

Management Of Student Hotspot Networks Through The Integration Of Academic Information Systems

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ABSTRACT

In the digital era, fast, stable, and easily accessible internet has become essential, particularly in academic settings. Students require reliable connectivity to support teaching and learning activities, research, and access to scholarly information. However, managing hotspot networks on campus often faces challenges such as user authentication, bandwidth management, monitoring, and security. To address these issues, integrating hotspot network management with Academic Information Systems (AIS) presents a potential solution. This integration allows the hotspot network system to utilize academic data for authentication and authorization, enhancing efficiency, security, and ease of access. Case studies at several universities have shown significant improvements in operational efficiency and user satisfaction following the implementation of this integration. This research aims to develop a hotspot network management system integrated with AIS to support a more modern and integrated educational ecosystem and enhance the quality of internet access services on campus.

Keywords: *Academic Information System Integration, hotspot network management, user authentication, bandwidth management, network security, academic environment.*

INTRODUCTION

In today's digital era, fast, stable, and easily accessible internet has become a fundamental necessity, particularly in academic environments. Students require reliable connectivity to support their learning activities, research, and access to academic information. However, managing campus hotspot networks often faces various challenges, such as user authentication, bandwidth management, monitoring, and security. An authentication system that is not integrated with academic data can complicate the login process and reduce efficiency. Additionally, uncontrolled bandwidth usage can lead to network instability, disrupting academic activities. The lack of an effective monitoring system also makes it difficult for network administrators to identify issues and manage network usage optimally, while poorly managed networks are vulnerable to security threats (Ardianto, 2019).

To address these challenges, the integration of hotspot network management with the Academic Information System (SIA) offers a potential solution. This integration allows hotspot networks to utilize data from the SIA for authentication and authorization processes, creating a more efficient, secure, and user-friendly system. Through this integration, students can use their academic credentials to access the hotspot network, which not only simplifies the login process but also enhances security by ensuring that only registered students can access the network. Moreover, data from the SIA can be used to manage bandwidth allocation based on academic needs, ensuring that learning activities are not disrupted by unrelated network usage. This integration also facilitates the creation of more detailed network usage reports, which can be used for better network analysis and planning, as well as strengthening network security through a centralized authentication system.

Case studies at various universities that have implemented the integration between hotspot network management and SIA have shown significant improvements in operational efficiency and user satisfaction.

Students reported that they could access the network more easily and quickly, while network administrators found that they could manage and monitor the network more effectively. The development of a student hotspot network management system integrated with SIA aims to increase the efficiency and ease of network access for students, ensure network stability and optimization for academic activities, strengthen network security through an integrated authentication system, and simplify the process of monitoring and reporting network usage (Rahman, 2018).

As information technology advances, the demand for internet access continues to grow and has now become a basic need for society, including in academic settings. The widespread use of the internet has led public places such as libraries, restaurants, campuses, offices, and cafes to provide internet services as part of their facilities. The implementation of wireless networks (WLAN) in these places often poses challenges in bandwidth management, as every user desires a stable and fast internet connection, which requires significant bandwidth and incurs substantial costs (Dwiyatno et al., n.d.). To address this issue, the use of Mikrotik as a router has become a popular solution. Mikrotik, a company based in Latvia founded in 1996, provides hardware and software for network management, enabling bandwidth allocation for each user and creating a more stable network system in various environments, including campuses. This integration supports the creation of a more modern and integrated educational ecosystem and enhances the quality of internet services on campus.

METHOD

Here is a summary of the development of a student hotspot network management system integrated with the Academic Information System (SIA) using the Waterfall method:

Development Procedure

The Waterfall method was applied in the development of this system through six stages:

1. Analysis: Identifying system requirements, such as student authentication, network management, and integration with SIA.
2. Design: Creating the system design, including user interface (UI), database structure, and workflow to facilitate the management of the hotspot network.
3. Implementation: Developing and testing the program code using software tools like Visual Studio Code and XAMPP.
4. Testing: Conduct various tests, such as functionality, performance, and security tests, to ensure the system works properly and securely.
5. Deployment: Providing user training and making adjustments before officially launching the system.
6. Maintenance: The system is maintained and updated based on user feedback and emerging new needs.

