

IMPROVING COMPETENCE OF AN-NURMANIYAH VOCATIONAL HIGH SCHOOL STUDENTS THROUGH TRAINING AND IMPLEMENTING OF VPN ETHERNET OVER IP (EOIP) AND PPTP TUNNELING ON MULTI-SITE NETWORK AREA SCALE

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ABSTRACT

Program Kemitraan Masyarakat (PKM) we propose is in partnership with SMK An-Nurmaniyah Tangerang. The main target is the students of Computer and Network Engineering (TKJ) SMK An-Nurmaniyah. As students in the TKJ department, the goal is to be ready to use in the world and the work industry, requiring knowledge of technology, especially developments in the field of network connectivity. Learning activities taught by teachers are only limited to basic knowledge about competencies and discussion of teaching materials that students must possess, without being able to represent them in the field of Computer and Network Engineering (TKJ) which will later be used or applied to the industrial world. This is found when students carry out Prakerin/PKL activities in the industrial world. The tools available for practical activities are limited and the equipment is not fulfilled according to industry standards, and there is a need for tools or applications that can be applied instead of real devices, but can be used by students as real devices when practical activities take place. implementation of the VPN Tunneling Protocol, using the EoIP Protocol and PPTP Protocol methods, using the Mikrotik RB951Ui-2HND Router and HSDPA 4G Modem. Then for the virtualization scheme using the VLAN Bridging method on network connectivity, namely Wide Area Network (WAN). The results of the material tested resulted in an average scientific capacity of 45% for material from the discussion category.

Keywords: SMK An-nurmaniyah, EoIP, PPTP, VLAN

1. INTRODUCTION

SMK An-Nurmaniyah Tangerang is one of the educational institutions that aims to prepare middle-level workers, has the potential to produce quality human resources with reliable competencies and make the educational institutions of SMK An-Nurmaniyah Tangerang oriented to the formation of students armed with Faith and Knowledge, competent, professional and superior at the National level. In achieving this noble goal, every student must master various basic abilities and skills and must have extensive knowledge, especially in Information and communications technology (ICT) (Tekege, 2017) (Anwas, 2016). The goals and objectives of what we propose are specific to the Computer and Network Engineering Study Program at An-Nurmaniyah Tangerang. The purpose of the An-Nurmaniyah Tangerang TKJ Study Program is to equip and prepare students to be able to compete in the current digitalization era which focuses on the target for the acceptance of students to work for computer and network companies or those engaged in Information Technology. Ridwanto, 2020). In the Department of Computer and Network Engineering, students are prepared to be able to understand and learn about Assembling Personal Computers (PCs), installing stand-alone operating systems or network operating systems such as Linux, and others (Zainal, 2007) (DIKTI, 2015). Students are also prepared to design a local-based (LAN) or broad-based (WAN) network with network devices such as Cisco and MikroTik, create a wireless network (hotspot) and administration network servers.

The focus on partner problems is in the Community Partnership Program (PKM) activities, the target of which is SMK An-Nurmaniyah, in the Department of Computer and Network Engineering (TKJ). The PKM proposer will focus on the problems that partners face, from the results of interviews and observations carried out, which are described as follows:

The focus on the problems that partners found from the results of interviews and observation activities are:

- a. There are several competency constraints that exist in the syllabus, especially the Computer and Network Engineering program at SMK An-Nurmaniyah. One of them is not getting learning reinforcement, such as designing on infrastructure connectivity on network connectivity, which is fundamental and related when students carry out Prakerin activities, so they can get a detailed basis, on the application of network technology in an ICT company.

- b. The tools available for practical activities are limited and the equipment is not fulfilled according to industry standards, and there is a need for tools or applications that can be applied as a substitute for real devices, but can be used by students as real devices when practical activities take place.
- c. There are obstacles to implementing and connecting geographically separated network connectivity. As well as designing a network topology on a Multisite Wide Area Network (WAN) scale.

