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Datadog with Zigbee Wireless Communication Network Protocol for an Internal Implementation in an Educational Institution

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Abstract: ***Wireless Sensor Networks are the most powerful technique for monitoring Environmental factors. As the role of WSN relies totally on the service life of the sensor nodes, it is necessary to have complete monitoring of networks. Energy efficiency has always been a key concern for Wireless sensor networks. This paper presents a detailed literature review that examines how an artificial intelligence networking tool(datalog)can be used with ZIGBee-based network protocol for continuous Real-time data quality monitoring to detect bad data quality issues in an educational organization It also Tracks and improves application speed by following requests from beginning to end and monitoring application performance. By using AI algorithms for routing choices and optimization methods, the study aims to improve network performance, energy efficiency, and system scalability. The analysis of different routing strategies with AI implementations will be covered, emphasizing the potential advantages and challenges of this innovative approach in an organization.***

Keywords*: Protocol, Routing, Dashboard.*

I. INTRODUCTION

Depending on the network architecture and application, several routing protocols are used in WSNs [1]. Used sensors may be widely placed in places without human access, such as disaster regions, battlegrounds, etc. since they are tiny, affordable, clever, and disposable. Military sensing, physical security, air traffic control, traffic surveillance, video surveillance, industrial and factory automation, distributed robotics, environment monitoring, and building and structural monitoring are some of the current and future uses for WSNs. In the evolving landscape of [2][7][8][9][10][11] network management and monitoring, integrating advanced tools and technologies is essential to maintain robust, efficient, and secure communication systems.

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One such powerful combination is Data Dog, a comprehensive monitoring and analytics platform, with networks utilizing the Zigbee routing protocol. This synergy offers enhanced visibility, proactive troubleshooting, and intelligent automation, ensuring optimal performance and reliability of Zigbee-based networks. This article will provide a thorough review of wireless sensor networks and the content of the ZigBee protocol to accomplish these aims.

To present a more realistic picture of how the Data Dog protocol performs and behaves in a real-world setting, this article will run various simulations. The dashboard in DataDog is to visualize ZigBee power consumption data (heatmap, unusual power usage, time series graph which displays power usage for individual devices). The DataDog is an emulations AI tool that will be utilized for this purpose.

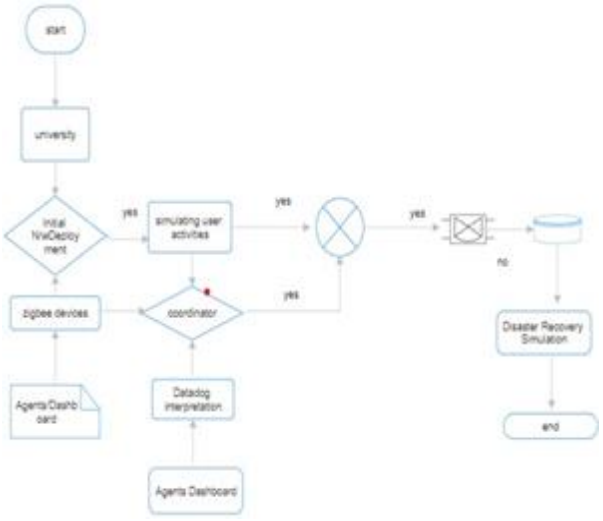

Figure 1: Simulation Model Diagram

II. NETWORK DESIGN AND LAYOUT

Fig (1) This simulation Model Diagram explains about network design and layout for an educational Institution integrating the DataDog platform with ZigBee Routing protocol to map the university's interconnected Network deploying ZigBee devices (sensors) using coordinators and Routers. It displays agents and Dash Boards which include Monitoring Metrics, Increasing the Number of Devices, and simulating security Threats here we are using. Repeater Network to restore a damaged or weak signal. Despite all the above processing models, there is an effective possibility of Disaster Recoverability and User Activity Monitoring.

A networking device called a repeater is used to create and magnify incoming signals. Repeaters function at the OSI model's physical layer. A networking device called a repeater is used to create and magnify incoming signals. Repeaters function at the OSI model's physical layer.

Networks (WANs) and Local Area Networks (LANs) are used to measure their performance. Using repeaters allows data to be sent to specific areas exclusively and reduces error and data loss. The main benefit of employing a repeater is that it allows data to be sent across vast distances and with greater security in a trustworthy educational environment.

