Implementation of Repeater-Based Wireless Network with IP Address Configuration at Uptd Sd Negeri 1 Taman Fajar

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A R T I C L E I N F O	A B S T R A C T
Keywords: Wireless Network, Repeater, IP Address Configuration, Network Infrastructure. *Received: 7, January* *Revised: 28, February* *Accepted: 15, March* ©2026 Maqi, Cahya (s): This is an open-access article distributed under the terms of the Creative Commons Atribusi 4.0 Internasional.	This initiative was motivated by the limited reach and unstable internet network in several school areas, necessitating a solution to improve network quality and coverage. The initiative began with observation and analysis of the existing network conditions. Next, network topology design, installation and configuration of wireless repeater devices, and IP address configuration were carried out so that each device could be connected within a structured network system. After the configuration process was completed, connectivity testing and evaluation were conducted to ensure the network could function properly and stably. The implementation of a repeater-based wireless network has proven to be able to expand the range of Wi-Fi signals and improve the stability of internet access within the school environment. This supports the smooth running of technology-based learning and administration processes.

INTRODUCTION

The development of information technology requires every institution, including educational institutions, to have a reliable and stable network system. Computer networks have become an essential requirement in supporting administrative activities, data communication, and information management effectively and efficiently. Therefore, the implementation of a well-structured wireless network is an appropriate solution to meet these needs.

UPTD SD Negeri 1 Taman Fajar, East Lampung, has a fairly large working area, requiring a wireless network with evenly distributed signal coverage. However, the limited range of access points often causes weak signals in certain areas. To overcome this problem, it is necessary to implement a repeater-based wireless network that functions to extend the Wi-Fi signal coverage so that it can reach all areas of the school.

The use of repeaters in a wireless network allows signals received from the main access point to be amplified and retransmitted to areas that were previously difficult to reach. Thus, network connectivity becomes more stable and evenly distributed. To ensure that each connected device can communicate properly within the network, proper IP address configuration is required, both static and dynamic, to avoid IP address conflicts and connection disruptions.

The implementation of a repeater-based wireless network with IP address configuration at UPTD SD Negeri 1 Taman Fajar aims to support the smooth operation of school activities, such as administrative data management, access to school information systems, and communication between work devices. A stable network also helps improve the efficiency of teachers and administrative staff in carrying out their daily tasks.

In addition, the implementation of a well-designed wireless network also facilitates maintenance and future network development. With an organized network system, the school can manage the network in a more controlled and secure manner.

Thus, the implementation of a repeater-based wireless network with IP address configuration at UPTD SD Negeri 1 Taman Fajar is expected to be a solution to improve network connectivity quality, support school operational activities, and create an efficient and sustainable network system.

THEORETICAL FRAMEWORK

Wireless networks are one of the most widely used data communication technologies today due to their ease of installation, flexibility, and ability to support user mobility. In educational environments, wireless networks play an important role as infrastructure supporting learning processes, school administration, and access to digital-based information sources. Optimal utilization of wireless networks can increase the effectiveness of teaching and learning activities and support digital transformation in educational institutions (Wardana & Santoso, 2023).

The implementation and management of wireless networks are important aspects that are directly studied in the field. Wireless networks used in school environments often face various technical constraints, such as limited signal coverage, interference, suboptimal access point placement, and decreased service

quality when the number of users increases. These problems are consistent with findings that wireless network quality is strongly influenced by signal propagation factors, physical barriers, and network topology planning.

This activity provides students with the opportunity to practically understand how wireless network planning, implementation, and evaluation are carried out in educational environments. Students not only study theoretical concepts of wireless networks but also conduct direct observations of network quality based on technical parameters, such as signal strength (RSSI) and throughput. These parameters are important indicators in assessing wireless network performance and user comfort in accessing network services (Wardana & Santoso, 2023).

In addition to network performance, wireless network security is also an important concern in this activity. Poorly managed wireless networks are vulnerable to security threats such as data interception and unauthorized access. Therefore, understanding the fundamentals of wireless network security is essential to maintain the confidentiality and integrity of data used in the school environment (Santoso et al., 2022).

The implementation mechanism consists of three stages: preparation, implementation, and evaluation. In the preparation stage, initial observations are conducted on the school's network infrastructure conditions, Wi-Fi signal coverage, internet access needs of teachers and staff, and the network systems previously implemented. The observation results indicate limited wireless network coverage in several school areas, requiring a solution in the form of repeater usage.

The implementation stage focuses on the installation and configuration of wireless network repeaters. Students configure repeater devices by adjusting IP address settings, both statically and dynamically, to integrate with the school's main network. Additionally, students conduct connectivity testing, signal strengthening, and network optimization to ensure stable internet access for teachers and staff. Supporting activities include network usage assistance, device checking, and technical documentation of installation.