Fulfilling the problems of these needs, it is one of the obligations of the proposing lecturer, PKM activities to encourage and facilitate this PKM activity, by submitting with partners SMK An-Nurmaniyah Tangerang, in community service activities, it is hoped that the knowledge of training and implementation activities given to students, can motivate and provide knowledge of Information and Communication Technology, especially in the field of Network Infrastructure technology and aspects that include connecting geographically separated network connectivity (Damanik, 2021). So that future students can be ready to use in the world and the work industry. The results achieved in this service will also create training modules, provide conceptual material and implementation in a training such as configuration and simulation of equipment.

2. IMPLEMENTATION METHOD

The method of implementing PKM, will explain the stages and steps taken in implementing the proposed solution to overcome the problems faced at SMK An-Nurmaniyah Tangerang. Based on the problems and needs faced by PKM partners, one solution that will be carried out is by equipping and providing additional knowledge material in the field of industry in particular and training on VPN technology and Virtualization on network connectivity using a Mikrotik Routerboard, for students at SMK An -Nurmaniyah majoring in Computer and Network Engineering (TKJ). By utilizing simple devices on MikroTik products and HSDPA Modems, which can implement connectivity at a network scale geographically. All activities are planned to be carried out online within 2 days. In order to realize the objectives of the Community Partnership Program (PKM) implementation activities, several stages will be taken and carried out in implementing them, among others illustrated in the flow chart Figure 1.

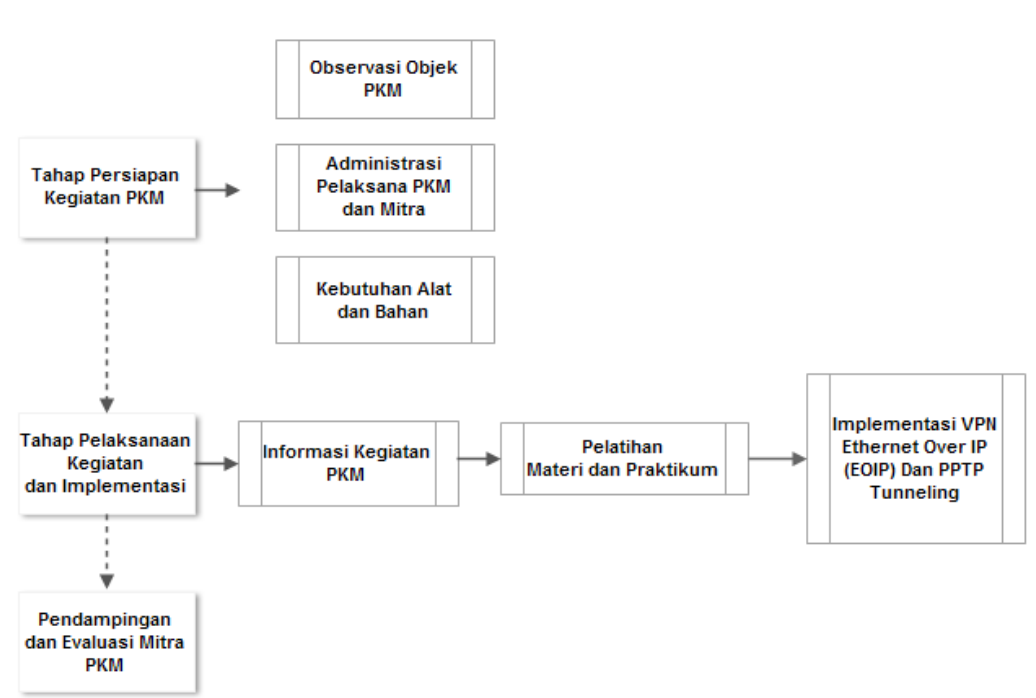


Figure1. Procedural and flow of pkm activities.

Preparation Phase for PKM Activities

This Community Partnership Program (PKM) implementation activity uses the partnership method, this service is in partnership with Budi Luhur University Lecturers from the Faculty Information and Technology Budi Luhur University. This PKM activity will be preceded by a preparatory agenda for the implementation of activities, namely observations, interviews with the Principal, Head of Study Programs and socialization activities. The implementation of socialization activities aims to provide information to PKM partners regarding the agenda of activities and the objectives of implementing activities as well as seeking agreement on the implementation schedule

and materials presented, virtually online. After the socialization was carried out, there were 10 students, with a training schedule of 11-12 August 2020.