A. Network Deployment Routine Monitoring and Performance Assessment

The primary goal of employing a repeater is to extend the networking Zigbee is a low-power, low-data rate wireless network protocol commonly used for home automation, industrial automation, and other IoT applications [5]. Depending on the network size, choose Zigbee routers (repeaters) to extend the network range and enhance reliability. Identifying the end devices (sensors, actuators, etc.) that will be part of the network. If needed, set up Zigbee-to-IP bridges to allow for remote control and monitoring which Measure the Received Signal Strength Indicator for each device to ensure that signals are strong enough for reliable communication. One of the measures is the link quality indicator (LQI) to assess the reliable communication.

III. SCALABILITY TESTING ANOMALY AND SECURITY TESTING

Any data point or suspicious event that deviates from the baseline pattern is a data anomaly. Unexpected deviations from the established dataset can indicate system failures, security breaches, or newly discovered security gaps in advance. Any inconsistent or redundant data points—including incomplete data uploads, unexpected data deletions, or data insertion failures—in a database are included in the definition of anomalous data [4]. Data mining anomaly detection enables security teams to identify statistically significant deviations from normal operating patterns in imperceptible events or data points. To respond to data anomalies, possibly prevent a breach, detect fraud, or assess system health, teams frequently require capabilities for real-time data monitoring. Teams can quickly locate the source of security issues by following the breadcrumbs left behind by malicious data points.

A. Wireless Connection Standards

As a component of the IEEE Computer Society's

802 Local and Metropolitan Area Network Standards Committee, IEEE forms the 802.15 working group [3] in active mode with specified results as of March 1999. 802.15.

Creating standards for Wireless Personal Area Networks (WPANs), or short-range wireless networks, was the main objective of the working group.Within the 802.15 working group, there are many target groups. Any Target group for instance (802.15.1) specifies the WPAN according to Bluetooth version 1.1's Physical (PHY) and Medium Access Control (MAC) levels [6] The next target group (802.15.2) creates a paradigm for WLAN (801.11) and WPAN (802.15) coexistence. The most target group's (802.15.3) goal is to create specifications for a WPAN data flow (20 Mbps and beyond).

B. DataDog Monitoring Service

In a rapidly evolving technological landscape, institutions such as universities, hospitals, and research facilities face increasing challenges in managing complex networks of interconnected devices. The proliferation of Internet of Things (IoT) devices has further complicated network management, necessitating advanced monitoring solutions to ensure reliability, security, and efficiency. One such solution is Datadog which was designed to provide a cloud-based monitoring and analytics platform with comprehensive visibility into IT infrastructure and applications.

DataDog offers a unified approach to monitoring by collecting and analyzing data from various sources in real time, enabling institutions to gain critical insights into the performance and health of their systems. The powerful analytics and visualization tools allow for the identification of patterns, detection of anomalies, and proactive resolution of issues, thereby minimizing downtime and enhancing operational efficiency, Getting into the exploring implementation of Datadog within an institutional context, focusing on its integration with Zigbee Networks. It is the most widely adopted wireless communication protocol for IoT devices. By

leveraging Datadog's capabilities, institutions can effectively monitor and manage their Zigbee-connected devices, ensuring seamless operation and optimal performance. The integration of Datadog with Zigbee networks in institutions offers numerous. Benefits include improved resource utilization, enhanced security and better support for critical applications. This introduction sets the stage for a detailed examination of how Datadog can address the unique challenges that are faced by institutions in managing their IoT infrastructure, ultimately contributing to their broader goals of innovation, efficiency, and reliability.

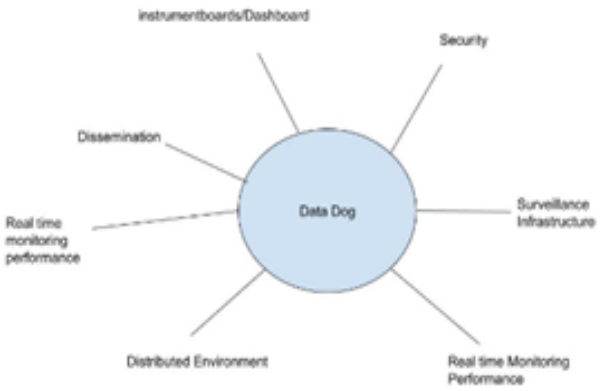

Figure: 1 Architecture of Data Dog

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This architecture enables comprehensive monitoring and observability for modern cloud environments, facilitating proactive issue detection and resolution. It deals with many Key features like Security, Latency Time, continuous Application performance Monitoring, Works in Distributed Systems, and Dashboard Measurements.

