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Implementation Of A Bandwidth Monitoring System Using Observium At PT XYZ

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Abstract: The increasing demand for fast, stable, and reliable internet services requires Internet Service Providers (ISPs) to have an effective network monitoring system. PT XYZ, as an Internet Service Provider, requires network monitoring to support bandwidth management and network performance supervision. Based on observations and interviews conducted during the Community Service Program, the existing network monitoring process had several limitations, including the absence of centralized monitoring, limited real-time bandwidth monitoring, lack of informative network visualization, and difficulties in identifying network disturbances. This activity aimed to implement a web-based network monitoring system using Observium to improve the effectiveness of bandwidth monitoring and assist the Network Operation Center (NOC) team in network supervision and troubleshooting. The implementation method used the Waterfall approach, consisting of requirements analysis, system design, implementation, testing, and maintenance. The system was implemented using Ubuntu Server 22.04, Nginx, MariaDB, PHP 8.1, Observium, and Simple Network Management Protocol (SNMP). Black Box Testing was conducted to verify the functionality of the implemented system. The results showed that the system successfully performed login, displayed the dashboard, monitored bandwidth, displayed network devices, and presented traffic graphs. The implementation centralized network monitoring, provided more understandable bandwidth information, and supported faster identification of network problems.

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Thus, Observium can support the effectiveness and efficiency of network monitoring activities at PT XYZ.

Keywords: bandwidth monitoring, network monitoring, Observium, SNMP, Network Operation Center

1. Introduction

The rapid development of information technology has increased the demand for fast, stable, and reliable network services. Internet Service Providers (ISPs) depend heavily on network quality to provide reliable internet services to customers. Therefore, network monitoring is an important activity for maintaining network performance and supporting the operational continuity of internet services. PT XYZ is a company operating in the information technology sector, particularly as an Internet Service Provider (ISP), general contractor, and provider of goods and services. In its operations, the company requires a network monitoring system capable of monitoring bandwidth usage and network conditions effectively.

Based on observations conducted during the Community Service Program, the existing network monitoring process at PT XYZ still had several limitations. Network monitoring had not been fully integrated into a centralized system. Monitoring activities were still performed manually or by using tools that could not provide comprehensive and real-time information. In addition, network bandwidth information was not presented through sufficiently informative graphical visualization. These conditions made it more difficult for the Network Operation Center (NOC) team to monitor network conditions quickly and accurately.

Another problem was the absence of an automatic notification mechanism for network disturbances. As a result, the identification of network problems and troubleshooting processes could take longer. The lack of centralized monitoring and historical information also limited the ability to analyze network conditions comprehensively.

To address these problems, Observium was implemented as a web-based network monitoring system[1]. Observium provides visual information regarding network devices, bandwidth usage, and network traffic[2]. The implementation was intended to centralize network monitoring and provide the NOC team with information that could support network supervision and troubleshooting activities.

Therefore, this activity aimed to implement a bandwidth monitoring system using Observium at PT XYZ, improve the effectiveness of bandwidth management, and support the NOC team in monitoring network conditions.

2. Materials and Method

2.1 Location and Activity

The activity was conducted at PT XYZ, located at East Bekasi, West Java. The Community Service Program was carried out from April 1 to June 2, 2026. The activity focused on the implementation of a network monitoring system for bandwidth and network device monitoring.

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2.2 Data Collection

The analysis of system requirements was based on observations and interviews with management and the Network Operation Center (NOC) staff. The observation focused on the existing network monitoring process, while interviews were conducted to identify operational requirements and problems related to bandwidth monitoring and network troubleshooting.

Based on the observations and interviews, the main requirements included real-time bandwidth monitoring, network device status monitoring, network traffic visualization, historical bandwidth data, network disturbance information, and network monitoring reports.

2.3 Development Method

The implementation used the Waterfall method[3]. The method was selected because it provides systematic and structured stages for system implementation[4]. The stages consisted of[5][6][11]:

1) Requirements Analysis: Identifying system requirements based on observations and interviews.
2) System Design: Designing the monitoring system according to the identified user and operational requirements.
3) Implementation: Installing and configuring the network monitoring system using Observium.
4) Testing: Testing the implemented system to ensure that its functions operated according to the requirements.
5) Maintenance: Performing improvements and maintenance when problems were identified.

