

Available online at : <https://journal.shpress.org/>

Community Praxis (ComPax)

| ISSN (Print) xxxx-xxxx | ISSN (Online) xxxx-xxxx |



Implementation of Healthy Internet Technology Using DNS Trust+ and RTBH in Wareng Village

Sutiyo¹, Kemas Muslim Lhaksana², Farisya Setiadi³

¹ School of Computing, Telkom University, Bandung, Indonesia

ARTICLE INFORMATION
Received: August 02, 2026 Revised: August 08, 2026 Available online: August 18, 2026
KEYWORDS
DNS, DNS Trust+, Real-Time Blackhole, Internet Safety, Digital literacy
CORRESPONDENCE
Phone: - E-mail: tioatmadja@telkomuniversity.ac.id

ABSTRACT

The development of information and communication technology has significantly impacted people's lives, including those in Wareng Village, Gunung Kidul Regency, Yogyakarta. Although internet access in this village is evenly distributed, its use is often not accompanied by adequate digital literacy. This creates challenges such as accessing negative content like online gambling, pornography, fraud, hoaxes and radicalism. The lack of supporting infrastructure for a healthy internet, such as filtering systems and access restrictions, exacerbates the situation. To address this problem, DNS Trust+ and RTBH technology were implemented on router devices. This system is designed to block access to negative content and create a safer internet environment. Additionally, through digital literacy training, the people of Wareng Village are encouraged to use the internet wisely and productively. The results of this implementation are expected to improve the quality of internet access, strengthen people's digital literacy, and support the government's vision of realizing Indonesia as an advanced digital country.

INTRODUCTION

A. Background

Wareng Village is one of the villages in Gunungkidul Regency, Special Region of Yogyakarta Province. It is in Wonosari District and covers an area of 620.933 hectares, with a population of approximately 4,000 residents (1,143 households) [1]. Most of the population in Wareng Village works in the agricultural sector.

The rapid development of information and communication technology over the past few decades has brought significant impacts on various aspects of community life, including rural areas. Wareng Village has experienced many positive effects of this technological progress. Increasingly accessible and affordable internet access has created new opportunities for residents to obtain information, improve communication, and support personal development.

However, alongside these benefits, unregulated internet use also presents serious challenges, particularly for rural communities with relatively low levels of digital literacy. In Wareng Village, irresponsible internet usage has raised concerns about the spread of negative content such as online gambling, pornography, radical

content, and misinformation. The lack of infrastructure to support a healthy internet environment, including content filtering systems and access restrictions to inappropriate websites, further exacerbates this situation.

The Indonesian government has established regulations to protect the responsible use of information technology through Law Number 19 of 2016 concerning Electronic Information and Transactions (ITE Law). Article 40 paragraph (2a) states that the government is obligated to prevent the dissemination and use of electronic information and/or electronic documents containing prohibited content in accordance with applicable laws. Furthermore, Article 40 paragraph (2b) authorizes the government to terminate access or instruct electronic system providers to block access to unlawful electronic information and/or documents [2].

In addition, Regulation of the Minister of Communication and Informatics Number 5 of 2020 concerning Private Electronic System Operators provides guidelines to ensure that digital content governance adheres to principles of security and safety. This regulation emphasizes the importance of controlling and supervising unlawful content and ensuring the provision of

healthy internet access to prevent the spread of harmful material [3].

Most residents of Wareng Village, who work as farmers and laborers, have limited understanding of responsible internet usage. The lack of digital literacy and awareness of the potential negative impacts of internet use—especially on younger generations, represents a critical issue that must be addressed. Therefore, appropriate technological solutions are needed to create a digital environment that is healthy, safe, and secure.

B. Problem Formulation

Based on the background described above, the main problem identified in Wareng Village is how to implement a healthy, safe, and secure internet environment using affordable and appropriate technological solutions.

C. Proposed Solution and Expected Outcomes

As a solution, this program integrates DNS Trust+ and Real-Time Blackhole (RTBH) technologies. DNS Trust+ is a DNS-based system containing a database of domains categorized as negative content, while RTBH is a filtering mechanism that uses a database of IP addresses associated with harmful or illegal activities. Such negative content includes online gambling, pornography, fraud, harassment, violations of decency, illegal online lending, violence, and misinformation. The DNS Trust+ and RTBH databases are managed by the Ministry of Communication and Digital Affairs of the Republic of Indonesia (KOMDIGI RI).

The implementation of healthy internet technology in Wareng Village is carried out by installing router and firewall devices synchronized directly with DNS Trust+ and RTBH services from KOMDIGI RI. In addition to using the centralized databases, the village administration can independently add blacklist entries for harmful content. This allows Wareng Village to proactively block dangerous content without waiting for formal reporting and confirmation from KOMDIGI RI.

