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Offloading in Fog Computing for IoT: Review, Enabling Technologies, and Research Opportunities

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Abstract

The digital world is expanding rapidly and advances in networking technologies such as 4G long-term evolution (LTE), wireless broadband (WiBro), low-power wide area networks (LPWAN), 5G, LiFi, and so on, all of which are paving the way for the emergence of sophisticated services. The number of online applications is increasing along with more computation, communication, and intelligent capabilities. Although current devices in use today are also getting more powerful in terms of features and capabilities, but they are still incapable of executing smart, autonomous, and intelligent tasks such as those often required for smart healthcare, ambient assisted living (AAL), virtual reality, augmented reality, intelligent vehicular communication, as well as in many services related to smart cities, Internet of Things (IoT), Tactile Internet, Internet of Vehicles (IoV), and so on. For many of these applications, we need another entity to execute tasks on behalf of the user's device and return the results - a technique often called offloading, where tasks are outsourced and the involved entities work in tandem to achieve the ultimate goal of the application. Task offloading is attractive for emerging IoT and cloud computing applications. It can occur between IoT nodes, sensors, edge devices, or fog nodes. Offloading can be performed based on different factors that include computational requirements of an application, load balancing, energy management, latency management, and so on. We present a taxonomy of recent offloading schemes that have been proposed for domains such as fog, cloud computing, and IoT. We also discuss the middleware technologies that enable offloading in a cloud-IoT cases and the factors that are important for offloading in a particular scenario. We also present research

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