The evaluation stage is carried out through testing the results of wireless network implementation, activity reflection, and report preparation. With the implementation of this repeater-based wireless network, internet access at UPTD SD Negeri 1 Taman Fajar is expected to become more evenly distributed, stable, and supportive of learning and administrative activities optimally.

METHODOLOGY

This study uses a qualitative descriptive approach with an applied (implementative) method, namely directly implementing a repeater-based wireless network solution in the school environment. The activity was conducted at UPTD SD Negeri 1 Taman Fajar, Purbolinggo District, East Lampung Regency, during the period of January 12 to February 14, 2026.

1. Wireless Network Design

The network design in the office room uses a wireless network architecture with one main device acting as the control center, namely the Wireless Router

WRT300N with IP address 192.168.1.1. The router is connected to a repeater device (192.168.11.1) and an office access point/Wi-Fi (192.168.111.1), which then distributes the connection to several client devices such as laptops, smartphones, and tablets.

Theoretically, a computer network is a collection of interconnected devices that exchange data and share resources through certain communication media (Parenreng et al., 2022). With a network, data communication can occur effectively and in a structured manner through established protocols.

The network designed in this office room has met the basic principles of computer networking because all devices are within the same IP addressing system and can communicate with each other within a single local network.

2. Type of Network Used

Based on its coverage area, the implemented network is categorized as a Local Area Network (LAN) because it is used within a limited scope, namely a single office room. LANs are generally used in small areas such as schools, laboratories, and offices (Parenreng et al., 2022).

In addition, this network uses wireless transmission media. Wireless networks utilize electromagnetic waves as a medium for transmitting data between devices without using physical cables (Hasibuan, 2025; Wibowo et al., 2022). Therefore, the system implemented in the office room is classified as a Wireless Local Area Network (WLAN).
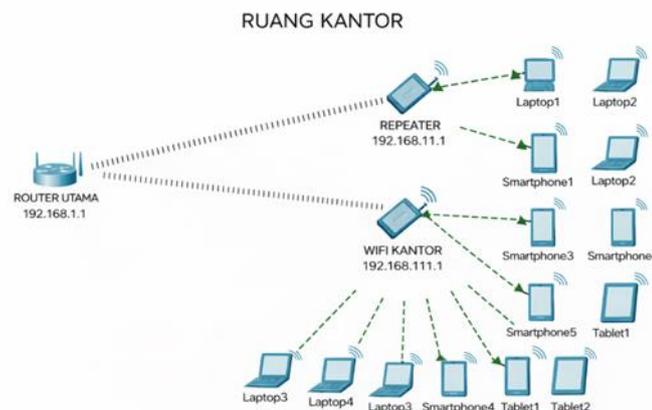
3. Network Device Analysis
a. Wireless Router (192.168.1.1)

The wireless router functions as the central controller (gateway) of the network, managing data distribution and IP addressing for all client devices. The router is also responsible for connecting the local network to a wider network (the internet).

In a wireless network, the central device plays an important role in regulating communication traffic so that data can be transmitted and received properly (Wibowo et al., 2022). Therefore, the router is the main component in this network design.

b. Repeater (192.168.11.1)

A repeater is used to strengthen and extend the Wi-Fi signal coverage from the main router. The use of a repeater is very important, especially in areas with physical obstacles such as walls or locations that are far from the signal source. Signal amplification devices in wireless networks function to maintain the stability and quality of data transmission so that it remains optimal over a wider area (Raharjo et al., 2019). With the presence of a repeater, network coverage becomes more evenly distributed throughout the office space.

c. Access Point / Office WiFi (192.168.111.1)

The access point functions as a connection distribution point for multiple client devices. This device allows several users to connect simultaneously within a single network.

An access point is a device used to expand network coverage and increase user access flexibility in a wireless network system (Hasibuan, 2025). With the Office WiFi acting as an access point, connection distribution becomes more efficient and stable.

4. Network Topology Analysis

The structure of the relationships between devices in the office network indicates the use of a star topology. In this topology, all client devices are connected to a central device that controls data communication.

Star topology is widely used because it is easy to manage and develop (Wibowo et al., 2022). If a disruption occurs in one client device, it does not affect other devices. The use of this topology is highly suitable for office environments that require network stability and ease in troubleshooting processes.

5. IP Addressing Analysis

The network uses the IP address scheme 192.168.1.x, which falls into the category of private Class C IP addresses. The use of private IP addresses is commonly applied in local networks because they are more secure and cannot be directly accessed from public networks (Parenreng et al., 2022).

The addressing structure used is as follows:

- Router: 192.168.1.1
- Repeater: 192.168.11.1
- Access Point: 192.168.111.1

This systematic IP configuration indicates well-planned network management, making monitoring and maintenance easier.