DataDog is a cloud-scale application monitoring solution that uses a SaaS-based data analytics platform to monitor servers, databases, tools, and services. Dashboards: Datadog allows you to construct two different kinds of dashboards.

An event graph generates a new timeline for correlation and troubleshooting automated layout using time-synchronized metrics With the use of time boards, you may simultaneously identify the metrics and services and fix problems.

A disorganized dashboard list page might impede the discovery of relevant content and contaminate a search query with superfluous or unrelated results. You can delete unneeded dashboards in bulk and undo any inadvertent removals by combining bulk delete with Recently Deleted dashboards. This manual comprises: Overarching guidelines for recognising inactive dashboards for scheduled deletion. The best ways to keep your list page manageable

IV. USER ACTIVITY MONITORING

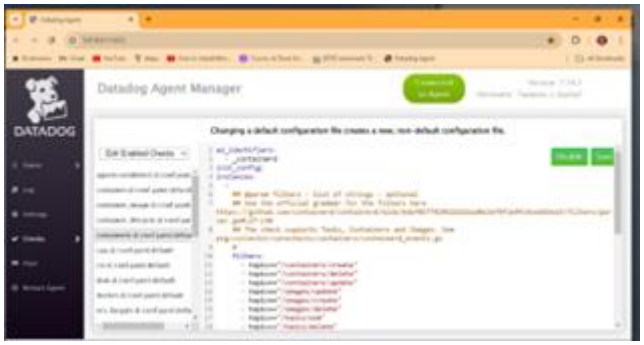

Figure: 2(a)

Figure: 2(b)

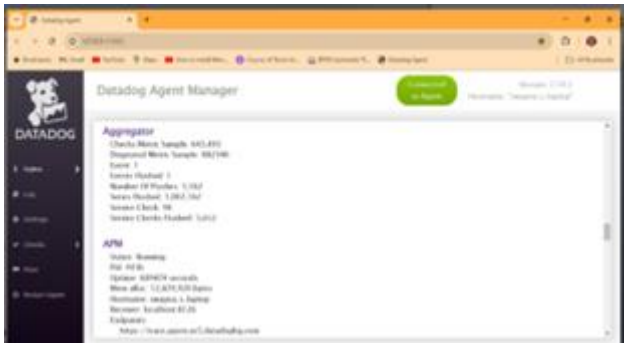

Figure: 2(c)

The above figures show that the Data Dog manager looks with the dashboard which monitors proxy settings with addresses, detecting remote configurations, aggregator with specifying host name and receiver local host.

V. SIMULATION SCENARIOS

The simulation displays the anticipated actions of the system under various circumstances using its simulation model. Therefore, this simulation model's goal is to ascertain the precise model and forecast the actual

system's behavior. The DataDog AI tool manages the monitor proxy settings with address offers a thorough development environment to facilitate distributed systems and communication network modelling.It plays a main roll in detecting remote configurations with all the present details including host name and receiver local host address.

VI. CONCLUSION

The deployment of Datadog for monitoring Zigbee networks within an institutional environment offers a significant advancement in managing and optimizing IoT infrastructure. Datadog's comprehensive monitoring capabilities, coupled with Zigbee's robust wireless communication protocol, provide a powerful combination for ensuring the reliability and efficiency of networked devices and systems. For institutions such as universities, colleges, research facilities, the ability to monitor and analyze real-time data from Zigbee-connected devices through Datadog can lead to enhanced operational efficiency and reduced downtime. This integration allows for proactive identification of issues, informed decision-making, and streamlined maintenance processes. The resulting improvements in network performance and device management can contribute to better resource utilization and cost savings. In summary, integrating Datadog with Zigbee networks within an institutional context not only strengthens the monitoring and management capabilities but also supports the institution's broader goals of innovation, efficiency, and reliability. This approach represents a strategic investment in the institution's technological infrastructure, paving the way for future advancements and scalability.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

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- **Authors Contributions:** The authorship of this article is contributed equally to all participating individuals.

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