Tools and Resources

This system requires hardware, such as hotspot routers and servers, as well as software like Visual Studio Code, XAMPP, and a PHP-based web application. The system is also designed to be easily monitored through a website integrated with SIA.

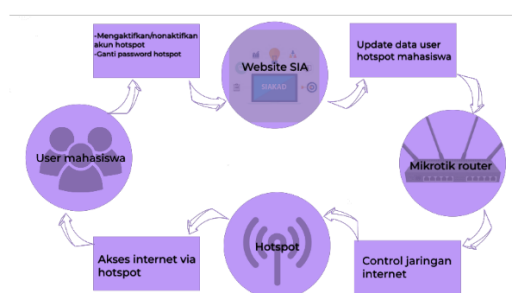


Figure.1 Diagram Alur Manajemen Jaringan Hotspot Mahasiswa

System Flowchart

The flowchart illustrates the network management process from user authentication via SIA to access management by the admin. These stages are designed to ensure ease of access and efficient management.

With SIA integration, this system ensures that students can easily access the hotspot network, while administrators can efficiently monitor and manage the network.

RESULT AND DISCUSSION

Result

MikroTik is a Latvia-based company renowned for its networking products and software, particularly its router devices. Its flagship product, RouterOS, is an operating system that can be installed on specialized hardware (RouterBoard) or on regular PCs, enabling advanced networking functions such as routing, firewall, bandwidth management, VPN, and wireless access points(Ardianto, n.d.).

RouterOS allows users to configure and manage their networks using a relatively user-friendly interface, either through the GUI (Winbox) or the command-line interface (CLI). It is popular among small to medium-sized Internet Service Providers and is widely used by businesses and network enthusiasts around the world(Taufik Rahman, 2023).

MikroTik offers several advantages, particularly for organizations in need of powerful and flexible networking solutions. Its affordable pricing provides advanced networking capabilities at a lower cost compared to similar products from other vendors, making it a favored choice for small to medium-sized businesses. The flexibility and scalability of MikroTik RouterOS support a wide range of networking functions, including routing, firewall, VPN, QoS, load balancing, and bandwidth management, which can be customized to meet varying network needs, from small setups to large deployments.

MikroTik's devices are known for their stability and performance, maintaining reliability even under heavy loads. The company's active global user community offers extensive support through online resources, forums, and groups. Regular software updates from MikroTik enhance functionality and address bugs, ensuring devices remain up-to-date with modern networking requirements. Additionally, MikroTik provides integration of wireless functions, enabling management of both wired and wireless networks from a single device(Feby Ardianto et al., 2018).

Overall, MikroTik presents a robust, flexible, and cost-effective networking solution suitable for a wide range of users and organizations.

Discussion

The testing of the student hotspot network management system was conducted using the Black Box method, where inputs are provided to each component of the application without knowing the internal processes. The purpose of this testing is to ensure that the output meets the functional requirements. If the output is correct, the component is considered acceptable; if not, revisions are necessary.

Table 1. Case of Admin data

Data Case and Test Result (True Data)	
Input Data	1. Username : admin 2. Password : 12345
which are expected	Check that the username and password are correct and enter the Dashboard page.
Result	Username and password accepted and successfully logged in to the Dashboard page
Conclusion	succeed

Black Box testing ensures that the hotspot network management website functions well and meets user needs. The testing covers functionality, navigation, responsiveness, security, and system component integration. The test results are used to improve and refine the system so that it operates effectively and meets user requirements.

Table 2 Data Case

Data Case and Test Result (True Data)	
Input Data	<ol style="list-style-type: none">1. Username: 21020409782. Password: 12345
which are expected	Check that the username and password are correct and enter the Dashboard page.
Result	Username and password accepted and successfully logged in to the Dashboard page
Conclusion	succeed

CONCLUSIONS

This research resulted in the development of a Student Hotspot Network Management website through the integration of an Academic Information System, specifically designed for administrators in educational institutions. The system was developed using the CodeIgniter framework, leveraging its features to build an effective and efficient system(Shaqia Nur Oktaviana et al., 2024).

Throughout the development process, black box testing was conducted to ensure the system's functionality without examining the source code. The testing results showed that the website operates well, meets all the established goals, and provides ease for administrators in managing the hotspot network and student academic data. The system proved to be stable, reliable, and user-friendly, reflecting the developers' success in utilizing CodeIgniter and the effectiveness of the testing methods employed.

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