

# Development of a Network Performance Heatmap System for Identifying Weak Connectivity Areas in Systems Plus College Foundation as Basis for Technical Support and Maintenance

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## ABSTRACT

This study proposes the development of a Network Performance Heatmap System for Identifying Weak Connectivity Areas in Systems Plus College Foundation (SPCF) as a Basis for Technical Support and Maintenance. The study addresses the challenges of weak or unstable Wi-Fi connectivity across the campus, which may affect academic and administrative activities. The proposed system aims to assess Wi-Fi performance, identify areas with poor connectivity, and provide organized network performance information to assist Information Technology Services (ITS) personnel in prioritizing technical support and maintenance. A descriptive-developmental research design with a quantitative approach will be employed. Network performance data, including signal strength, latency, packet loss, download and upload speed, and connection stability, will be collected from various campus locations during regular school days. The collected data will be processed, analyzed, and visualized through a color-coded heatmap categorizing connectivity as Excellent, Strong, Fair, Weak, or No Signal. The system will be developed using Python, Matplotlib, Plotly, and MySQL, with Agile Scrum as the system development methodology. The proposed system is expected to provide a visual representation of weak connectivity areas and a priority guide for technical support, maintenance, and potential network improvements. Ultimately, the study aims to support data-driven campus network management and contribute to a more reliable internet connection for students, faculty, and staff at SPCF.

**Keywords:** *Network Performance, Heatmap System, Identifying Weak Connectivity Areas, Technical Support and Maintenance, RSSI, Latency, Packet Loss, Access Point, Connection Stability, Throughput Upload and Download Speed*

## SECTION I — INTRODUCTION (THE PROBLEM AND ITS SETTING)

### 1.1 Introduction

Internet connectivity is essential in academic institutions for academic, administrative, and communication activities. At Systems Plus College Foundation (SPCF), students, faculty, and staff rely on Internet access for research, class activities, enrollment, file sharing, and other institutional transactions. Network performance can be measured through indicators such as throughput, latency, and packet loss, which provide information about Wi-Fi connection quality (Sultan et al., 2022). Network quality evaluation also considers packet loss, latency, jitter, and download and upload speeds to understand connection performance (Opensignal, 2024).

Connectivity problems in faculty rooms, computer laboratories, and administrative offices can disrupt school-related activities. Factors such as distance, obstacles, and the number of users can affect Wi-Fi latency and throughput (Sultan et al., 2022). Recent network studies also focus on latency, packet loss, and throughput to assess wireless network performance (Sathya et al., 2024). Heatmap analysis and Wi-Fi signal mapping can help identify weak connectivity areas and support access point placement (Yana et al., 2025).

This study proposes the Development of a Network Performance Heatmap System for Identifying Weak Connectivity Areas in Systems Plus College Foundation as Basis for Technical Support and Maintenance. The system will use indicators such as signal strength, latency, packet loss, download and upload speed, and connection stability to visualize weak and unstable connectivity areas. The results will help SPCF IT Services personnel prioritize technical support and maintenance and improve the overall campus network performance.

## 1.2 Background of the Study

Internet connectivity has become an essential part of modern educational institutions, supporting academic instruction, research, communication, and administrative operations. Students, faculty, and staff depend on reliable Wi-Fi access to perform various activities, such as accessing online learning resources, conducting research, submitting academic requirements, and processing institutional transactions. According to O'Brien et al. (2022), Wi-Fi plays an important role in university education by providing students with internet access for educational activities. Therefore, maintaining reliable wireless connectivity is necessary to support the academic and operational needs of an educational institution.

At Systems Plus College Foundation (SPCF), internet connectivity is utilized in classrooms, computer laboratories, faculty rooms, administrative offices, and other campus facilities. However, as identified in the researchers' initial title proposal, weak or unstable internet connectivity may affect academic and administrative activities within the institution. Computer laboratories may experience slow or unavailable internet access when numerous users are connected simultaneously. Faculty members may encounter connectivity problems during enrollment and subject encoding, while the Accounting Office may experience delays in processing payments and other school-related transactions. Additionally, limited ITS personnel and the absence of a centralized system for monitoring and documenting network issues may make it difficult to identify affected locations and prioritize technical support and maintenance.

Recent studies have demonstrated the importance of Wi-Fi monitoring, signal mapping, and heatmap visualization in identifying connectivity problems. Guion and Tan (2021) assessed Wi-Fi signal strength and bandwidth in public Wi-Fi locations in the Philippines, using signal measurements to visualize network coverage and evaluate connectivity performance. Rindorindo (2023) developed a web-based application that maps Wi-Fi signal strength and monitors network traffic, allowing administrators to identify areas with weak or unavailable wireless coverage. These studies demonstrate how network performance measurements and visual representations can help identify connectivity concerns. However, the researchers identified a need for an institution-specific system that combines network performance assessment, location-based heatmap visualization, and maintenance-oriented information to assist technical personnel in prioritizing weak connectivity areas.