This technology is selected as an appropriate solution for several reasons:

1. **Relevance:** DNS Trust+ and RTBH directly address the current problem of widespread access to harmful online content.
2. **Effectiveness:** The technology has proven effective in blocking unwanted websites.
3. **Affordability:** Implementation costs are relatively low and can be adjusted to the village budget.
4. **Ease of management:** The router and firewall devices provide user-friendly interfaces and are easy to configure.
5. **Sustainability:** The system can be regularly updated to keep pace with emerging threats and new categories of harmful content.

Through the implementation of this technology, a healthier, safer, and more comfortable internet environment is expected to be established for the residents of Wareng Village. Furthermore, the deployment of DNS Trust+ and RTBH supports the national vision of advancing Indonesia as a digitally developed country.

Based on the proposed solution, the expected outcomes of this activity are:

1. **Effectiveness of technology in filtering negative content**

The DNS Trust+ and RTBH system effectively restricts access to harmful content such as online gambling, pornography, fraud, radical content, and misinformation. This contributes to creating a safer internet environment, especially for younger generations who are more vulnerable to such content. Periodic evaluations will be conducted to assess the effectiveness of the system in supporting healthy internet use in Wareng Village.

2. **Improvement of community digital literacy**

Through integrated outreach and training programs, the digital literacy of Wareng Village residents will improve. Community members will learn to use the internet responsibly and productively, enhancing their capabilities in areas such as education, business, and social interaction.

D. Community Service Activity Steps

This community service program aims to create an innovative and sustainable solution for Wareng Village. Therefore, the activity steps are carried out as follows:

1. **Planning and needs analysis**

An assessment of the community's needs regarding internet access and content filtering is conducted to determine which types of content should be blocked and the required level of filtering granularity. This stage focuses on selecting router devices that also function as firewalls, choosing systems that provide negative content databases such as DNS Trust+ and RTBH, and designing a network architecture that integrates all components.

2. **Selection and procurement of hardware**

After planning, router devices and supporting equipment are purchased and installed at strategic locations to ensure optimal network coverage in all required areas.

3. **Device configuration**

Basic router configuration is performed by setting IP addresses, DNS servers, and firewall rules. The router is configured to use DNS Trust+ as the primary DNS and to establish BGP peering with the KOMDIGI RI RTBH system.

4. **Integration of DNS Trust+ and RTBH**

Integration involves regular synchronization between the local DNS and DNS Trust+ to keep the blocked domain list up to date, as well as synchronization of RTBH BGP peering to ensure that blocked IP addresses remain inaccessible.

5. **Socialization and training**

Community members and village officials receive outreach on the benefits of negative content filtering systems. Village staff are trained to operate and maintain the system, including managing DNS Trust+ and RTBH.

6. **Implementation and monitoring**

The DNS Trust+ and RTBH system is activated and continuously monitored to ensure optimal performance and to prevent disruptions to internet access services in Wareng Village.

7. **Maintenance and upkeep**
Firmware and software updates for router and firewall devices are carried out regularly, along with routine hardware maintenance to keep the system running reliably.

RESULTS OF THE COMMUNITY SERVICE ACTIVITIES

A. Activity Format, Location, and Schedule

As a guideline for implementing the community service program, the timeline of activities is presented in Table 1.

Table 1. Timeline of Community Service Activities

No.	Activity	2024			
		Sept	Oct	Nov	Dec
1.	Collection of user requirements and field survey for installing healthy internet access service devices	■			
2.	Design of the healthy internet access service system		■		
3.	Integration of the healthy internet access service system			■	
4.	Testing of the healthy internet access service system				■
5.	Socialization/outreach on system usage to the community and village officials				■
6.	Final evaluation of the healthy internet access service system				■
6.	Final evaluation of the healthy internet access service system				■

B. Community Stakeholders Involved

This community service program involves several community stakeholders. The participation of various groups in Wareng Village helps ensure that the designed system is well accepted and effectively utilized by the community. The participants involved in each activity are as follows:

1. **Observation activities**
Participants: village officials and community leaders.
2. **System testing activities**
Participants: village officials, community leaders, and youth representatives.
3. **Implementation activities**
Participants: village officials, community leaders, youth representatives, and representatives from the Community Information Group (KIM).

C. Design Results of the DNS Trust+ and RTBH System in Wareng

The DNS Trust+ and RTBH system designed for Wareng Village aims to filter negative content—such as online gambling and pornography—while improving the quality of internet access. The design process was carried out through several stages, starting from community needs analysis and hardware procurement to full system configuration. The system consists of the following main components:

1. **DNS cache**
A DNS system embedded in the router device that functions as a domain resolver whenever there is a request to access a website.
2. **DNS Trust+ (Master)**
A DNS service provided by the Ministry of Communication and Digital Affairs of Indonesia (KOMDIGI RI) that contains a database of domains categorized as negative content.

3. **RTBH (Real-Time Black Hole)**
An IP address database system provided by KOMDIGI RI that stores IP addresses classified as negative or harmful content.
4. **Router**
A device that serves as both a gateway and a firewall between Wareng Village's internal network and the internet.