Administration of Activities and SMK An-Nurmaniyah

This PKM activity places PKM partners as objects and also as subjects with the aim and intent of activeness and cooperation in conveying problems and conditions that are expected from existing problems. The PKM implementation activities consist of 3 stages and sub-stages starting from the PKM Activity Planning Preparation Stage, Training and Implementation Stage and then the Mentoring and Evaluation stage and process which will involve all elements of the PKM partner environment.

Instrument (Hardware and Software) PKM Activities

Provision Instrument hardware and software is carried out by collecting data, which is directed to data retrieval by studying, researching and reading references related to technology that can be developed in community service in the Department of Computer and Network Engineering (TKJ). Search for relevant data and references that are relevant to community service that will be implemented, Increasing Competence of An-Nurmaniyah Vocational School Students through the Introduction and Application of VPN Ethernet over IP (EOIP) and PPTP Tunneling at the Multi-Site IP Network Area Scale (Cisco, 2022.). As the current technology that is widely used in a company, where until now VPN technology and Virtualization schemes on network connectivity are used and applied to many industrial fields that have many branches, especially Internet Service Providers (ISP), the goal is the aspect of security, scalability, confidentiality and ease of monitoring the number and scale of networks in a company (Zhiyong, Bo, Jian, & Zhongnan, 2014). So that with the knowledge and implementation that is applied, it adds knowledge and added value for students in applying technology, especially on network connectivity by utilizing existing device resources and producing appropriate value, especially in the recovery process on a network connectivity in a company (Damanik, 2020) (Damanik, 2021).

- a. Software Instruments (Hardware and Software)
 - 1) MikroTik RB1100AHx2
 - 2) Routerboard RB951Ui-2HND
 - 3) Modem HSDPA 4G
- b. Hardware Instruments
 - 1) Winbox 2.28 (32-bit)
 - 2) PPP (MPPP client, PPP, PPTP, L2TP, PPPoE, ISDN PPP clients and servers)
 - 3) USB Features.

Phase of Activities and Implementation

The training activities for the material will be presented based on the approach to the theoretical learning process and practical learning and implementation. This training syllabus provides and outlines for answers related to current conditions in the industrial world with activities that can provide new understanding to be implemented. Comparison of theoretical and practical activities is around 1:2 and will be conducted online on the first day. The training method is described in table 1 below.

Tabel 1. Training method

<i>Meeting Topics</i>	<i>Chapter Outline</i>	<i>Goals Objectives</i>
<i>Implementing</i>	1.0 Introduction	1. VPNs
<i>Virtual</i>	1.1 VPNs	2. VPN Overview
<i>Private Networks (VPNs)</i>	1.2 Site-to-Site PPTP Tunnels	3. VPN Technologies
	1.2 Site-to-Site EoIP Tunnels	4. IPsec VPN Components and Operation
		5. Introducing EoIP
		6. Intrducing PPTP
		7. PPTP and EoIP Protocols
		8. Implementing Site-to-Site PPTP VPNs with CLI
		9. Configuring a Site-to-Site PPTP VPN

The topology design that will be modeled for PKM activities, namely the design technique will be designed in advance for topological scenarios with connectivity between 10 different location branches (for each student) to the Head Office (HO), using the VPN Tunnel technique, with the following stages: following:

- a. Installation and configuration of PPTP Server and Client path mapping, EOIP Server and Client, with the concept of geographic modeling (WAN).
- b. Initialize the HSDPA Modem on the Routerboard RB951Ui-2HND device.

- c. Configure default route to Dynamic IP from cellular provider using HSDPA Modem.
- d. Configure the default route to the VPN Server.
- e. Local Area Connection (LAN) in each branch can be connected to Local Area Connection (LAN) HO, with connection over dynamic cellular provider network. With a modeled VPN Tunnel concept.
- f. Local Area Connection (LAN) in each branch of Remote-SMK-Location-A, Remote-SMK-Location-B, Remote-SMK-Location-C and Remote-SMK-Location-D and Remote-SMK-Location- D communicates and connects with ICMP packet testing, with connections over dynamic cellular provider networks. With the concept of a modeled VPN Tunnel protocol.