In response to these concerns, this study proposes the Development of a Network Performance Heatmap System for Identifying Weak Connectivity Areas in Systems Plus College Foundation as Basis for Technical Support and Maintenance. The proposed system aims to assess Wi-Fi performance across the SPCF campus using key network metrics, including signal strength, latency, packet loss, download and upload speed, and connection stability. Through heatmap visualization, the system will identify and document areas with weak or unstable connectivity and provide organized network performance information to help ITS personnel prioritize technical support, maintenance, and possible network improvements. Ultimately, the study seeks to support data-driven

campus network management and contribute to a more reliable digital learning and working environment for students, faculty, and staff.

### 1.3 Objectives of the Study

**General Objective:** The general objective of this study is to develop a Network Performance Heatmap System that assesses Wi-Fi connectivity across selected buildings, offices, classrooms, laboratories, and common areas within the Systems Plus College Foundation (SPCF) campus, and identifies priority areas for technical support, maintenance, and network improvement.

**Specific Objectives:** The specific objectives of the study are:

1. To assess Wi-Fi performance across Systems Plus College Foundation (SPCF) common spaces using key metrics such as signal strength, latency, packet loss, download and upload speed, and connection stability.
2. To identify and document areas with weak or no connection, and determine which buildings, floors, and locations experience the poorest network performance across the campus.
3. To design and generate a visual network heatmap that displays connection quality categorized as excellent, strong, fair, poor, or no signal
4. To establish a priority guide that determines which areas require immediate technical support, maintenance, and network upgrades based on network performance data.
5. To test and validate the functionality of the heatmap system, ensuring it accurately maps low-signal areas and serves as a reliable reference for campus network management.
6. To provide network performance information and recommendations that can help ITS personnel in planning appropriate technical support and maintenance actions for identified weak connectivity areas in SPCF.

### 1.4 Scope and Delimitation of the Study

**Scope:** This study focuses on the development of a Network Performance Heatmap System for Wi-Fi connectivity within the Systems Plus College Foundation (SPCF) campus. The system will record RSSI, latency, packet loss, download speed, upload speed, connection stability, and the location associated with each measurement. Data gathering will be conducted during regular school days and at selected periods, such as morning, noon, and afternoon, to capture different operating conditions. Measurement locations and the coverage of the survey will be finalized with the appropriate SPCF personnel before data collection.

The system will validate and organize the measurements, classify connectivity conditions using predefined rules, generate a color-coded heatmap, identify weak or unstable locations, and produce a priority reference for technical support and maintenance. The system will preserve the underlying measurements so that ITS personnel can review the basis of the classifications.

**Delimitation:** This study only covers Wi-Fi or wireless connection and does not include wired or fiber internet connections. Results may be affected by factors outside our control such as weather, power outages, interference from other devices, or sudden changes in the number of users connected at the same time. Also, the study is limited only to the Systems Plus College Foundation (SPCF) campus and will not cover other branches or schools. The accuracy of the heatmap depends on how complete and consistent the data collection is. This project is designed as a support tool and will not replace the official network management systems already used by the school.

### 1.5 Significance of the Study

**To the Students** - They will experience more stable and faster internet while doing research, projects, and online activities on campus. They will know which areas have good connection, and the improvements made will help them study better.

**To the Faculty and Teachers** - They will have a more reliable connection for teaching, submitting grades, and doing school tasks. Less interruptions during classes and meetings.

**To the Information Technology Services (ITS) Personnel** - They will have a clear visual guide to see exactly where connection problems are. This will make their work faster, easier, and more organized no more guessing which areas need fixing first.

**To the School Administration** - This study provides actual data to help them make decisions about budget, network planning, and future improvements. It shows concrete proof of what needs to be upgraded.

**To Future Researchers** - This can serve as reference or related study for others who want to do similar projects about network monitoring, heatmaps, or campus connectivity.

## 1.6 Definition of Terms

### 1. Access Point (AP)

A networking device that allows wireless devices to connect to a network. In this study, access points refer to the wireless network devices within Systems Plus College Foundation whose connectivity performance will be assessed.

### 2. Connection Stability

The consistency and reliability of a network connection over time. In this study, it refers to the ability of the SPCF Wi-Fi network to maintain a consistent connection during data gathering.

### 3. Heatmap

A graphical representation of data using colors to indicate different values or conditions. In this study, it refers to the visual map that displays Wi-Fi performance across SPCF campus locations using the categories Excellent, Strong, Fair, Weak, and No Signal.

### 4. Information Technology Services (ITS)

The department responsible for providing information technology services and technical support. In this study, Information Technology Services (ITS) personnel are the intended users of the system who will utilize the heatmap and network performance information to identify connectivity issues and prioritize maintenance.

### 5. Latency

The time required for data to travel from a source to a destination across a network. In this study, latency is one of the network performance metrics used to evaluate the responsiveness of Wi-Fi connections in different SPCF locations.