6. Relation to Wireless Technology Development

The development of wireless technology today enables faster, more flexible, and more efficient connectivity in various work environments. Wireless network technology continues to evolve to improve service quality, user capacity, and data transmission speed (Purbo et al., n.d.).

Thus, the implementation of a wireless network in the office environment represents a solution that is relevant to the development of modern communication technology.

RESULTS AND DISCUSSION

Before configuration, ensure that the device is first connected to the repeater, either using a LAN cable or by connecting via Wi-Fi with the repeater's network name. Then, access a browser and enter the IP address **192.168.11.1** in the search bar. The interface will appear as follows.
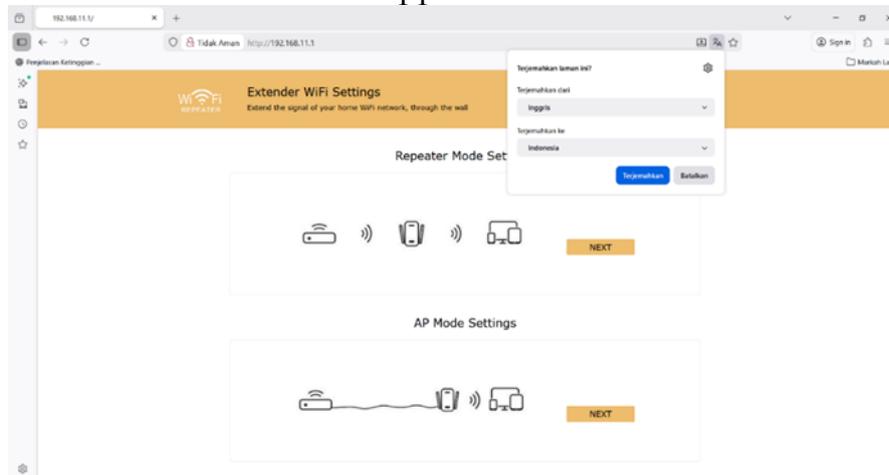
After the page opens, the system displays two configuration mode options: Repeater Mode and AP (Access Point) Mode. Repeater Mode is selected at this stage because the goal is to extend the range of the main WiFi network without using additional LAN cables. After selecting Repeater Mode, the user presses the Next button to continue the configuration process. Repeater mode receives the signal from the main router and then rebroadcasts it, extending the signal range.
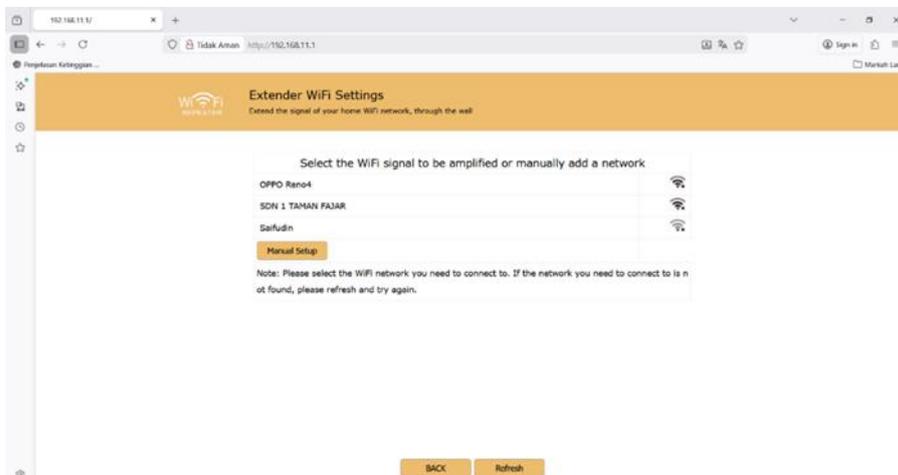
After the scanning process is complete, a list of available WiFi networks will appear, such as: OPPO Reno4, SDN 1 TAMAN FAJAR, Saifudin. At this stage, select the primary network to be extended: SDN 1 TAMAN FAJAR. If no network is found, users can press the Refresh button or use the Manual Setup option.

After selecting the SSID, the system displays the Repeater Mode Settings page.

The next steps are:

a. Ensure the selected SSID is correct.

b. Enter the password for the primary WiFi network (SDN 1 TAMAN FAJAR).