2.4 System Implementation

The monitoring system was implemented using a web-based Observium environment. The server used Ubuntu Server 22.04[7] with Nginx as the web server[8] and MariaDB as the database server[9]. PHP 8.1 and its supporting modules were configured to support the application environment. The implementation process consisted of server preparation, installation of the web server and database, database configuration, PHP configuration, Observium installation, SNMP configuration, Nginx configuration, system initialization, and automatic scheduling using cron jobs. SNMP was used as the monitoring protocol to collect information from network devices. Cron jobs were configured to support device discovery, periodic network data polling, and system housekeeping.

3. Results and Discussion

3.1 Existing Network Monitoring Conditions

The observation results showed that the existing network monitoring process had not been fully centralized. Network information was not presented through a single monitoring system capable of providing comprehensive real-time information. The main problems identified were the lack of centralized network monitoring, the absence of real-time bandwidth monitoring, the lack of automatic network disturbance notifications, difficulties in troubleshooting, and the absence of

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informative network data visualization. These conditions indicated the need for a monitoring system capable of presenting network conditions in a centralized and visual manner.

3.2 Implementation of Observium

Observium was implemented as a web-based network monitoring system. The implementation was deployed on a server using Ubuntu Server 22.04 and integrated with Nginx, MariaDB, PHP 8.1, and SNMP. The database used was MariaDB with a database named observium. The database structure followed the Observium Community Edition database structure. Several tables supported the monitoring process, including Devices, Users, Ports, Ports_statistics, Eventlog, Alerts, and Sensors. The system was configured to monitor network devices and collect network traffic information periodically. The monitoring environment was then accessed through a web browser to provide a visual interface for network supervision.

3.3 Dashboard

The dashboard provides an overview of network conditions and bandwidth usage. It displays network traffic information in graphical form and provides the status of monitored network devices. The dashboard allows the NOC team to obtain an overview of network conditions from a centralized interface. This makes monitoring activities more practical compared with monitoring information that is distributed across different tools or performed manually.