### 6. Network Performance

The overall quality and efficiency of a network connection based on measurable indicators. In this study, it is evaluated using signal strength, latency, packet loss, download speed, upload speed, and connection stability.

### 7. Packet Loss

The percentage of data packets that fail to reach their intended destination during transmission. In this study, packet loss is measured to help identify areas where Wi-Fi connectivity may be unreliable.

### **8. Receive Signal Strength Indicator (RSSI)**

A measurement of the strength of a received wireless signal, commonly expressed in dBm. In this study, RSSI is used to assess Wi-Fi signal strength at different locations across the Systems Plus College Foundation (SPCF) campus.

### **9. Technical Support and Maintenance**

Activities performed to identify, troubleshoot, and address technical problems affecting network operations. In this study, these activities refer to the maintenance and improvement efforts that Information Technology Services (ITS) personnel may prioritize using the system's heatmap and network performance data.

### **10. Throughput**

The actual rate at which data is successfully transmitted over a network within a given period. In this study, download and upload speed measurements are used to evaluate Wi-Fi data transmission performance across selected SPCF locations.

### **11. Wi-Fi Connectivity**

The ability of a device to connect to a network wirelessly using Wi-Fi technology. In this study, it refers to the wireless internet connection assessed across classrooms, laboratories, offices, and other areas within the Systems Plus College Foundation (SPCF) campus.

### **12. Weak Connectivity Areas**

Locations where wireless network performance is poor, unstable, or unavailable. In this study, these refer to SPCF campus locations identified through network measurements and heatmap visualization as having Weak or No Signal connectivity.

## **SECTION II — LITERATURE REVIEW**

### **2.1 Introduction to the Review**

This section presents a review of related literature concerning Wi-Fi network performance, connectivity assessment, heatmap visualization, and network monitoring. It examines previous studies on the factors that affect network performance, methods used to identify weak or inconsistent connectivity areas, and technologies applied in monitoring and maintaining network infrastructure. The reviewed literature provides a basis for understanding existing approaches to network performance assessment and highlights the need for an integrated system that can visualize connectivity conditions and support technical maintenance. These concepts serve as a foundation for the development of the proposed Network Performance Heatmap System for Identifying Weak Connectivity Areas in Systems Plus College Foundation as a basis for technical support and maintenance.

### **2.2 Review of Related Literature and Studies**

Globally, Sultan et al. (2022) found that Wi-Fi performance can change depending on distance and physical obstacles, while Yuliana et al. (2024) emphasized the use of network performance indicators such as traffic and throughput in monitoring network conditions. Similarly, Camacho et al. (2024) and Hardaker and Shapira (2022) highlighted the importance of analyzing network data and measuring network quality to understand changing network conditions. These studies show that collecting network performance information is important in identifying and evaluating connectivity problems.

For Wi-Fi coverage and visualization, Rindorindo et al. (2023) used signal mapping to identify areas with inconsistent or missing Wi-Fi coverage, while Shang et al. (2025) explored heatmap-based visualization of indoor

Wi-Fi signals. Matulesy and Prihartono (2026) also used RSSI, SNR, site surveys, and heatmaps to identify poor signal areas and improve access point placement. These studies demonstrate that combining network measurements with visual maps can make weak connectivity areas easier to locate.

In educational environments, Ekwueme et al. (2024) examined campus Wi-Fi performance under different network conditions, while Diana Josephine and Rajeswari (2020) studied network performance in a college campus environment. Saputra et al. (2020) focused on network monitoring in a university, and Wijaya and Hadi (2026) examined network infrastructure problems such as slow internet and limited coverage in a school. These studies show that network performance and monitoring are important in maintaining reliable connectivity in schools and universities.

Other studies focused on improving network configuration and maintenance. Hosseini et al. (2023), Raman et al. (2024), and Qiu et al. (2023) examined access point placement and network configuration to improve Wi-Fi coverage and performance. Kamdee and Apavatjirut (2021) also showed that automated Wi-Fi tuning can help reduce interference and make troubleshooting easier. Meanwhile, Ta-Armart and Savithi (2026) and Belvis et al. (2024) emphasized centralized monitoring and organized network information for technical operations.

Overall, the reviewed studies show that network performance measurement, Wi-Fi visualization, monitoring, and network improvement are important for maintaining reliable connectivity. However, most studies focus on only one or two of these areas, such as performance testing, signal mapping, access point placement, or network monitoring. There is still a need for a system that combines network performance measurements with location-based heatmap visualization and uses the results to support technical maintenance in a school campus. This study addresses that gap by developing a Network Performance Heatmap System for Systems Plus College Foundation to identify weak connectivity areas and provide information that can serve as a basis for technical support and maintenance.