Figure 1. Design of the DNS Trust+ and RTBH System in Wareng Village [4]

Figure 1 illustrates the system architecture designed to filter internet traffic in Wareng Village. The system aims to block access to negative content such as online gambling and pornography. The operational workflow of the system is described as follows:

1. **User request**
When a user in Wareng Village attempts to access a website, their device—such as a computer or smartphone—sends a request to the local router, which is then forwarded to the DNS. The DNS is responsible for translating the web address or domain name (e.g., www.example.com) into an IP address.
2. **Local DNS cache**
The DNS request is first checked against the local DNS cache. This cache functions as a local domain resolver or directory that stores previously queried domain names. If the requested domain is found in the cache, the response is returned directly, speeding up the access process.
3. **Forwarding the request**
If the requested domain is not found in the local DNS cache, the request is forwarded to DNS Trust+ (referred to in the figure as DNS Trust Master). DNS Trust+ is a DNS server managed by KOMDIGI RI that maintains a list of domains categorized as negative and blocked by the Indonesian government.
4. **DNS Trust+ verification**
DNS Trust+ checks whether the requested domain is included in the block list. If it is blocked, DNS Trust+ returns a blocking response or redirects the user to the page <https://lamanlabuh.aduankonten.id/>. This landing page informs users that the requested domain is included in the government's block list, as shown in Figure 2.
5. **IP address verification**
In addition to domain-based verification through DNS Trust+, each request is also checked against an IP blacklist. This blacklist contains IP addresses of servers known to host or distribute negative content. If the

destination IP address is included in the blacklist, the request is blocked and not forwarded.



Figure 2. Tampilan domain yang diblokir [5].

6. RTBH (Real-Time Black Hole)

Figure 3. BGP peering dengan RTBH KOMDIGI RI.

RTBH is a mechanism used to directly block data packets destined for IP addresses listed in the blacklist. The system is integrated with three RTBH BGP peerings provided by KOMDIGI RI. Figure 3 shows a screenshot of the BGP peering dashboard with RTBH. These three RTBH peerings provide routing tables with blackhole attributes that contain lists of blacklisted IP addresses.

Figure 3. BGP peering dengan RTBH KOMDIGI RI.

RTBH is a mechanism used to directly block data packets destined for IP addresses listed in the blacklist. The system is integrated with three RTBH BGP peerings provided by KOMDIGI RI. Figure 3 shows a screenshot of the BGP peering dashboard with RTBH. These three RTBH peerings provide routing tables with blackhole attributes that contain lists of blacklisted IP addresses.

The DNS Trust+ and RTBH databases are continuously updated in real time whenever domains or IP addresses are added to or removed from the block lists. As a result of this implementation, residents of Wareng Village have experienced a safer and more comfortable internet environment. In addition to deploying this technology, the community has also received digital literacy training to encourage responsible and productive internet use.

Figure 3 shows the BGP peering with the KOMDIGI RI RTBH system, while Figure 2 presents an example of a blocked domain display [5]. Overall, the implementation is expected to improve the quality of internet access and strengthen the digital literacy of Wareng Village residents, supporting the government's vision of advancing Indonesia as a digitally developed nation.

CONCLUSION

The implementation of DNS Trust+ and RTBH technology in Wareng Village has effectively filtered negative online content while protecting residents from harmful digital exposure. DNS Trust+ provides domain-based filtering, whereas RTBH offers IP address-based filtering. Together, these mechanisms significantly reduce access to harmful content such as online gambling, pornography, fraud, misinformation, radical content, and other negative materials. Through intensive outreach and training programs, the residents of Wareng Village have developed a better understanding of safe, responsible, and healthy internet usage. The sustainability of this system can be maintained through regular updates and proper management by village officials, supported by technology that is tailored to community needs. In the future, this initiative is expected to serve as a model for similar implementations in other villages and to contribute to the realization of Indonesia's vision as a digitally advanced nation.

REFERENCES

- [1] "Tabel Data Kependudukan berdasar Populasi Per Wilayah." Diakses: 21 Oktober 2024. [Daring]. Tersedia pada: <https://desawareng.gunungkidulkab.go.id/first/wilayah>
- [2] "Undang-undang (UU) No. 19 Tahun 2016." Diakses: 4 Januari 2025. [Daring]. Tersedia pada: <https://peraturan.bpk.go.id/Details/37582/uu-no-19-tahun-2016>
- [3] "Peraturan Menteri Komunikasi dan Informatika Nomor 5 Tahun 2020." Diakses: 4 Januari 2025. [Daring]. Tersedia pada: <https://peraturan.bpk.go.id/Details/203049/permenko-minfo-no-5-tahun-2020>
- [4] "Filtering Konten Negatif Sosialisasi dan Bimbingan Teknis," Surabaya, Des 2023.
- [5] KOMINFO, "Trustpositif." Diakses: 24 Oktober 2024. [Daring]. Tersedia pada: <https://amanlabuh.aduankonten.id/>