Abdimas Umtas: Jurnal Pengabdian Kepada Masyarakat
LPPM-Universitas Muhammadiyah Tasikmalaya
Volume: 8, Issue: 3, July, 2025; pp: 1463-1471
E-ISSN: 2614 - 8544

Computer Network Learning and Training Using Cisco Packet Tracer Application as Competency Provision for Students of SMK Negeri 1 Empat Lawang

Dedi Setiadi[a)], and Riduan Syahri[b)]

Institut Teknologi Pagar Alam, Pagar Alam, South Sumatera, Indonesia

[a)] Corresponding author: dedisetiadi1212@gmail.com
[b)] syahririduan@gmail.com

ABSTRACT

The rapid development of information technology has encouraged the widespread use of computer networks, thus requiring every individual to have knowledge and skills related to computer networks, including an understanding of supporting applications. One of them is Cisco Packet Tracer, a computer network simulator designed to help users understand the concept of computer networks visually and interactively. Given its importance of understanding this application, encouraged us to carry out Community Service activities. The main objective of this activity is to optimize the use of information technology through training in the use of the Cisco Packet Tracer application, in order to support the teaching and learning process, especially in the field of computer networks. The methodology used in implementing this activity consists of three main approaches: direct observation, which is carried out by visiting partner locations to understand the conditions and needs of participants; direct training, namely providing materials and practice in using the Cisco Packet Tracer application; and evaluation and monitoring, which aims to assess the effectiveness of the training and the extent to which participants can apply the knowledge provided. The results of the implementation of this activity indicate that the training provided has made a positive contribution to improving the understanding of students of SMK Negeri 1 Empat Lawang, especially in the use of the Cisco Packet Tracer application and the process of installing and configuring computer networks.

ARTICLE INFO

Article History :
Submitted/Received 3 July 2025
First Revised 9 July 2025
Accepted 29 July 2025
First Available online 31 July 2025
Publication Date 31 July 2025

Keyword :
Cisco Packet Tracer
Computer networks
Network simulation
Student competency

https://doi.org/10.35568/abdimas.v8i3.6879

INTRODUCTION

The rapid development of information technology has encouraged the use of computer networks in almost all aspects of human life, (Aulia et al., 2023) from education, government, business, to households. (Syaputra & Stiadi, 2020) This phenomenon makes mastery of computer networks and various supporting applications an important and urgent need to be mastered by every individual. (Hakim & Razaqi, 2019) Not only limited to theoretical understanding, but also includes practical skills in managing and operating computer networks effectively. One of the software that is very well-known and widely used in the field of computer networks is Cisco. (Mananggel et al., 2021) In this context, the term Cisco refers to a set of technologies and hardware and software used to organize and manage computer networks. One of its most popular applications, (Zulkarnaen & Aliyah, 2021) especially in the world of network education and training, is Cisco Packet Tracer. This application is an interactive network simulator designed to help users understand network concepts through visual simulation. (Amran et al., 2024) Cisco Packet Tracer consists of various syntactic and semantic rules that are used to represent network configurations virtually. (Sinaga et al., 2023)

With Cisco Packet Tracer, users can execute various instructions related to network management directly. This application is interpretive, meaning that the instructions given can be executed in real-time to model the interaction between various network devices, such as routers, switches, computers, and other network devices. This capability makes Cisco Packet Tracer a very effective tool in the learning and training process of computer networks, (Leki et al., 2022) especially in vocational education environments. Seeing the importance of understanding and mastering information technology and network applications such as Cisco Packet Tracer, our team was motivated to carry out community service activities. The main objective of this activity is to make a real contribution to improving the literacy and skills of the community, especially students, in the field of computer networks. Through the training and learning programs that we have designed, we hope to facilitate students of SMK Negeri 1 Empat Lawang in gaining direct experience in building, managing, and configuring computer networks using the Cisco Packet Tracer application. (Tangkowit et al., 2021) The use of this application in the training process is very relevant, given its ability to detect and analyze network connection problems efficiently. Thus, students not only learn theoretically, but are also able to understand real problems that often occur in the world of work and are able to find solutions through network simulations provided in the application. (Anwar, 2020) This is certainly very useful as a provision of technical skills that are not always taught in detail in the school curriculum. (Fitriani et al., 2022)