## **2.3 Conceptual Framework**

The study will use the Input–Process–Output (IPO) model to present how the information and network performance measurements that are gathered will be transformed into useful results for technical support and maintenance. The framework is aligned with the study objectives of assessing Wi-Fi performance, identifying weak connectivity areas, generating a heatmap, and providing information that can support maintenance decisions.

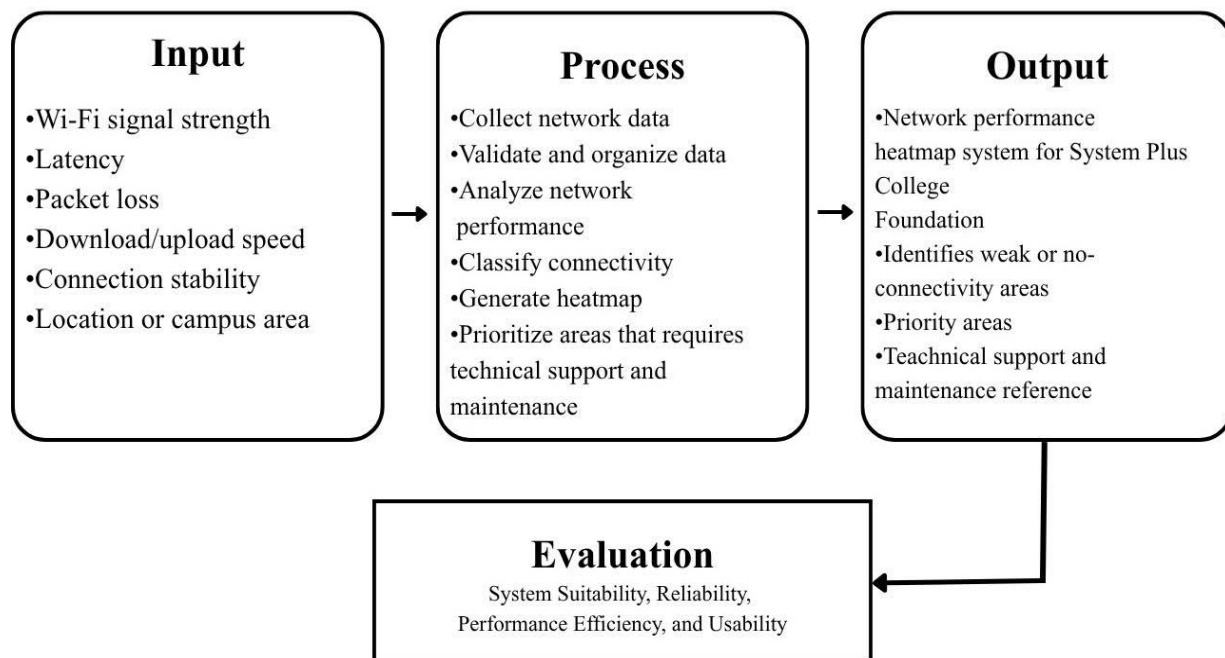


Figure 1. Input-Process-Output Conceptual Framework of the Network Performance Heatmap System.

The input includes network performance measurements and location information that will access the connectivity across Systems Plus College Foundation (SPCF). Then, the process involves collecting, validating, analyzing, and classifying the data, followed by heatmap generation and identification of areas that require attention in order to identify areas that need to be priorities. As a result, the output consists of a network performance heatmap, identified weak connectivity areas, performance information, and basis for technical support and maintenance priority information intended to visualize areas that have weak or unstable connectivity.

## 2.4 Synthesis

While prior studies focus on network monitoring, Wi-Fi performance testing, signal mapping, and access point placement, only a few combine these areas to help identify weak connectivity and support maintenance in a school campus. The studies show that factors such as the number of users, distance, signal strength, interference, and access point placement can affect Wi-Fi performance. However, there is still a need for a system that can show network performance based on specific locations and make the information easier for technical personnel to use. This project fills that gap by developing a Network Performance Heatmap System for Systems Plus College Foundation that uses network measurements and heatmap visualization to identify weak connectivity areas and provide a basis for technical support and maintenance.

## SECTION III — METHODOLOGY

### 3.1 Research Design

This study will use a descriptive-developmental research design with a quantitative approach. The descriptive part of the study will focus on determining the current network condition of Systems Plus College Foundation (SPCF). The researchers will gather numerical data from different areas of the school, such as signal strength, download and upload speed, latency, packet loss, connection stability, and the location where each measurement is taken. The collected data will be examined to determine areas with excellent, strong, fair, weak, or no signal connectivity.

The developmental part will focus on creating the proposed Network Performance Heatmap System. The data gathered from the network assessment will be used as a basis for developing the system. The system will organize and analyze the collected measurements and present the results using a heatmap. This will make it easier to visualize which parts of the SPCF have weaker network performance and may need to be checked by the ITS personnel.

