



IMPLEMENTING A MIKROTIK RECURSIVE FAILOVER SYSTEM TO ENSURE INTERNET NETWORK AVAILABILITY AT PT. OMEGA MEDIA GLOBAL

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(Naskah diterima: 1 Juli 2025, disetujui: 28 Juli 2025)

Abstract

The availability of a stable internet connection is essential for maintaining smooth business operations, especially in digital-based companies like PT. Omega Media Global. Relying solely on a single internet connection creates a major risk, as any disruption may halt the entire workflow. To address this issue, this study implements a network system using the failover recursive gateway method on Mikrotik devices. This system is designed to automatically monitor the stability of the primary internet link and seamlessly switch to a backup connection in the event of a failure, based on preconfigured priorities and connection speed. The implementation results indicate that the system successfully performs automatic failover without manual intervention, effectively reducing downtime and maintaining connection stability. The application of this method has proven to significantly improve network reliability and operational efficiency, enabling the company to continue its digital activities without interruption during internet failures.

Keywords: failover, recursive gateway, Mikrotik, network reliability

Abstrak

Ketersediaan koneksi internet yang stabil sangat penting bagi keberlangsungan operasional perusahaan, terutama di lingkungan digital seperti PT. Omega Media Global. Ketergantungan pada satu jalur koneksi utama menjadi masalah serius ketika terjadi gangguan, karena dapat menghentikan seluruh aktivitas kerja. Penelitian ini mengimplementasikan sistem jaringan dengan metode failover recursive gateway menggunakan perangkat Mikrotik. Sistem dirancang agar dapat memantau kestabilan koneksi utama dan secara otomatis mengalihkan trafik ke koneksi cadangan jika terdeteksi gangguan, dengan pengaturan prioritas dan kecepatan jalur. Hasil implementasi menunjukkan bahwa sistem berhasil menjalankan proses failover secara otomatis tanpa intervensi manual. Waktu downtime dapat ditekan secara signifikan, dan koneksi internet tetap berjalan stabil meskipun jalur utama terganggu. Penerapan metode ini terbukti meningkatkan keandalan dan efisiensi jaringan perusahaan. Sistem mampu mendukung operasional digital secara berkelanjutan serta mengurangi risiko terhentinya layanan akibat gangguan koneksi.

Kata kunci : failover, recursive gateway, Mikrotik, koneksi Cadangan



I. INTRODUCTION

The use of computer networks is increasing along with the advancement of information technology. Computer networks are used not only for business purposes but also for personal purposes such as internet banking and social media (Pratomo, 2023).

PT. Omega Media Global is a company engaged in administration and client services within the internet service provider (ISP) sector, headquartered in Cibinong, Bogor. PT. Omega Media Global operates in the Information and Communication Technology (ICT) sector, focusing primarily on providing fiber-optic internet services and end-to-end ICT solutions. The company is widely known for its trademark, Bnetfit. Since its founding, PT. Omega Media Global has operated. Its headquarters are located at Ruko Imperium C1–C3, Jalan Mayor Oking No. 63, Cibinong, Bogor Regency, West Java. PT. Omega Media Global is also a member of the Jala Lintas Media Group, a consortium of technology companies operating in the internet and communications services sector in Indonesia. All internal company work processes, from data management and internal communications to the use of web-based applications, are highly dependent on a stable internet connection. Disruptions to internet connections can directly disrupt administrative workflows, slow down decision-making processes, and create operational inefficiencies.

In this context, "Failover can automatically move internet resources from the primary path to the backup path using the recursive gateway method" (Sulistyawan & Priyawati, 2021). This concept not only ensures layered internet connection availability but also enables automatic connection switching (failover) by considering the priority, stability, and speed of each connection path. By implementing this concept, companies can maintain optimal digital service continuity even if an interruption occurs to one of the internet connections. Based on this background, the author critically analyzed the existing problems and recognized the need for an appropriate solution to address them. Therefore, the author took the initiative to design an internet network system with automatic recursive failover and minimal downtime. This research will discuss the Design of a Recursive Failover System to Ensure Stable Internet Network Availability at PT. Omega Media Global. The scope of the research covers the following aspects:

1. Analysis of Existing Network Conditions

The research will begin with an analysis of the existing internet network conditions at PT. Omega Media Global, including the network topology used, the primary internet

connection (ISP), and potential single points of failure. The primary focus will be on networks that still use a single connection path (single route), which is vulnerable to disruptions and downtime.

