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# Mobile Edge Computing

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## Abstract

Mobile applications are becoming increasingly computational-intensive, while many mobile devices still have limited battery power and cannot support computational intensive tasks. Mobile edge computing (MEC) computing is an extension of edge computing, and it refers to computing at the edge of a network. In mobile edge computing, computing and storage nodes are placed at the Internet's edge near mobile devices. It places the edge clouds at the candidate locations. This paper presents a brief introduction to MEC.

***Index terms***— mobile edge computing, edge computing, multi-access edge computing.

## 1 Introduction

he technological evolution of mobile devices, such as smartphones or laptops, has an impact on mobile and wireless networks worldwide. An increasing number of applications are routinely installed on a mobile device. Mobile devices have become the most natural devices for multimedia consumption, production, computation, and human-computer interaction [1]. Due to limited size, battery capacity, energy consumption, and latency of the mobile devices, one is constrained to run the computationally demanding task on them.

To address this problem a new emerging concept, known as mobile edge computing (MEC), has been introduced. MEC is recently known as multiaccess edge computing. This is a new paradigm of cloud computing, which provides low-latency service by moving cloud resources to the edge of the network rather than a remote central cloud data center. In other words, MEC has emerged as an effective way to mitigate the problem of long latencies and improve the current network architecture.

The European Telecommunications Standards Institute (ETSI) introduced the concept of MEC, where mobile users can utilize computing services from the base station [2]. Since MEC is an extension of edge computing, it is expedient to give some background information on edge computing.

## 2 II.

## 3 Overview of Edge Computing

The proliferation of the Internet of things (IoT), the success of cloud services, and the 5G communication technologies have led to the emergence of a new computing paradigm, edge computing, which calls for processing the data at the edge of the network, as opposed to a data center or cloud. Edge computing is essentially the computing infrastructure that exists close to the sources of data. Edge computing enables data produced by the Internet of things (IoT) devices to be processed closer to where it is created. This allows organizations to analyze their data in real-time.

Edge computing covers a spectrum of technologies such as cloudlets, fog computing, and mobile edge computing. A combination of edge and cloud computing is referred to as fog computing because it combines centralized and distributed computing resources into a single architecture. Physical proximity is the essence of edge computing since it improves latency, bandwidth, trust, and survivability. While the cloud revolutionized the way we deal with data, the next wave of that revolution will happen at the edge [3]. Edge computing is instrumental in enabling edge processing to deliver on the promise of the industrial IoT.

## 4 III. Concept of Mobile Edge Computing

Mobile edge computing (MEC) is a network concept that enables cloud computing capabilities at the edge of the cellular network. The edge of a network refers to the edge of a mobile network, hence the term "mobile

edge computing." It mitigates the problem of long latencies. It is an integration of cloud computing and mobile computing. It is an emerging architecture where cloud computing services are extended to the edge of networks. MEC is regarded as one of the key components for technologies for 5G systems [4]. Its main motivation is that processing tasks closer to the cellular customer will reduce network congestion. It is characterized by a low latency, proximity, high bandwidth, and agile mobile service.

It provides ubiquitous and efficient cloud services to mobile users.

Mobile edge servers are co-placed with the mobile network base station at the edge of the mobile network. Mobile edge computing represents a key technology and architectural concept to enable the evolution to 5G. MEC can offer a service environment with ultralow latency, high-bandwidth, and direct access to real-time network information [5]. A typical mobile edge computing architecture is shown in Figure **??** [6].

# 5 IV.

# 6 Applications

As a promising edge technology, it can be applied to mobile, wireless, and wireline settings, using software and hardware platforms that are located at the network edge in the vicinity of end-users. MEC providers can improve the efficiency and resources utilization for IoT applications. Applications, such as smart grid, content delivery networks, crowd sourcing, augmented reality, traffic management, and healthcare will greatly benefit from mobile edge computing. Some of these are covered here in detail [7].

? Healthcare: MEC can help healthcare professionals assist their patients, independent of their geographical location. MEC enables smartphones to collect patient physiological information. For example, to detect and prevent falling accidents, human-computer interaction devices, such as a smartphone, smart watch, and Google glass, can be introduced. ? Video Analytics: MEC will be beneficial by implementing intelligence at the device itself which is programmed to send data to the network. MEC enables surveillance cameras to be bene ficial for several applications, such as traf fic management applications.

# 7 ? Connected Vehicles:

Mobile edge computing supports connected cars to ensure real-time, interactive, services for users. Deploying MEC environments along the road can enable two-way communication between the moving vehicle. Connected vehicles have access to the Internet and can sense the physical environment around them and interact with other vehicles [8].

? Smart Grid: A smart grid infrastructure consists of several components, such as smart appliances and smart meters that are distributed over the network. When the smart meters and micro grids integrated with MEC, SCADA systems can be supported.

V.

# 8 Benefit and Challenges

Mobile edge computing (MEC) offers a wide range of benefits for equipment providers and system integrators. It puts the services and resources of the cloud closer to users and delivers low latency. It aims to reduce end-to-end latency, ensure better service delivery, and offer improved user experience. MEC facilitates the leveraging of available services and resources in the edge networks, closer to the users, instead of in the cloud. It significantly reduces the energy consumption of user equipment.