The study will use a quantitative approach because the main data to be collected are numerical measurements. These measurements will be summarized and analyzed using appropriate descriptive statistics. The results will also be used to classify the network conditions and show the differences in connectivity among different areas across the school. After the system is developed, it will be tested to check whether it can properly receive the data, process the measurements accurately, generate the heatmap, identify areas with weak connectivity, and prioritize areas that require technical support and maintenance.

Overall, this research design will allow the researchers to first determine the existing network conditions at System Plus College Foundation (SPCF) and then use the findings as a basis for developing the proposed system. The system will provide ITS personnel with a clearer visual representation of network performance, which can help them identify areas that may require technical support and maintenance.

### **3.2 System Development Methodology**

The study will use the Agile Software Development approach, particularly the Scrum framework, to develop the proposed Network Performance Heatmap System. Scrum allows the system to be developed in smaller parts through Sprints, making it possible to test and improve functions throughout the development process. Schwaber and Sutherland (2020) describe the Sprint as the main development cycle, which includes Sprint Planning, development, Daily Scrum, Sprint Review, and Sprint Retrospective.

Huss, Herber, and Borky (2023) explained Agile as a lightweight software development approach and identified Scrum as an Agile framework that supports iterative development. In this study, Scrum will be adapted to develop, test, and improve the system incrementally.

The process will begin with the Product Backlog, followed by Sprint Planning and preparation of the Sprint Backlog. During each Sprint, the selected system functions will be developed and tested while progress is monitored through Daily Scrum activities. After each Sprint, the completed functions will form a usable increment, which will be reviewed and evaluated. A Sprint Retrospective will then identify improvements for the next Sprint. This process will support the development of the system's network performance data collection, analysis, heatmap visualization, weak connectivity identification, and technical support and maintenance features.

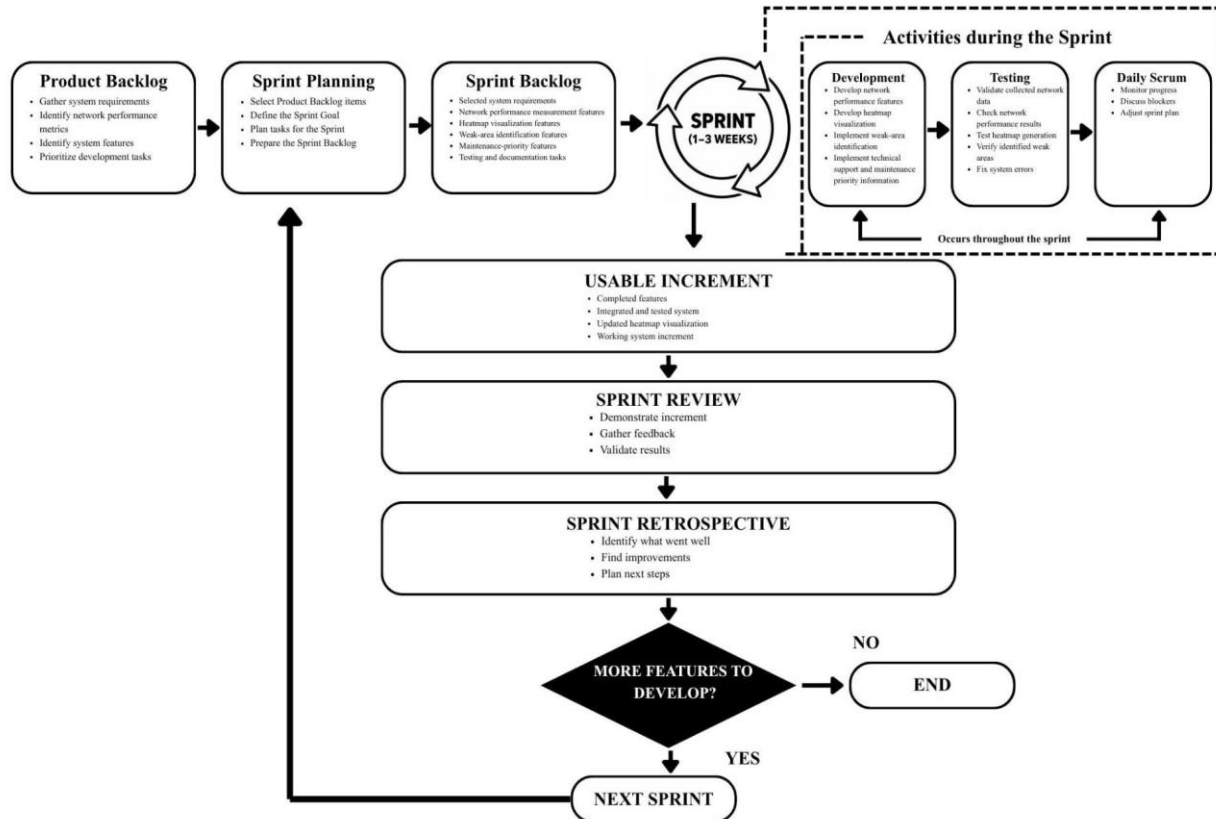


Figure 2. Agile Scrum Development Process Adapted for the Network Performance Heatmap System.