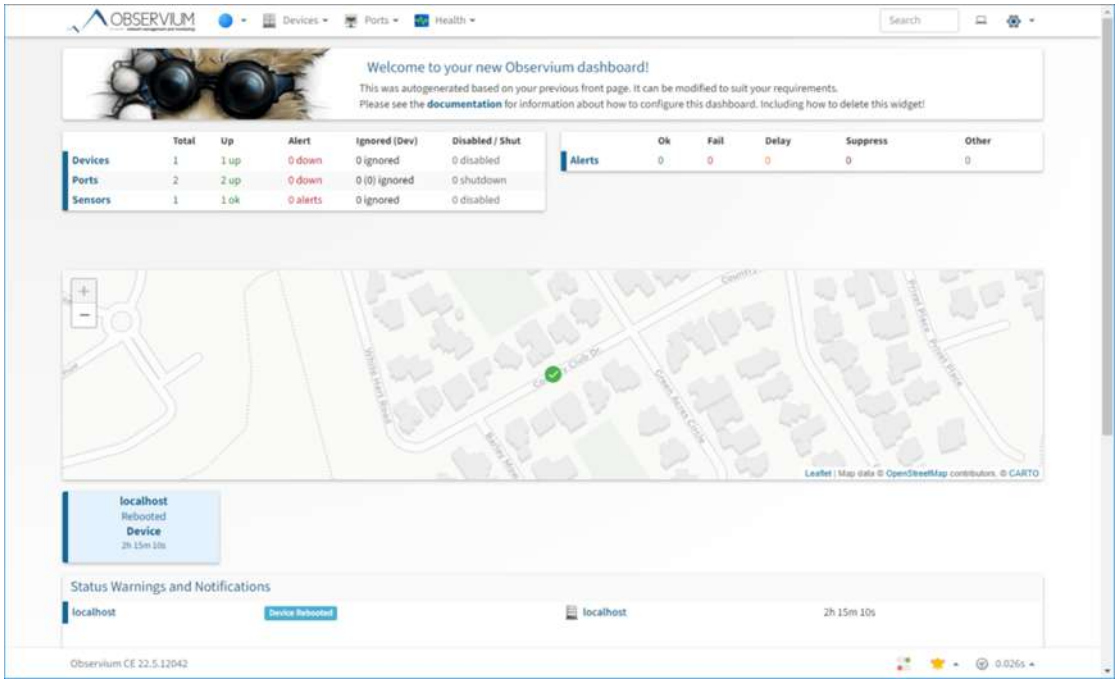

Figure 1. Dashboard of the Network Monitoring System

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3.4 Device Monitoring

The device monitoring page provides detailed information regarding monitored network devices, including device IP address, status, and uptime. This feature supports the NOC team in identifying the operational status of network devices from a centralized monitoring interface.

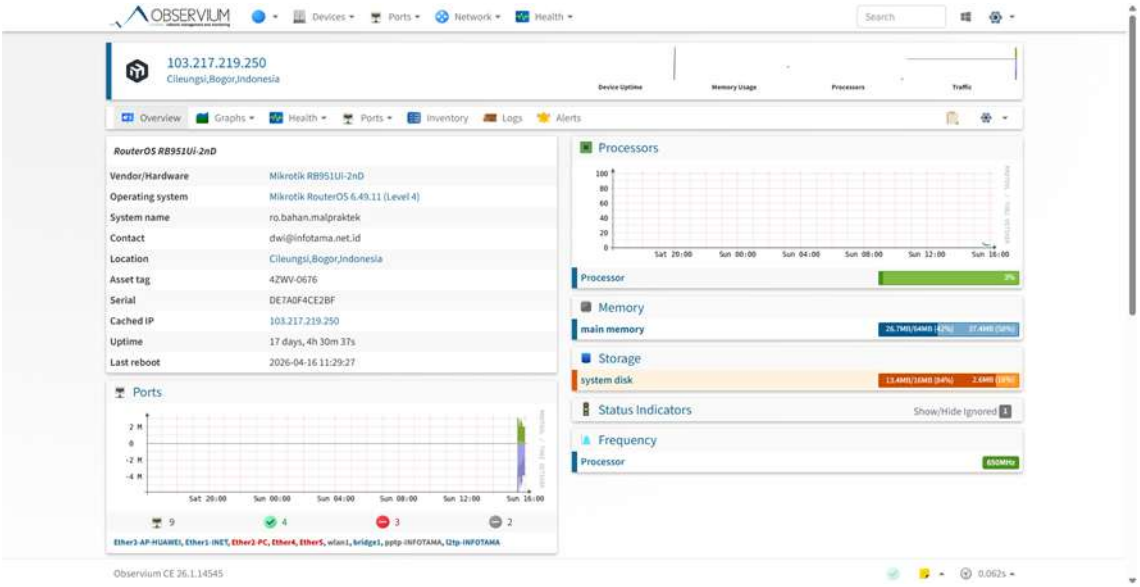

Figure 2. Device Monitoring

3.5 Traffic Monitoring

The traffic monitoring feature presents network traffic information in graphical form. The visualization helps users understand bandwidth utilization and observe network traffic conditions. The availability of graphical traffic information provides a more understandable representation of network conditions and supports the monitoring and troubleshooting process.