Through this training program, it is expected that students of SMK Negeri 1 Empat Lawang can develop their capacity and potential optimally in the field of computer networks, both theoretically and practically. This program not only aims to equip participants with a deep understanding of basic network concepts, but also to improve technical skills in designing, implementing, and configuring network systems according to the needs that are developing in today's digital era.This ability is very crucial, considering that today's world of work demands human resources who not only understand theory, but are also able to apply it directly in the field. Therefore, this training is designed as a means to strengthen students' readiness to enter the industrial world, especially in the information and communication technology (ICT) sector. With the provision of relevant and applicable expertise, it is hoped that students will be able to compete competitively and contribute as professionals who are adaptive to global technological developments. (Setiadi & Syamsuar, 2021).

https://doi.org/10.35568/abdimas.v8i3.6879

METHOD

In order to carry out Community Service activities, the service team designed and implemented several strategic approaches aimed at understanding the readiness and needs of partners. (Alamsyah & Hasan, 2022) in this case students of SMK Negeri 1 Empat Lawang, for computer network materials and practices. These approaches are arranged systematically so that the implementation of activities runs effectively, is focused, and is able to provide optimal impacts for participants. (Setiadi et al., 2023) The steps are as follows:

FIGURE 1. Method of implementing community service

- **Observation stages**

  This observation was conducted by the service team going directly to the activity location, both before and during the implementation.(Setiadi & Febriansyah, 2021) The purpose of this observation is to identify real field conditions, such as laboratory facilities, student readiness, and their expectations regarding the use of computer networks. This observation is very important because it can provide a factual picture of the real needs of training participants, which then becomes the basis for designing the right learning approach.(Indarthi et al., 2023) Through this activity, the team can also establish initial interactions with participants, so that a closeness is created that supports a more communicative and open learning process.(Maulida & Safiah, 2025)

- **Stages of training and mentoring**

  The service team provides intensive training on the use of the Cisco Packet Tracer application, a computer network simulation software that is widely used in the world of network education and training.(Drajana & Bode, 2021) This training is designed in two sessions, each lasting three hours per day, which are carried out for two consecutive days. The training material includes an introduction to the Cisco Packet Tracer interface, practice building network topologies, configuring network devices, to testing connections between devices.(Choirina et al., 2021) With this training, it is hoped that participants will have practical skills in operating the application independently and be able to apply it according to the needs that develop in the world of work or industry.(Setiadi et al., 2021)

- **Evaluation and monitoring stages**

  The evaluation aims to measure the extent of students' understanding and skills in using the Cisco Packet Tracer application after participating in the training.(Al Habib et al., 2025) The monitoring process is carried out periodically during and after the training, to assess the application of the knowledge that has been provided and to see the sustainability of its use by partners. Monitoring also aims to identify obstacles or technical difficulties that may be faced by participants, so that solutions or necessary follow-up can be provided.(Prabowo et al., 2025)

- **Stages of application of science and technology**

https://doi.org/10.35568/abdimas.v8i3.6879

In this context, Cisco Packet Tracer is used as a means to transfer knowledge and technology practically to students. As one of the computer network simulators that is widely used globally, Packet Tracer allows users to build, test, and develop network simulations like in the real world. Through this approach, students not only gain theoretical knowledge, but also gain real experience in implementing computer network technology.(Usanto et al., 2024) In addition to supporting the learning process, this application is also very relevant to use in network research and simulation because of its ability to imitate various network scenarios virtually.

Through the implementation of various integrated approaches based on partner needs, this community service activity is expected to provide real contributions that are positive and sustainable. The main focus is directed at improving digital literacy and technical skills in the field of computer network technology, especially among Vocational High School students. With this activity, students not only gain a conceptual understanding of computer networks, but are also equipped with practical experience that is relevant to industry demands. The participatory and contextual approach in training allows for effective knowledge transfer, while building student independence and confidence in developing professional competencies. It is hoped that this activity will be the starting point for sustainable synergy between higher education institutions and partner schools in an effort to produce a young generation that is ready to face the challenges of the digital era and the industrial revolution 4.0.

RESULTS AND DISCUSSION

Packet Tracer is a network simulation software developed by Cisco Systems to support the learning and training process in the field of computer networks. This application allows users to model, configure, and test various types of network protocols in a virtual environment that resembles real conditions. One of the main advantages of Packet Tracer is its ability to simulate both in real-time mode and planned simulation mode, making it very effective for understanding data communication flows and interactions between network devices. With these features, Packet Tracer is one of the highly recommended tools in network technology education, both for basic and advanced scales, and is widely used in Cisco certifications such as CCNA (Cisco Certified Network Associate).