| Sprint   | Activities                                                                                                                                                                                            | Expected Outcomes                                                                            |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Sprint 1 | Identify the intended users, SPCF areas to be assessed, system requirements, and network performance metrics such as latency, and packet loss, upload and download speed, and connection stability    | Prioritized Product Backlog                                                                  |
| Sprint 2 | Design the system interface, database, and heatmap structure.                                                                                                                                         | Initial System Design and data structure                                                     |
| Sprint 3 | Develop the functions for recording network performance measurements and associating measurements across different areas of System Plus College Foundation (SPCF).                                    | Working Network Data Collection and Recording Module                                         |
| Sprint 4 | Develop connectivity classification and heatmap visualization.                                                                                                                                        | Working Heatmap Module                                                                       |
| Sprint 5 | Develop functions for identifying weak connectivity areas and presenting performance information and technical support and maintenance priority information through the system dashboard and reports. | Integrated Heatmap, Weak-Area Identification, and Maintenance and Technical Support Features |
| Sprint 6 | Test system functionality, validate network performance results and heatmap outputs, identify errors, refine the system, and conduct final validation.                                                | Tested and Validated Network Performance Heatmap System                                      |

*Table 1. Sprint Application*

The Sprint activities shown above are tailored to the needs of the research project. The main Scrum activities, including Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective, follow the Scrum framework, while the tasks within each Sprint were planned specifically for the development of the proposed system. According to Schwaber and Sutherland (2020), the Sprint serves as the period in which Scrum events and development activities are carried out.

### 3.3 Requirement Specification and Analysis

This chapter describes many diagrams that support researchers in finishing their system.

#### Use Case Diagram

The Use Case Diagram of the System illustrates the interaction between the proposed Network Performance Heatmap System. Our System is designed to support the main role: Information Technology Services (ITS), IT Staff/Tech Support, Maintenance.

The Information Technology Services (ITS) are responsible for monitoring network performance across the campus. They primarily utilized the system for reviewing reports and planning maintenance activities. Lastly, the System itself functions as an automated tool that continuously collects data from network devices, visualizes results in a heatmap format. This ensures that Information Technology Services (ITS) have access to real-time information for pro-active technical support.

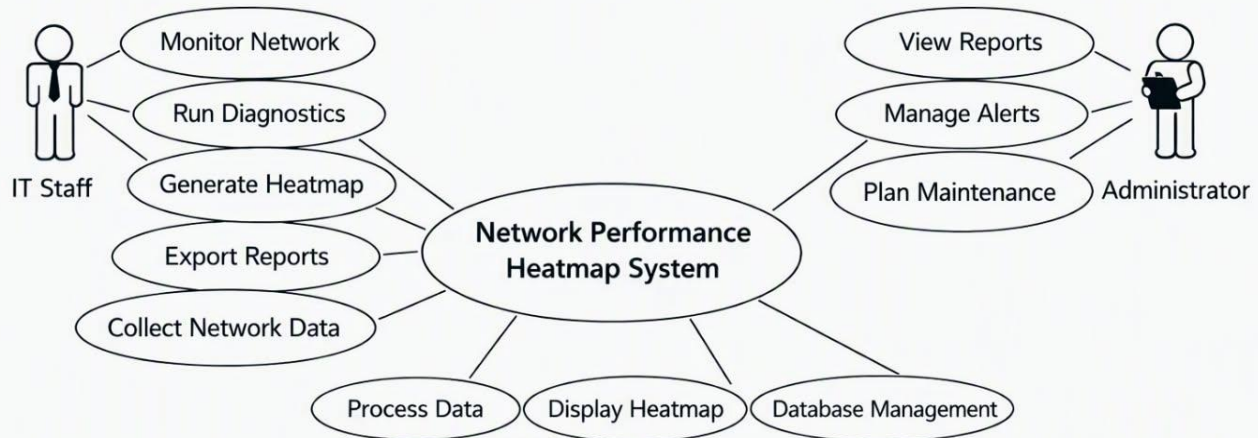


Figure 3. Use Case Diagram for the Network Performance Heatmap System.

### Data Flow Diagram (DFD)

This Diagram provides a detailed view of how information moves through the network performance Heatmap System.

**External Entities:** Networking devices such as access point, routers and connected computers or devices are the primary sources of data. Those devices generate performance metrics including, bandwidth usage, latencies and packet loss.