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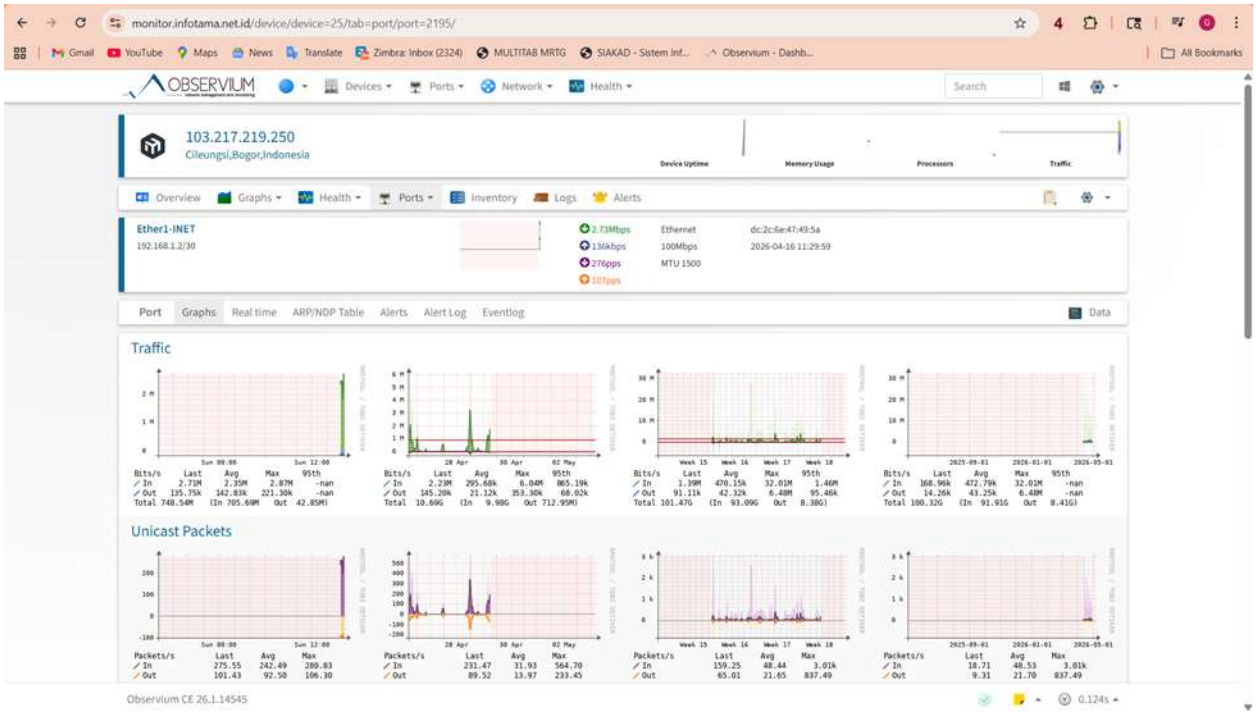

Figure 3. Traffic Graph

3.6 System Testing

System testing was conducted using Black Box Testing[10]. The testing focused on verifying whether the main functions of the monitoring system operated according to the identified requirements.

Table 1. Black Box Testing Results

No	Testing Scenario	Result
1	Login to the system	Successful
2	Display dashboard	Successful
3	Bandwidth monitoring	Successful
4	Display network devices	Successful
5	Display traffic graph	Successful

The testing results indicate that the main functions of the implemented monitoring system operated successfully. The login function, dashboard, bandwidth monitoring, device monitoring, and traffic graph could be accessed and displayed according to the expected functionality.

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3.7 Discussion

The implementation of Observium provided improvements to the network monitoring process at PT XYZ. Previously, monitoring was not fully centralized and the available information was limited in terms of real-time monitoring and visualization. After implementation, network monitoring could be performed through a centralized web-based interface. The system also provided bandwidth and traffic information in visual form, making the information easier to understand. This supported the NOC team in observing network conditions and identifying potential network problems more quickly. The implementation also provided a foundation for further development. Based on the evaluation, additional features such as automatic notifications through email or Telegram and integration with other monitoring systems could be considered for future development.

4. Conclusion

The implementation of the bandwidth monitoring system using Observium at PT XYZ provided a solution to the limitations identified in the previous network monitoring process. The implemented system was able to provide centralized network monitoring, display bandwidth usage, monitor network device status, and present network traffic information through graphical visualization. Based on Black Box Testing, the main system functions, including login, dashboard display, bandwidth monitoring, device monitoring, and traffic graph display, operated successfully. The implementation therefore supported more effective and efficient network monitoring activities and assisted the Network Operation Center (NOC) team in network supervision and troubleshooting. For further development, the system can be enhanced by implementing automatic notifications through email or Telegram and integrating Observium with other network monitoring systems.

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