2. Recursive Failover System Design

This research will design a recursive failover system to address downtime and connection instability issues. This design includes selecting appropriate hardware and software, as well as a routing configuration that allows for automatic connection switching, taking into account the priority, stability, and speed of alternative connection paths.

3. System Implementation and Testing

Once the design is complete, the next stage is the implementation of the recursive failover system within PT. Omega Media Global. This research will include system testing to measure the effectiveness of failover in reducing downtime and ensuring continuous internet connection continuity.

4. Reliability and Efficiency Evaluation

This research will also evaluate the impact of implementing a recursive failover system on network performance, including analysis of reliability, operational efficiency, and end-user experience. The evaluation is conducted by comparing network conditions before and after implementation.

5. Research Limitations

This research is limited to the design and implementation of a recursive failover system for internet connections at the Subscriber Management division office of PT. Omega Media Global. The scope of the research does not include managerial aspects, network security, or internal networks (LANs) that are not directly related to internet connections. Furthermore, this research focuses on a mechanism for automatically switching connections between primary and backup lines, without making major changes to the existing physical infrastructure.

II. THEORETICAL STUDIES

A computer network (network) is a telecommunications network that allows computers to communicate with each other by exchanging data. The purpose of a computer network is to enable each part of the computer network to request and provide services (Astuti, 2018).

A computer network refers to interconnected computing devices capable of sharing resources and exchanging data. To transmit information between network devices, a system

known as a communication protocol is used. The function of this protocol is to transmit information via physical or wireless technology (Hafiz et al., 2023).

A LAN (Local Area Network) is a network that connects personal computers in an office, company, factory, or campus (Tomi Tristono, 2013). Furthermore, a LAN is a computer network that only covers a small area, such as a school, university, office, or home (Amala et al., 2023).

The Internet is a computer network that connects various sites, including academic, government, business, organizations, and individuals. The Internet provides communication services, discussions, information access, and remote file transfer. Due to its crucial role in supporting businesses, a stable connection is essential for smooth operations (Rusito et al., n.d.).

The internet is a network that connects computers worldwide, making this technology incredibly powerful and creating increasingly important new functions. People worldwide can interact, communicate, and exchange information worldwide using internet-connected technology (Sari et al., 2022).

Mikrotik is a wireless technology currently widely used by ISPs (Internet Service Providers) in Indonesia because it provides a more stable network and allows for bandwidth management and user data management. Mikrotik offers a low-cost solution for building a network because it can be installed with a standard computer (Saputra & Ariyadi, n.d.).

Failover is a technique that reaches a network target using multiple paths, but typically only one link is active. The unused link serves as a backup and is automatically activated only in the event of a primary link failure. Recursive bridging techniques enable failover to automatically redirect data from the primary link to the backup link (Darmawan & Risnanto, 2023).

Recursive gateways are a method of monitoring gateways that are not directly connected to the router in use. In other words, they monitor the gateways on top of the internet service provider (ISP), or more simply, the client computer monitors the internet server directly (Setiawan et al., 2021).

III. RESEARCH METHODS

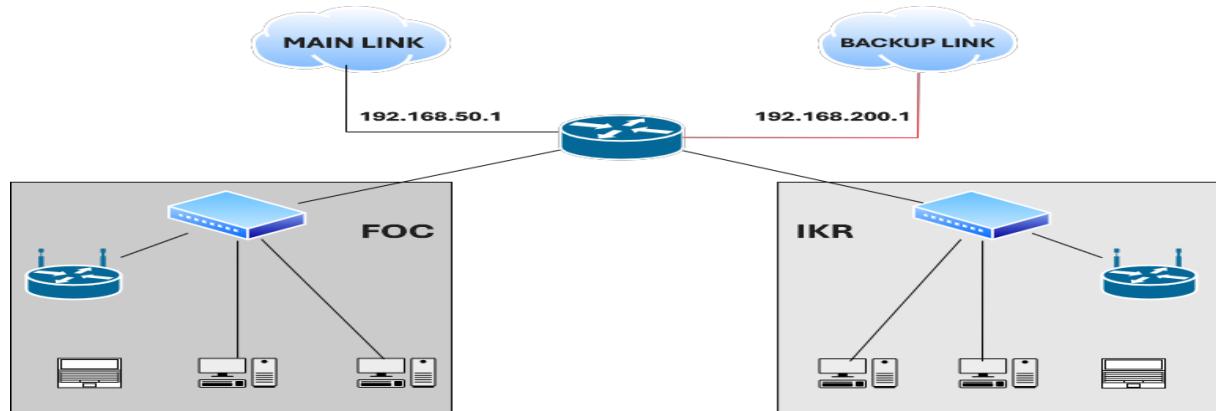
The data obtained from the research results were collected as documentation of the old system. The data collection methodology used in this study began with observation, at this stage the researcher conducted observations in the workplace so that the company's needs