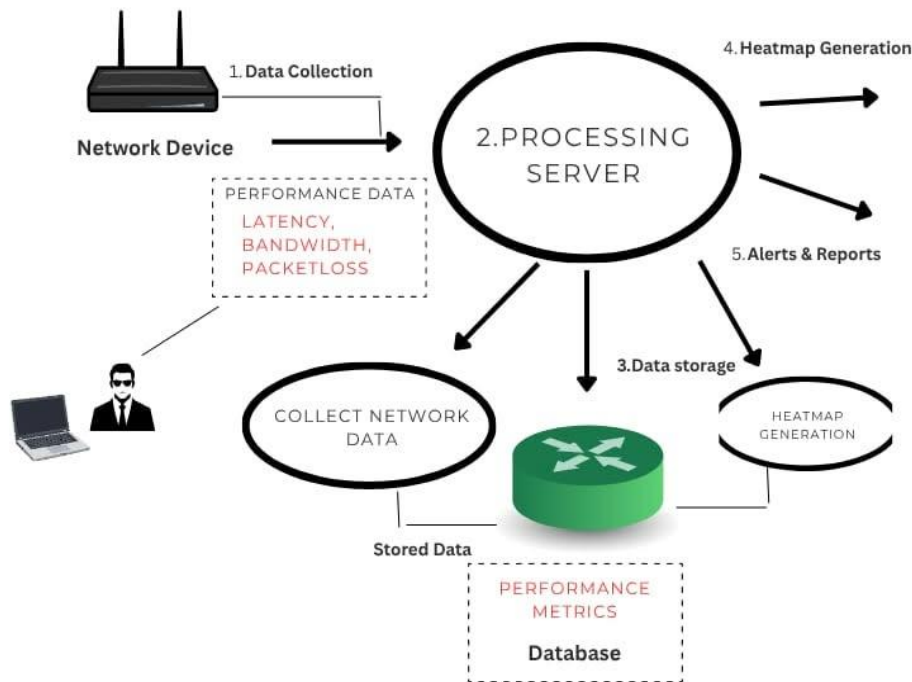
**Process:** Monitoring Students act as the first process of collecting raw performance data from the networking devices. Processing Server analyzes those data, transforming it into perfect connectivity insights.

**Data Stores:** the analyzed data of the processing server is stored in the Performance Metrics Database which maintains a record of device identifiers.

**Outputs:** this is the final process of Visualization Dashboard, which processes data converted into a heatmap. This output is accessed by Information Technology Services (ITS) , enabling them to quickly identify weak connectivity areas and plan actions.

This Data flow diagram (DFD) shows the logical flow of information, from Data collection to processing to storage and visualization. The diagram ensures that all functional requirements are addressed and that the system operates efficiently.

## DATA FLOW DIAGRAM



## OUTPUTS



Figure 4. Data Flow Diagram for the Network Performance Heatmap System.

### 3.4 System Design Specification

This section explains what requirements from the point of view of the systems are. The ERD or Entity-Relationship diagram defines the logical structure of the database for the Heatmap Systems.

Access Point represents the physical network access points deployed across the Systems Plus College Foundation (SPCF). Devices refers to the end user devices connected to the network. it includes the attributes device ID , user to link in accesspoint. Performance Metrics, Stores the collected network performance data such as Bandwidth, Latency. Every record is linked to a specific device through Device ID.

For the user representing system users like Information Technology Services (ITS). attributes include User Id and Credentials.

This Entity-Relationship Diagram (ERD) ensures that the system can store and analyze performance data effectively. By the use of structured databases from access points, devices and performance metrics, the system can generate a heatmap that will reflect real time connectivity conditions.

