FOG Computing Realization with Big Data Analysis for Advanced Applications

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Abstract – In this paper, I have designed a smart architecture that will be helpful for condition monitoring of the various devices that are used in either home or industry applications using frequency response data.

Key Words: AWGN, Equalization, Fading, Phase modulation, RLS.

1. INTRODUCTION

Smart city innovations are anticipated to become gigantic financial engines in the coming decades and are relied upon to merit a total 1.565 trillion dollars by 2020, and 3.3 trillion dollars by 2025 [1]-[3]. It is normal that in excess of 9 billion individuals will live on the planet in 2050, and around 66% of them in urban areas. This generous population development in urban regions will bring about expanding requests on assets, administrations, and infrastructures in urban areas. Thus, to guarantee the effectiveness, supportability, and wellbeing with the intelligent innovations to incorporate enormous infrastructures and administrations in the territories of vitality, building, transportation, medical services, instruction, land, and utilities [4]-[6]. The integration of infrastructure segments and administrations in shrewd urban communities requires a proficient observing and an adaptive feedback control framework to guarantee the wellbeing of urban networks.

Big data guarantee new levels of logical disclosure and financial esteem. We are entering the period of Big information - a term that alludes to the blast of accessible data [7]. Such a Big information development is driven by the way that gigantic measures of high dimensional or unstructured information are ceaselessly delivered and put away with a lot less expensive expense than they used to be. As far as computational productivity, Big information motivates the advancement of new computational architectures and information storage techniques. However, when information sources are dispersed over numerous areas and low inertness is essential, in cloud information preparing neglects to meet the necessities. The term "Fog Computing" is introduced by Cisco to run geo distributed applications over the network [8]. Fog computing is characterized as a circulated registering worldview that generally expands the tasks given by the cloud to the edge of the system. There are numerous favourable circumstances of utilizing Fog computing, for example, Reduction of system traffic, Suitable for IoT undertakings and inquiries, low latency prerequisite and adaptability [9]. Edge and cloud assets impart utilizing a machine to machine gauges, for example, MQTT (once in the past MQ Telemetry Transport) and the compelled application protocol [10]. Programming characterized organizing assists with the effective administration of heterogeneous haze systems. To empower ongoing examination in mist figuring we should explore different asset the board and planning methods including the position, relocation, and union of stream handling administrators, application modules and undertakings. This fundamentally impacts handling inactivity and basic leadership times.

In this paper, an architecture is proposed to handle the large amount of data with the help of Fog computing and Big data analysis. Basically, the proposed architecture is designed by keeping in mind about the condition monitoring of various appliances and it will be discussed more in upcoming sections.