could be determined. Then the researcher conducted a question and answer session with internal company parties aimed at gathering information related to frequently encountered network problems, the impact of connection disruptions on work activities, and their expectations for a more stable and automated network system. In addition, the author conducted a researcher looking for other sources to strengthen the theoretical basis through books, documents, and written materials related to the problem being studied. The network development model used by the author in this study is the PPDOIO method, namely, Prepare, Plan, Design, Implement, Operate, and Optimize.

IV. RESEARCH RESULTS

Based on the analysis of the network at PT. Omega Media Global, the author recommends implementing a recursive gateway failover scheme to improve the reliability and availability of internet connections. This approach is designed to ensure connectivity is maintained in the event of a disruption to one of the primary connection paths.

By configuring a recursive gateway failover on a Mikrotik router, this method aims to improve the reliability and redundancy of internet connections in the event of a problem with one of the internet connection sources. If the primary gateway experiences a disruption or failure, the system will automatically attempt to route data packets through several different gateways in sequence. This allows the network to automatically switch to the backup gateway, avoiding network outages or downtime.

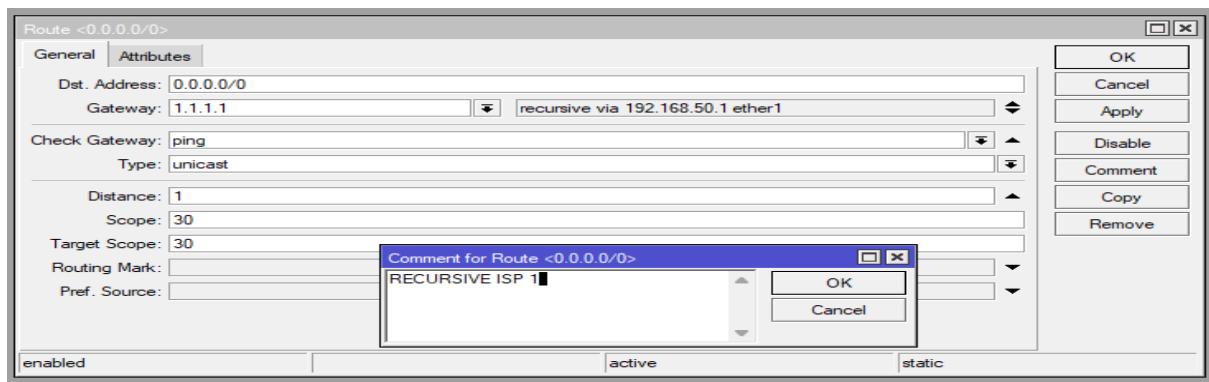


Proposed Network Scheme

The proposed network scheme uses a recursive failover gateway to improve internet connection reliability when a main link issue occurs. This is achieved without changing the existing star topology of the network. The recursive failover gateway method can reduce the possibility of configuration failures without disrupting the actual network. This addition

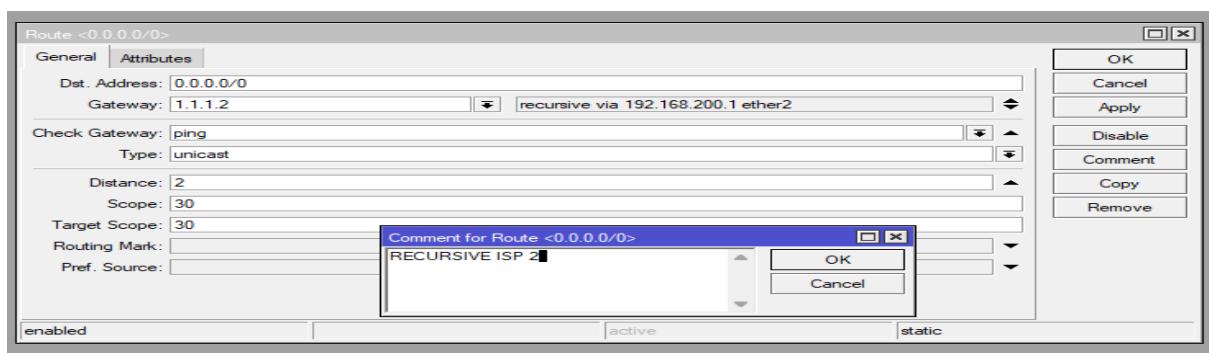
ensures that internet usage remains active even if there is a problem with the main link or main gateway.