PKM Assistance Activities

Mentoring activities carried out to form WhatsApp (WA) group conversations as a sharing medium between partners and the proposer team and ensure group communication runs optimally so that the communication process can take place anytime and anywhere. Evaluation is intended for evaluation design through presentations, demonstrations and reviews to measure the partner's ability to understand knowledge and insight about the concept of activity material and evaluation design through assistance in meeting the needs of practicum services and learning media to ensure follow-up of the implementation process from the results of program implementation in the partner environment.

3. RESULT AND DISCUSSION

The results of the implementation of this PKM activity will explain the steps taken in implementing the solutions offered to overcome problems at SMK An-Nurmaniyah Tangerang. PKM activities will be preceded by preparation for the implementation of activities with teachers and public relations at the Ann-Nurmaniyah Vocational High School before the training activities are carried out. Figure 2 is a summary of the documentation, where the presenters and assisted by the team's lecturers, explained the activities of implementing PKM activities and training, by introducing the material given to students. In this presentation, the activity implementers looked at the basics of IP Addressing, Subnetting, VLAN, routing and VPN concepts, to give participants a start and learning that is still being applied to the organization and to deal with UKK for TKJ students. The presenter, delivered the material with the workshop method, question and answer and practice in its delivery.

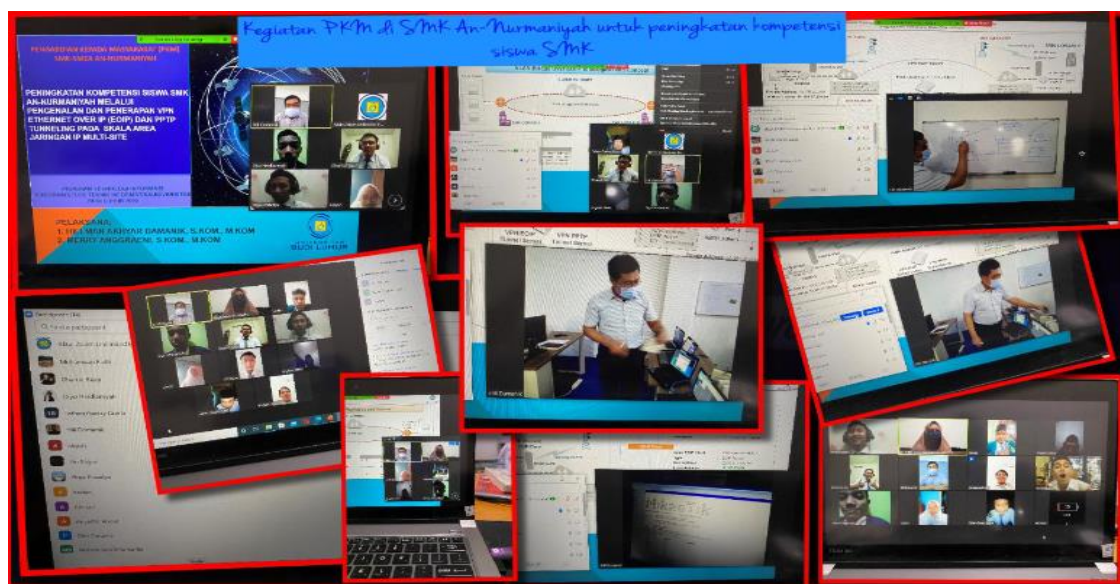


Figure 2. PKM implementation activities at SMK An-Nurmaniyah vocational school

Figure 2 is the presenter and is assisted by the team. The presenters, delivered the material using the workshop method, question and answer and practice using infocus media, packet tracer applications. An overview of science and technology provided for PKM activities at Pustek Serpong Vocational School with the delivery of material and simulation activities as well as implementation using concepts in the form of technology transfer. from lecturers implementing the PKM program to partners in an effective, efficient and sustainable manner. The concept of technology transfer to PKM partners is carried out through the concept of training workshops, simulations and implementations, which are carried out by directional instruction both offline and online with two main aspects. The PKM practicum presenter by implementing, exploring and combining PTP Protocol, EOIP Protocol and VLAN Bridging, is the target to be achieved from this PKM program is to provide additional knowledge material in the

field of industry in particular and training on VPN technology and Virtualization on network connectivity using a Mikrotik Routerboard, GSM HSDPA modem for students at SMK An-Nurmaniyah majoring in Computer and Network Engineering.