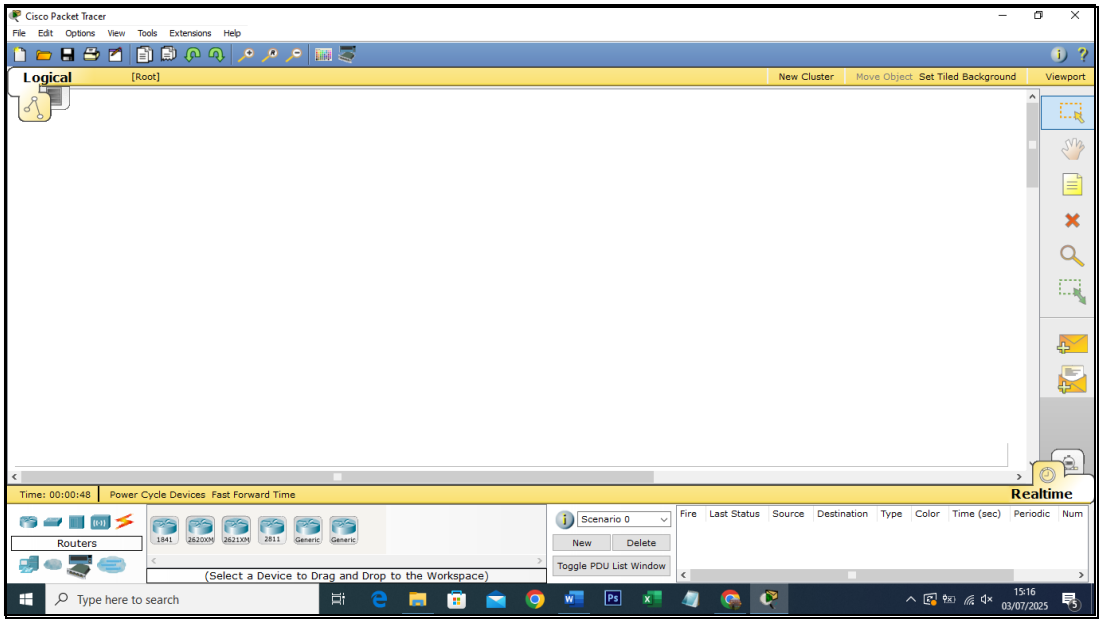

FIGURE 2. Cisco Packet Tracer Worksheet View

https://doi.org/10.35568/abdimas.v8i3.6879

Figure 2 shows the main interface of the Cisco Packet Tracer software, which is a visual worksheet where users can design and simulate computer network topologies. In this display, various network device components are available, including routers, switches, hubs, wireless devices, network connections, end devices, WAN network emulation, custom-made devices, and multiuser connections. Each element available in this worksheet is designed to support the learning process and development of technical skills in building a comprehensive network system. Through this visual-based approach, users—especially students and students in the field of information and communication technology—can easily understand how a network is formed, how devices are interconnected, and how data is sent between nodes. Thus, Cisco Packet Tracer becomes an effective educational tool in bridging conceptual understanding and real practice in the world of the computer network industry., as seen in Figure 3. Where the computer network topology consists of several computer network devices, namely:

- 2 servers,
- 2 switches,
- 1 router,
- 1 wireless,
- 6 laptops,
- 16 computers, and
- Straight cable