c. Specify the name of the extended network (Extender SSID).
The image shows that the network name is expanded to: SDN 1 TAMAN FAJAR-2.4G-ext. Check the modify SSID option if you want to change the extender network name.
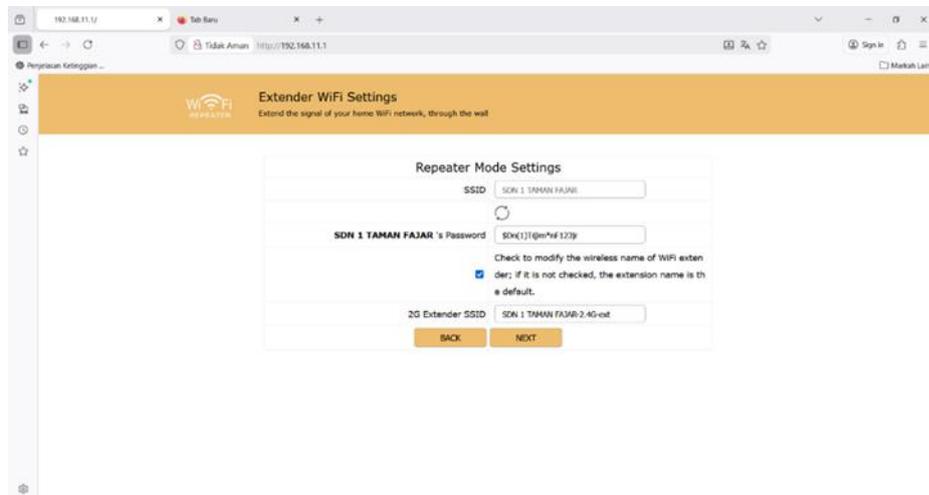
After all data has been filled in correctly, click the **Next** button to save the configuration. The system will then perform the following processes:
d. Saving the settings

e. Restarting the repeater device

f. Synchronizing with the main router

After the process is complete, the device will broadcast a new network named **SDN 1 TAMAN FAJAR-2.4G-ext**. User devices can then connect to this network to obtain internet access with wider coverage.

From the perspective of academic and technical competence, students are able to apply their knowledge in the field of network infrastructure through the design and expansion of internet signal coverage. Students are directly involved in the entire technical cycle, starting from analyzing coverage area requirements, selecting strategic device placement, to configuring the repeater. This technical capability is further strengthened by the students' success in managing network addressing through systematic IP address configuration, ensuring that each connected device has stable connectivity and is free from data conflicts. This demonstrates the students' ability to integrate their understanding of network protocols into practical and applicable solutions.

The value of real-world problem solving is reflected in the students' initiative in identifying the limited internet access issues in the UPTD SD Negeri 1 Taman Fajar area. Based on these problems, students provided a solution in the form of implementing a repeater-based wireless network as an efficient and cost-effective method to extend signal coverage without requiring complex cabling. This solution proved effective in improving the availability of digital information access for teachers and staff, directly supporting smooth school administration and technology-based teaching and learning activities.

In terms of collaboration, students demonstrated strong teamwork skills with the school principal, school operators, and supervising lecturers. Students actively coordinated in determining an IP addressing scheme that aligns with the school's

internal policies and provided basic technical guidance to school staff regarding device maintenance. This collaboration ensured that the infrastructure built not only functions technically but also aligns with the school's operational needs. Furthermore, the value of usefulness is reflected in the network implementation results, which can be sustainably utilized to support the school's digitalization programs.

In terms of attitude and professionalism, students showed significant improvement in discipline, responsibility, and work ethics while working within the institution. They were able to adapt to the school's work culture, comply with existing regulations, and carry out installation tasks according to the predetermined schedule.

The first challenge encountered was the limited Wi-Fi signal coverage from the main access point, which was unable to reach the entire school area. In addition, there were technical issues related to the limited number of devices that could be stably connected to the central network, often resulting in decreased connection quality or access failures when usage demand increased. This problem was further complicated by the potential occurrence of IP address conflicts if device identification within the network was not managed systematically.

To address these issues, students implemented a technical solution in the form of a repeater-based wireless network. The initial step involved mapping the area to determine the most strategic placement points for the repeater, ensuring it could optimally capture and retransmit the main signal to previously unreachable areas. To ensure stable communication between devices, students configured IP addresses in a structured manner, using static configuration for infrastructure devices and dynamic configuration for user devices. This approach ensures that each device has a unique communication path and prevents connection disruptions caused by overlapping network addresses.

In addition to technical measures, students also applied an educational approach by providing brief explanations to school staff regarding the basic working principles of repeaters and the importance of IP address management in maintaining network stability. This integrated solution proved effective in expanding Wi-Fi coverage at UPTD SD Negeri 1 Taman Fajar without compromising connection quality. With a more organized system, school operational activities such as administrative data management and access to educational information systems can run more smoothly, efficiently, and sustainably.

CONCLUSIONS AND RECOMMENDATIONS

This activity serves as a practice-based learning medium that enables students to integrate computer network theory from lectures with the direct implementation of information technology infrastructure in an educational institution. Through this activity, students successfully implemented wireless network expansion using repeater devices as an innovative and practical solution.

The structured configuration of IP addresses has also proven effective in maintaining orderly data distribution and preventing technical disruptions within the network. This implementation not only improves connectivity but also contributes to the development of a more reliable digital ecosystem for teachers and staff at UPTD SD Negeri 1 Taman Fajar.

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