2. SYSTEM MODEL

Fig. 1 shows the proposed architecture for Fog computing with Big data analysis. All most all the home appliances are connected to client Fog nodes and all these nodes are connected to a Cloud server. The architecture shown in Fig. is considered for a single home with all majorly required appliances, however one small Fog node is enough for a home practically. This system works based on frequency response curve (FRA) of a particular devices under test. For any device a FRA curve is noted at its good working condition and it will be stored in Fog node. If there is any malfunction is occurred in any device, the warning will be sent to the Fog node as well as user. Fog node sensor immediately switches off that particular device and the same information also will be sent to an authorized mechanic. After repairing has been done, the FRA curve will be generated and stored in Fog node. This complete process will be repeated for all appliances for certain duration that will be decided by the user. As every home requires basic needs such as TV, Laptop, Air Cooler, Motor, Generator, Air conditioner, Car (any vehicle) and etc, it requires to store more and more data if we consider the same appliances for a city. Therefore, a cloud is required to store all these data and here instead of maintaining a cloud, a Fog node is used for saving and easy access.
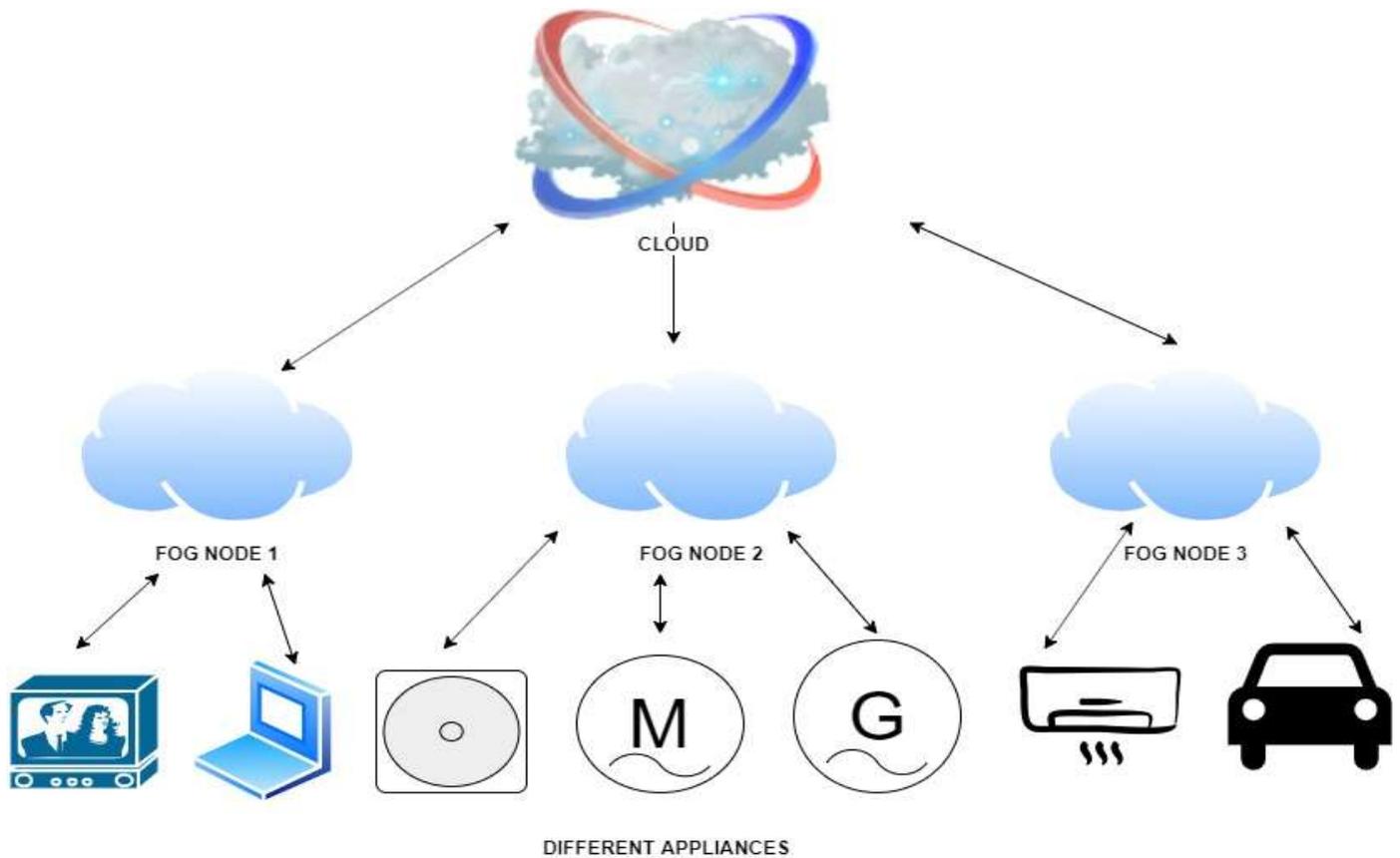
Fig. 1. Proposed architecture for Fog Computing with Big Data Analysis