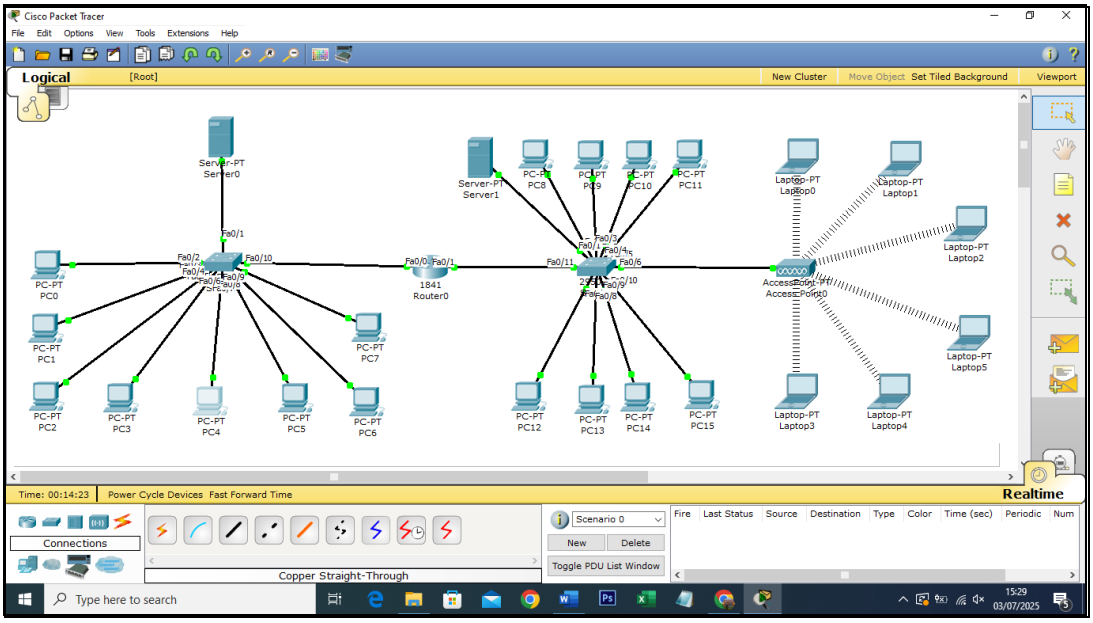

FIGURE 3. Computer Network Simulation View

Training activities on computer networks using the Cisco Packet Tracer application have been successfully held in the SMK Negeri 1 Empat Lawang environment. This activity is part of an effort to increase the capacity and skills of students in understanding and applying computer network technology practically. This training is one of the real forms of synergy between higher education institutions and vocational schools in expanding access to information technology-based learning.

https://doi.org/10.35568/abdimas.v8i3.6879

(a) (b)

FIGURE 4. (a) and (b) Cisco Packet Tracer application training and mentoring process

The school's response to the implementation of this activity was very positive. The leaders and educators of SMK Negeri 1 Empat Lawang welcomed this initiative, because it was considered very relevant to the needs of student competencies in the digital era. They saw that this training was able to provide added value in the learning process, especially in subjects related to Computer and Network Engineering.

FIGURE 5. Training results evaluation process

After the series of training and mentoring activities were completed, the next stage carried out was a learning evaluation to measure the level of understanding and achievement of competencies of 28 students regarding the practicum material that had been delivered, especially in the use of the Cisco Packet Tracer application. This evaluation was carried out by referring to a number of assessment

https://doi.org/10.35568/abdimas.v8i3.6879

indicators that had been systematically designed by the Community Service program implementation team. The purpose of this evaluation was not only to assess the extent to which students were able to absorb the material provided, but also to map the effectiveness of the learning methods and approaches used during the training. By conducting an evaluation based on measurable criteria, it is hoped that the results obtained can be the basis for developing strategies for improving learning in the future, as well as providing constructive feedback for both participants and the community service team. This evaluation is also important as part of program accountability, as well as supporting the creation of continuity between academic activities and the need to improve the quality of human resources in the field of computer network technology. The results of the assessment can be seen in Table 1. Below.

TABLE 1. Student Evaluation Results

No	Assessment Components	Persentase (%)
1	Students learn about the Cisco Packet Tracer application	100 %
2	Students are able to create a simple LAN network	92 %
3	Students can configure computer networks	85 %
4	Students can create a client server network	85 %
5	Students can do routing	89 %
6	Students can complete the study case given	92 %

From the evaluation results, it can be seen that the results of the training and mentoring on the use of the Cisco Packet Tracer application at SMK Negeri 1 Empat Lawang are very satisfying, seen from the fairly large percentage value of the assessment components. Moreover, the school also expressed the hope that similar activities would not stop at just one implementation, but could be used as a routine and ongoing program. With regular training, they hope that students can continue to follow the development of computer network technology that continues to change over time. In addition, the sustainability of this activity is believed to be able to form a generation of vocational school graduates who are ready to work and able to compete professionally in the industrial world and the world of further education. Training like this also opens up opportunities for wider collaboration between service institutions and schools in the form of applied curriculum development, internships, or other technical and applicable advanced training activities. Thus, this service activity is not only a moment to share knowledge, but also a starting point for the formation of a strategic cooperation network in strengthening vocational education in the field of information and communication technology.

