ABSTRACT

IoT leverages heterogeneity, interoperability, distributed processing, and real-time analytics in parallel. Cloud supported IoT could provide dynamically scalable and often virtualizes resources as services over the Internet for IoT era. Limitation of cloud such as high latency and high costs led to development of new cloud concept called fog computing. Fog computing moves data processing closer to the network edge to reduce Internet traffic.

The purpose of this thesis is to propose modified fog offloading framework that able to reduce requests end-to-end delay. In contrast to the previous works in the literature, the proposed framework will be limited to a clustered IoT network. K-means clustering algorithm is used for clustering the IoT nodes. The proposed framework allowed IoT nodes to send a request to its clusters fog node and a request can be offloaded to another fog nodes or to the cloud. Offloading decision is based on waiting time and queue length threshold which determined using brute force method.

Three different scenario each with eleven different parameter settings are applied and combined with five different request intergeneration time. Assumed there are two types of request, light request and heavy request generated by IoT nodes. Discrete event simulator is used to analyze performance of the framework consisting of end-to-end delay, total requests processed, request success ratio and fog nodes utilization.

Two thresholds determined using brute force method that focuses on obtaining lowest end-to-end delay have been applied to the offloading framework. The experimental simulation results on clustered IoT network shows that the proposed offloading framework is able to independently process request using cluster's fog node and also able to offload requests to other fog nodes or cloud. The framework is also able to decrease end-to-end delay up to 75.8% and able to partially meet the ITU-T Rec. G.114 requirement. Request success ratio is also improved using fog-cloud processing (FC) scenario with value up to 55.8%.

Keywords: Fog Computing, Computational Offloading, Internet of Things