence of several new computing applications, such as virtual reality and smart environments, has become possible due to availability of large pool of cloud resources and services. However, the delay-sensitive applications pose strict delay requirements that transforms euphoria into a problem. The cloud computing paradigm is unable to meet the requirements of low latency, location awareness, and mobility support. In this context, Mobile Edge Computing (MEC) was introduced to bring the cloud services and resources closer to the user proximity by leveraging the available resources in the edge networks. In this paper, we present the definitions of the MEC given by researchers. Further, motivation of the MEC is highlighted by discussing various applications. We also discuss the opportunities brought by the MEC and some of the important research challenges are highlighted in MEC environment. A brief overview of accepted papers in our Special Issue on MEC is presented. Finally we conclude this paper by highlighting the key points and summarizing the paper.

Index Terms—Mobile Edge Computing, Edge Computing, Fog Computing, Cloudlets

✦

1 INTRODUCTION

The cloud computing facilitates users with several opportunities by providing wide range of services and virtually unlimited available resources [1], [2]. The large pool of resources and services has enabled the emergence of several new applications, such as virtual reality [3], smart grids [4]–[6], and smart environments [7]. However, the euphoria transforms into a problem for delay-sensitive applications, which need to meet the delay requirements. The problem becomes clearer and more intense as several smart devices and objects are getting involved in human's life as in case of smart cities [8] or Internet of Things [9]. Current cloud computing paradigm [10] is unable to meet the requirements of low latency, location awareness, and mobility support [11], [12]. To address the problem, researchers have coined a term of Mobile Edge Computing (MEC) that

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was introduced to bring the cloud services and resources closer to the user proximity by leveraging the available resources in the edge networks. To meet the above mentioned requirements of applications, the mobile operators are planning to integrate the computing, networking, and storage resources with the base station in the form of MEC platform. Similar to Cloudlet [13], [14], MEC is not replacing but complimenting the cloud computing model. The delay sensitive part of application can be executed on MEC server whereas delay tolerant compute intensive part of application can be executed on the cloud server.

MEC aims to enable the billions of connected mobile devices to execute the real-time compute-intensive applications directly at the network edge. The distinguishing features of MEC are its closeness to end-users, mobility support, and dense geographical deployment of the MEC servers [12]. Despite the several advantages, realizing the vision of MEC is challenging task because of the administrative policies and security concerns. There is a need to investigate the key requirements and potential opportunities for enabling the vision of MEC. In this special issue, we sought new and