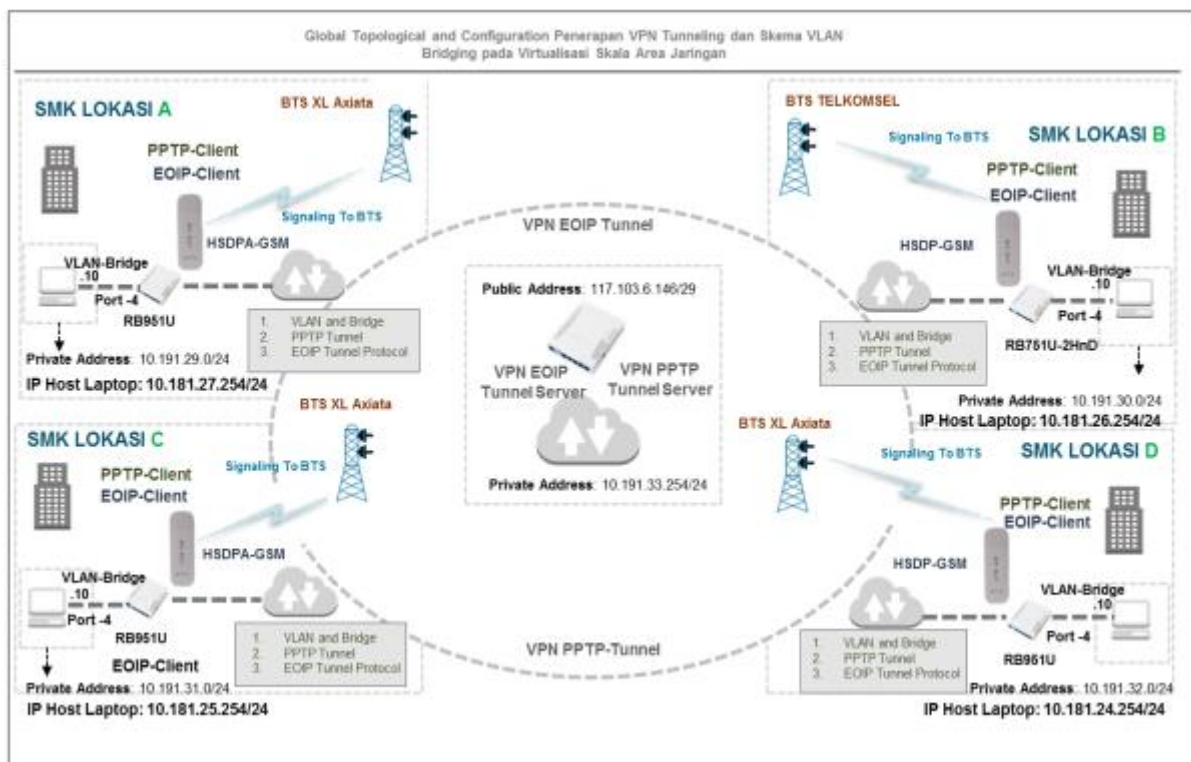


Figure3. Topology and implementation of VPN Ethernet Over Ip (EOIP) and PPTP tunneling at area scale multi-site IP network