# NETWORK PERFORMANCE HEATMAP SYSTEM

Entity-Relationship Diagram

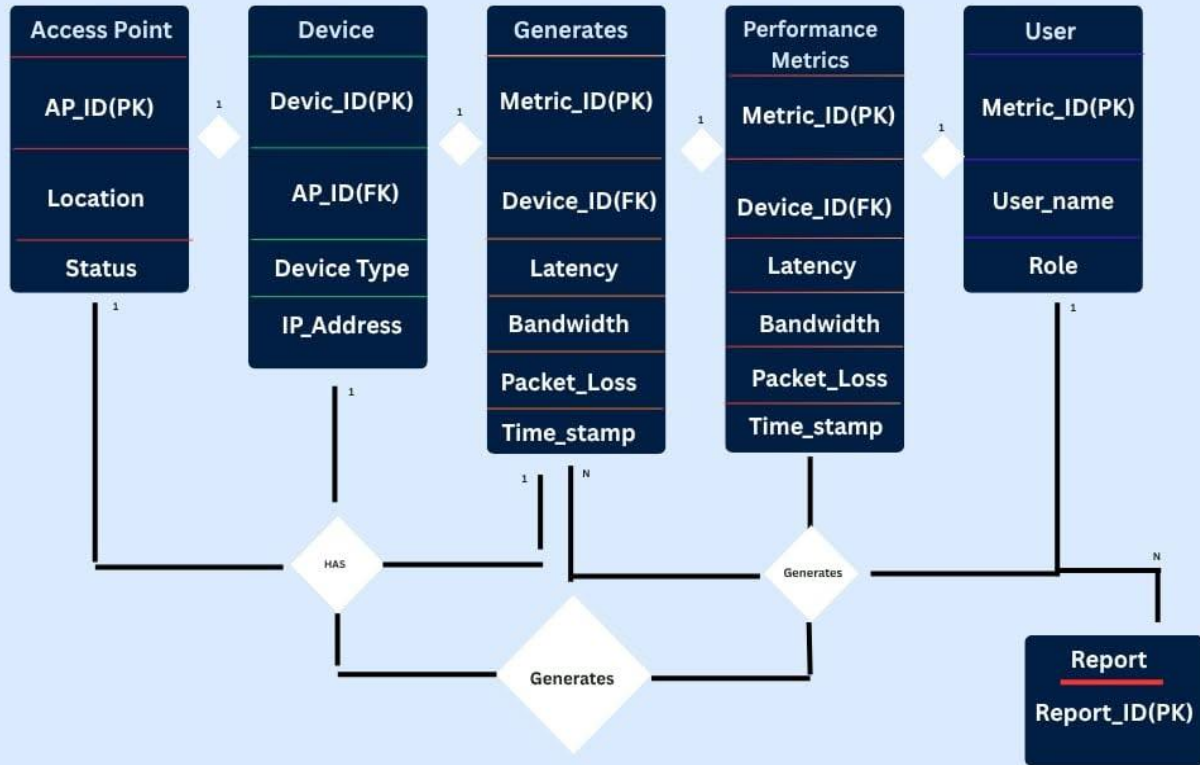


Figure 5. Entity-Relationship Diagram for the Network Performance Heatmap System.

## 3.5 Implementation

The system will be developed and will be deployed based on the requirements and design specifications.

### Development Environment

Python is the primary programming language for data collecting, processing and analysis to implement the System. For the visualization, Matplotlib and Plotly were integrated to generate the heatmap interface. Lastly for storing performance metrics and ensuring structured and reliable data management the system will use a MySQL Database.

### Modules

**Data Collection:** Monitoring agents configured to gather network metrics such as Bandwidth and latency from access points and devices that are connected.

**Data Storage Module:** The entity relationship diagram will be implemented in MySQL to create tables for AccessPoint, Devices and PerformanceMetrics. MySQL ensures the proper organization and retrieval of data.

Processing Module: Python was developed to combine and analyze collected data.

Visualization Module: The Dashboard was built for displaying a color coded heatmap to allow Information Technology Services (ITS) to easily identify weak connectivity areas.

Integration: Every module will be integrated following the logical flow defined in the Data Flow Diagram. Data will be collected from devices, processed and stored in a database and then it visualized to the dashboard.

### **Deployment**

Our System will be deployed on a local server of Systems Plus College Foundation (SPCF) accessible for Information Technology Services (ITS). To secure sensitive network data, a role based access control will be implemented.

## **3.6 Testing and Evaluation**

The following instruments will be used by the researchers to examine the reliability and to assess the necessary components of the system's.

### **Testing and evaluation in network systems**

Provide Information Technology Services (ITS) personnel/Support with the ability to monitor performance, describe system requirements and implement solutions that validate the system.

### **Implementation**

The system will be implemented in the network environment of Systems Plus College Foundation (SPCF). Information Technology Services (ITS) personnel test the systems to verify all data collection, database storage, processing and visualization if all modules are functioning properly.

### **Unit Testing**

Each module will be tested individually to ensure the proper functionality. Data collection will be validated for accuracy in capturing bandwidth, Latency and packet loss. The database module will be checked for the correct storage and retrieval of performance metrics while the visualization part will be checked to confirm the accuracy of the heatmap.

### **Integration Testing**

Modules were tested together to confirm seamless data flow from collecting and visualization. This ensured that the architecture of the system defined in Data Flow Diagram (DFD) was correctly implemented and the modules worked cohesively as a single system.

### **(UAT) User Acceptance Test**

UAT will be conducted to determine whether the system operates effectively in real-time conditions. Information Technology Services (ITS) personnel interact with the Heatmap dashboard to confirm if the system met both functional specification and non-functional criteria such as efficiency, reliability and usability.

### **Evaluation Questionnaire**

During pilot testing the evaluation questionnaire will be distributed to Information Technology Services (ITS) personnel. This assesses the quality of the system's in terms of functionality, efficiency, reliability and performance. response will be collected and analyzed to highlight strengths and areas for improvement.

## Results and Analysis

Testing confirmed that the proposed system accurately identified weak connectivity areas and it provides actionable insights for technical support/Information Technology Services (ITS) personnel. The output of heatmap is aligned with baseline measurements from network monitoring tools such as Traceroute and PING. Database query logs confirmed the proper storage and retrieval of performance metrics. user feedback highlighted the natural design of the dashboard and its value pro-active maintenance planning.

This phase demonstrates that our system fulfills its intended purpose such as providing reliable and user-friendly tools for identifying weak connectivity areas and technical support and maintenance at Systems Plus College Foundation (SPCF).

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