CONCLUSION

Although the results of this community service activity have not fully achieved the previously planned targets and outputs, in general this activity has had a significant impact in increasing the knowledge and understanding of students of SMK Negeri 1 Empat Lawang, especially in terms of the use of information technology and computer networks. This activity has shown a significant initial step and can open students' insights regarding the importance of mastering computer network technology. as a provision for facing the development of an increasingly digital era. As a form of evaluation and reflection on the implementation of the activity, there are several suggestions submitted for improving activities in the future, namely to organize more in-depth counseling or advanced training, with a focus on the development of medium to large-scale computer networks. Training materials can include designing complex network topologies, managing network security systems, and implementing network services that are commonly used in industry and education.

ACKNOWLEDGMENTS

https://doi.org/10.35568/abdimas.v8i3.6879

We would like to express our deepest appreciation and gratitude to the Principal of SMK Negeri 1 Empat Lawang, who has given permission, support, and facilities for the smooth implementation of this activity, the Board of Teachers and Staff of SMK Negeri 1 Empat Lawang, who have helped coordinate and accompanied the implementation of the training with great enthusiasm. All students participating in the training, who have actively participated, showed enthusiasm, and a high spirit of learning during the activity. We would also like to thank other parties who cannot be mentioned one by one, who have helped directly or indirectly for the implementation of this activity. Hopefully the knowledge and experience gained in this training can be useful in improving the competence of participants in the field of computer networks and become valuable provisions to face the challenges of the world of work and education in the future.

REFERENCES

Al Habib, S., Azim, R. F., Firdaus, M. R. R., Haliza, D. N., Rosadi, M. I., Ambo, S. N., Adharani, Y., Rosanti, N., & Mujiastuti, R. (2025). Introduction to Networking Infrastructure on Cisco Packet Tracer: Routing a Home-to-Home Network to a Central Server. Jurnal Gramaswara: Jurnal Pengabdian Kepada Masyarakat, 5(2), 152–166.

Alamsyah, A. B. D. R., & Hasan, G. (2022). Penerapan Strategi Digital Marketing dan Promotion Mix pada UMKM Berry Catszone Batam. Jurnal Pengabdian Masyarakat Akademisi, 1(4), 39–46.

Amran, A., Ramadhan, B. L., & Thoyibah, S. (2024). Analisis Dan Simulasi Jaringan Komputer Di SMKN 3 Tuban Menggunakan Aplikasi Cisco Packet Tracer. Innovative: Journal Of Social Science Research, 4(3), 13306–13316.

Anwar, S. (2020). Peningkatan Pemahaman Matakuliah Jaringan Komputer Dasar Menggunakan Simulator Jaringan Cisco Packet Tracer. Jurnal ICT: Information Communication & Technology, 20(2), 54–59.

Aulia, B. W., Rizki, M., Prindiyana, P., & Surgana, S. (2023). Peran krusial jaringan komputer dan basis data dalam era digital. JUSTINFO| Jurnal Sistem Informasi Dan Teknologi Informasi, 1(1), 9–20.

Choirina, P., Huda, M. M., Jannah, U. M., Utama, S., & Pradani, E. R. K. (2021). Pelatihan Topologi Jaringan Menggunakan Cisco Packet Tracer untuk Meningkatkan Kompetensi Mahasiswa Politeknik Angkatan Darat Malang. Mitra Mahajana: Jurnal Pengabdian Masyarakat, 2(2), 117–123.

Drajana, I. C. R., & Bode, A. (2021). Simulasi jaringan menggunakan cisco packet tracer. Simtek: Jurnal Sistem Informasi Dan Teknik Komputer, 6(1), 24–27.

Fitriani, D., Rindiani, A., Zaqiah, Q. Y., & Erihadiana, M. (2022). Inovasi Kurikulum: Konsep, Karakteristik dan Implementasi Kurikulum Berbasis Komppetensi (KBK). Jurnal Dirosah Islamiyah, 4(1), 43–58.

Hakim, L., & Razaqi, R. S. (2019). Pengaruh Penggunaan Aplikasi Cisco Packet Tracer Terhadap Minat Dan Hasil Belajar Siswa Kelas X TKJ1 Pada Mata Pelajaran Komputer Jaringan Dasar Di SMK Negeri 1 Kendit Situbondo. EDUSAINTEK: Jurnal Pendidikan, Sains Dan Teknologi, 6(2), 39–53.