MEC faces some challenges which include the administrative policies and security concerns, i.e., secure data storage, secure computation, network security, data privacy, usage privacy, location privacy, etc. [9]. In MEC, service latency is the main concern, which brings in new challenges to live virtual machine (VM) migration. In conventional cloud computing, users normally do not have a high requirement for service latency.

Compared to cloud computing, resource provisioning in MEC is challenging. Standards for MEC are being developed by ETSI.

# 9 VI.

# 10 Conclusion

Mobile edge computing is emerging as a novel computing platform that overcomes the problem of limited resources of mobile devices and meets the everincreasing computation demands from mobile applications. It provides cloud computing capabilities at the edge of the network, near the mobile devices. It is envisioned as a promising approach to improving the computation capabilities and energy efficiencies of mobile devices. [1]

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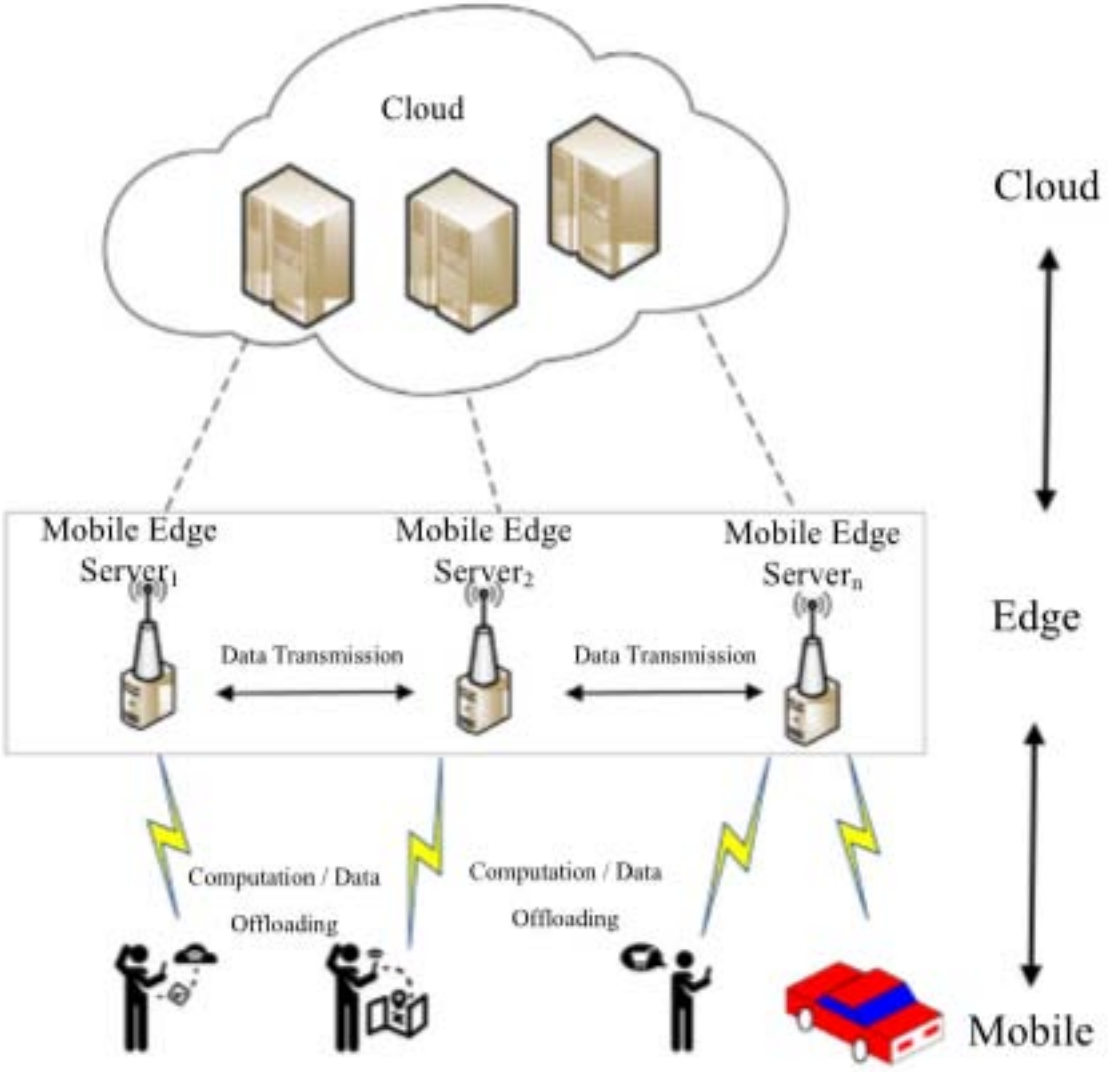
Cloud
Cloud
Mobile Edge Server1
Mobile Edge Server2
Mobile Edge Servern
Edge
Data Transmission
Data Transmission
Computation / Data Offloading
Computation / Data Offloading
Mobile

Figure 1:

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