4. RESULTS AND DISCUSSION

It has been found that various distribution and power transformers can pass different ranges of RF frequencies. These transmission windows are used for the purpose of communication. Such characteristics are unique for every transformer. The FRA data is obtained by transformer modeling is shown in Fig. 2. When it is transmitted over a wireless channel, the obtained output data is shown in Fig. 3. This FRA data is stored in the Fog node and if there is any malfunction occurs while operating a device, this FRA response will be disturbed and the same information is passed to the user and the device will be stopped to get rid of major damage. Untill the device repaired well, it will not generate the original FRA and without original FRA, Fog node will not give permission to use the device.
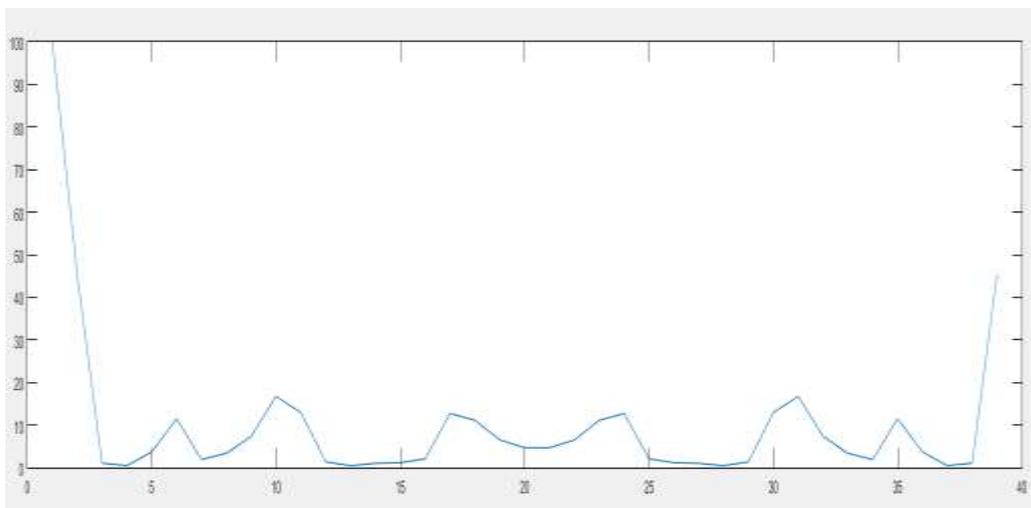
Fig.2. Input FRA data
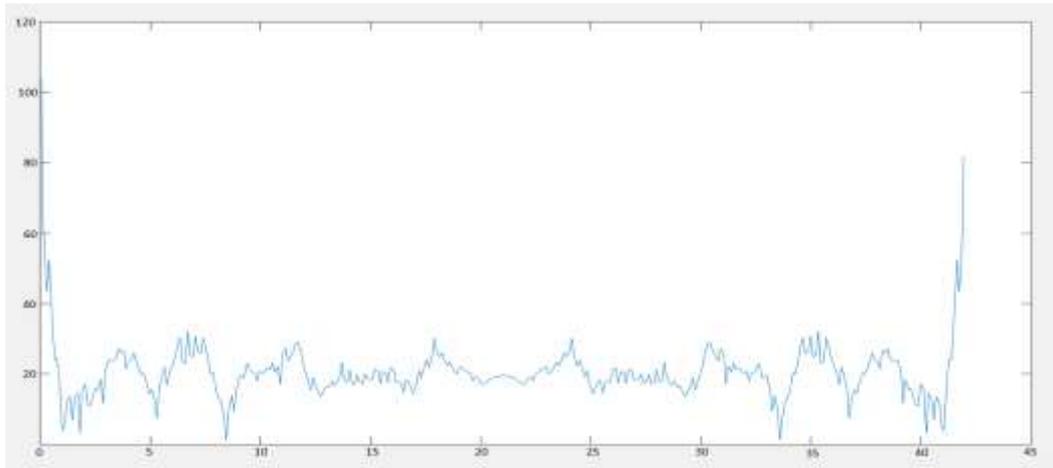
Fig.3. Output FRA data

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