A MikroTik router with a recursive gateway is configured to automatically redirect data traffic to an alternative path. This ensures that network services continue to operate without interruption. This solution increases the redundancy and reliability of PT Omega Media Global's services. The design implemented by the author uses a MikroTik router as the central path in the recursive failover gateway system to improve internet connection reliability when a main link issue occurs. In the router configuration process, the author uses a MikroTik graphical user interface (GUI)-based supporting application called Winbox.



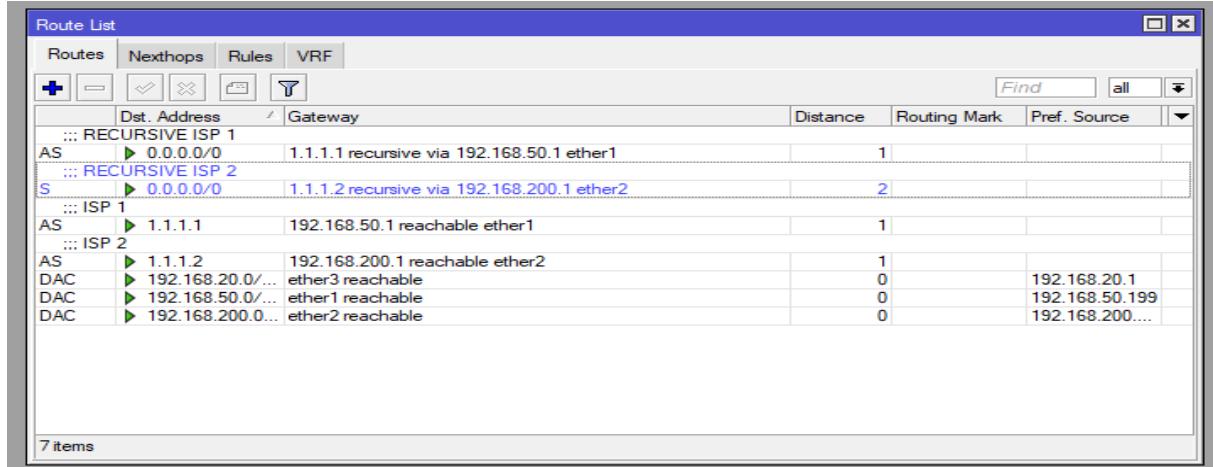
Recursive Main Link Configuration

At this stage, recursive configuration is performed on the main link by adding the main link IP route 1.1.1.1. This configuration will automatically recursively route to the main link gateway 192.168.50.1. This indicates that the routing settings have been successfully implemented.



Recursive Backup Link Configuration

Then, for the Recursive Backup Link Route, add the backup link route IP address 1.1.1.2, which points to the Backup gateway 192.168.200.1. If configured correctly, the Recursive will run properly, and the results will be as shown below:

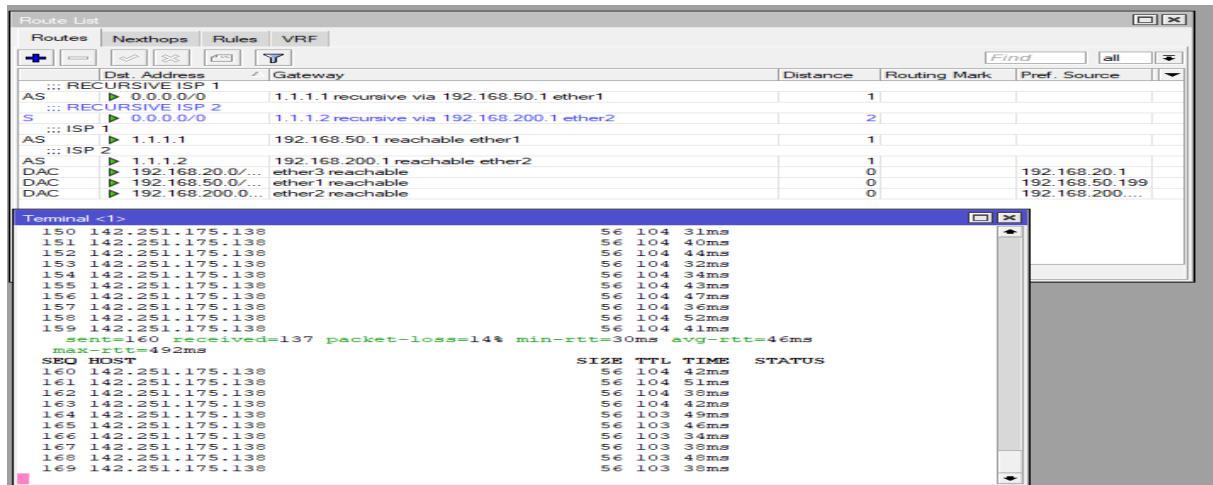


The screenshot shows the 'Route List' window with the 'Routes' tab selected. The table displays the following routes:

	Dst. Address	Gateway	Distance	Routing Mark	Pref. Source
AS	0.0.0.0/0	1.1.1.1 recursive via 192.168.50.1 ether1	1		
S	0.0.0.0/0	1.1.1.2 recursive via 192.168.200.1 ether2	2		
AS	1.1.1.1	192.168.50.1 reachable ether1	1		
AS	1.1.1.2	192.168.200.1 reachable ether2	1		
DAC	192.168.20.0/...	ether3 reachable	0		192.168.20.1
DAC	192.168.50.0/...	ether1 reachable	0		192.168.50.199
DAC	192.168.200.0/...	ether2 reachable	0		192.168.200....

Route List Display

After all configurations are complete, the next step is to test the network to determine whether the recursive gateway failover configuration was successful.



The screenshot shows the 'Route List' window with the 'Routes' tab selected. The table displays the same routes as the previous screenshot. Below the window, a terminal window titled 'Terminal <1>' shows network traffic statistics:

```

Terminal <1>
sent=160 received=137 packet-loss=1.4% min-rtt=30ms avg-rtt=46ms
max-rtt=492ms
SRTT HOSTT SIZE TTL TIME STATUS
160 142.251.175.138 56 104 40ms
161 142.251.175.138 56 104 40ms
162 142.251.175.138 56 104 44ms
163 142.251.175.138 56 104 32ms
164 142.251.175.138 56 104 32ms
165 142.251.175.138 56 104 43ms
166 142.251.175.138 56 104 47ms
167 142.251.175.138 56 104 36ms
168 142.251.175.138 56 104 36ms
169 142.251.175.138 56 104 41ms
sent=160 received=137 packet-loss=1.4% min-rtt=30ms avg-rtt=46ms
max-rtt=492ms

```

Final Test Results

In this final test, the author attempted to reactivate the internet from the primary ISP, which had previously experienced disruptions. After the primary connection was reactivated, the system automatically switched back from the backup link to the primary link. This was observed in the route list display on the router interface, where the primary gateway status changed to reachable. Thus, all network traffic was rerouted through the primary route, according to the previously determined priority configuration. This process demonstrated that the recursive gateway mechanism was functioning properly and as expected.

V. CONCLUSION

Based on the implementation and testing of the network system using the recursive gateway failover method, it can be concluded that this solution successfully improves the reliability and stability of internet connections in the PT. Omega Media Global environment. By adding a backup connection in addition to the primary connection. This system is designed to automatically switch to the backup connection when the primary connection experiences a disruption. From the test results, this method has proven successful in maintaining a stable internet connection and reducing downtime, so that operational activities at PT. Omega Media Global can continue without interruption. In addition, the implementation of the recursive failover system is able to switch connections automatically by monitoring the stability and response of the primary connection. If a disruption is detected, the system immediately switches to the backup path based on the configured priority and connection speed, so that the connection remains stable without the need for manual intervention. The implementation of this method has been proven to improve network reliability and work efficiency of the company. A more stable internet connection supports smooth access to digital services, internal communications, and data management, so that company operations are not easily disrupted by connectivity issues.

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