Indarthi, A. W., Malik, A., & Siswanto, Y. (2023). Desain Pelatihan Tata Boga di Balai Latihan Kerja (BLK) Kabupaten Pemalang. Jendela PLS, 8(1), 70–86.

Leki, N., Djamen, A. C., & Mintjelungan, M. M. (2022). Penerapan Cisco Packet Tracer sebagai media pembelajaran jaringan untuk meningkatkan hasil belajar siswa SMK. Edutik: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi, 2(1), 14–26.

Mananggel, A. V., Mewengkang, A., & Djamen, A. C. (2021). Perancangan jaringan komputer di SMK menggunakan Cisco Packet Tracer. Edutik: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi, 1(2), 119–131.

https://doi.org/10.35568/abdimas.v8i3.6879

Maulida, S., & Safiah, I. (2025). Penggunaan Pendekatan Komunikatif Pada Pembelajaran Bahasa Indonesia Di Kelas Iv Sd Negeri Aneuk Batee Kabupaten Aceh Besar. Journal of Education and Social Sciences (JEDSOC), 1(2), 178–190.

Prabowo, D. W., Prasetyaningrum, E., & Utari, W. (2025). Pelaksanaan Uji Kompetensi Keahlian Teknik Komputer dan Jaringan di SMK Negeri 1 Cempaga dalam Mempersiapkan Lulusan yang Siap Kerja. Rengganis Jurnal Pengabdian Masyarakat, 5(1), 169–179.

Setiadi, D., & Febriansyah, T. S. (2021). Sosialisasi Dan Workshop Aplikasi Pengolahan Nilai Ujian Smp/Mts Kota Pagar Alam Dengan Menggunakan Microsoft Excel 2016. Vol, 4, 1–7.

Setiadi, D., Ichsan, O. A. N., & Susanti, N. (2023). Pelatihan Dan Pendampingan Untuk Mengoptimalkan Produksi Dan Pemasaran Produk Umkm Keripik, Kerupuk, Kemplang. JMM (Jurnal Masyarakat Mandiri), 7(6), 6014–6024.

Setiadi, D., Syahri, R., & Masdalipa, R. (2021). Workshop Network Administrator Pada Mahasiswa Sekolah Tinggi Teknologi Pagaralam. NGABDIMAS, 4(02), 99–105.

Setiadi, D., & Syamsuar, D. (2021). Development Of The Pagaralam College Of Technology Of Computer Network To Accommodate Digital Campus. Jurnal TAM (Technology Acceptance Model), 12(1), 9–18.

Sinaga, F. M., Pipin, S. J., & Kurniawan, H. (2023). Pelatihan Instalasi Jaringan Komputer Menggunakan Simulasi Cisco pada SMK Methodist Tanjung Morawa. Journal of Social Responsibility Projects by Higher Education Forum, 4(1), 45–50.

Syaputra, A., & Stiadi, D. (2020). Pemanfaatan Mikrotik Untuk Jaringan Hotspot Dengan Sistem Voucher Pada Desa Ujanmas Kota Pagar Alam. Jurnal Informatika Dan Rekayasa Elektronik, 3(2), 176–186.

Tangkowit, A. E., Palilingan, V. R., & Liando, O. E. S. (2021). Analisis dan perancangan jaringan komputer di sekolah menengah pertama. Edutik: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi, 1(1), 69–82.

Usanto, U., Sopian, A., Suhanda, Y., Sucahyo, N., Nurlaela, L., & Ningtyas, S. (2024). Peningkatan Kompetensi Teknik Jaringan Komputer Dan Telekomunikasi Bagi Siswa Smk Melalui Pelatihan Dan Simulasi Praktis. Swadimas: Jurnal Pengabdian Kepada Masyarakat, 2(2), 24–30.

Zulkarnaen, I., & Aliyah, J. (2021). Perancangan Jaringan Menggunakan Router Switch Cisco Packet Tracer Pada Kantor Diskominfotik Provinsi Nusa Tenggara Barat. Jurnal Tambora, 5(2), 16–20.

FINAL VERDICT: Accept with Minor Revisions

The article presents a practical, high-impact community service model that effectively trains vocational students in computer networking using a well-established tool (Cisco Packet Tracer). The structure is logical, the results are promising, and the training aligns well with industry demands.

https://doi.org/10.35568/abdimas.v8i3.6879