ABSTRACT

Smart grids have a higher demand for latency and data transmission stability in power grids, which is a major challenge for existing power grid communication technologies. The smart grid system becomes open to operators and even users, so in order to ensure efficient communication to share information across the smart network system, the concept of a Named Data Network (NDN) is designed for the smart grid system. NDN has network caching capabilities to store response packets; in this way, if users request data repeatedly, it can be obtained from the appropriate CS in the nearest location without having to access the terminal, thus reducing network traffic and reducing the risk of network congestion.

Because the smart grid systems used today still use TCP/IP, this concept has weaknesses in sending and receiving data packets. Therefore, the solution that can be proposed is to implement the NDN concept. The best route forwarding and client control strategies, as well as caching strategies, are Least Recently Used (LRU) and First In First Out (FIFO). The implementation of such system strategies is supported using NDN network topologies based on IEEE-39. Then, analyze which strategies are best against forwarding and caching on NDN to apply to smart grid systems.

The author evaluates network performance by paying attention to parameters such as Delay, Cache Hit Ratio, Packet Drop, and Satisfied Interest Ratio. Based on the graphical results obtained from each model as a whole, changes in the size of the content store: In testing the delay, the Client Control-LRU system strategy got the lowest delay compared to other strategies, namely 29.37 ms, 15.85 ms, and 5.19 ms. For hit ratios, the Client Control-FIFO system received a hit ratio percentage with the highest increases reaching 21.527%, 33.554%, and 55.3%. The drop package test obtained the lowest drop package reduction on Client Control-LRU, as many as 12655, 4821, and 0. In the satisfied interest ratio test, Client Control-LRU received the highest percentage increases of 99.58%, 99.96%, and 99.98%. In the condition of changing the frequency of interest, in testing the delay, the Client Control-LRU system strategy got the lowest delay compared to other strategies, namely 38.01 ms, 33.26 ms, 26.22 ms, and 26.01 ms. For hit ratios, the

Client Control-FIFO system received a hit ratio percentage with the highest increases reaching 17.909%, 19.058%, 21.517%, and 22.928%. The drop package test obtained the lowest increase in drop packets on Client Control-LRU, as many as 3278, 8682, 12655, and 15824. In the satisfied interest ratio test, Client Control-LRU got the highest percentage increase of 99.2081%, 99.4131%, 99.58%, and 99.686%. From the data obtained by the author, it can be concluded that the Client Control-LRU system is a better choice to be implemented in a smart grid communication system compared to other systems. In other words, the LRU cache replacement method is superior to the FIFO cache replacement method. While the difference in comparison of the forwarding method for each system obtained is not too large. This happens because the forwarding method that the author uses has the same route determination algorithm.

Keywords: Smart grid, NDN, Forwarding, Caching, Topology