Utilization of simple devices on MikroTik products and HSDPA modems, which can implement connectivity at a geographically network scale. Topological system design design specifications, Application of VPN Ethernet over IP (EOIP) and PPTP Tunneling at the Multi-Site IP Network Area Scale in PKM writing are modeled as Figure 3. Configuration design and network topological concepts are modeled from Remote-SMK-A-B-C-D to the Vocational Center as shown in Figure 3 where the modeling and topological modeled with the network consists of 4 remote routers for SMK locations, 1 core router server node, and 4 laptop units. Where from the 4 remote nodes will be classified based on ICMP Ping to be monitored through the central server core node and between these remotes. The application technique will be designed in advance for the connectivity topology scenario between 4 different location branches to the Campus Center (PK) using VPN Tunnel PPTP and EOIP techniques. Previously the status of the PPP Protocol would be established first, namely by signaling to the Cellular BTS used. The results of each stage of the material and practicum provided, first conduct a pre-test and post-test with the aim of measuring the ability of student participants. The results of the pre-test carried out by students will be used as a comparison of the team's success rate in providing training activities from the aspects carried out to students. Then at the end of each session, a post-test will be conducted. This activity will be used as material and evaluation by the implementing team, namely by comparing the results of the Pre-Test with the Post-Test. The comparison of each of these results from the participants can be seen in Figure 4 below.

Figure 4 shows the average results of the Pre-Test and Post-Test conducted by 10 participants at SMK An-Nurmaniyah. From these results, it was found that there was an increase in the understanding of the training participants from each meeting held, with an average score of 85.5. Coaching will also be carried out after training and the process is carried out in a directed and flexible manner. In this case, it means that the coaching process is not scheduled and can be done through various means of communication, such as via telephone, email, and the whatsapp application.

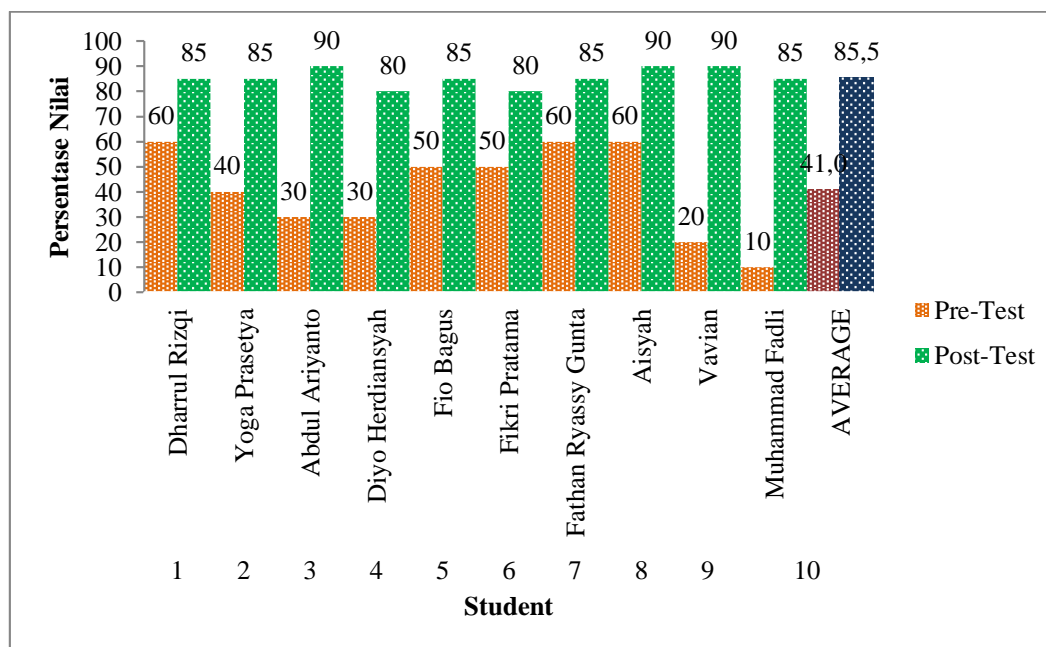


Figure 4. Results of pre-test and post-test material IP addressing, subnetting, VLAN, routing and VPN

4. CONCLUSION

This PKM activity given at SMK An-Nurmaniyah Tangerang, with the delivery of implementation activities using the concept of technology transfer, the aim is to transfer the ability to be able to utilize and master science and technology conveyed from the topic of VPN network connectivity, conceptual and application from lecturers implementing PKM programs to partners in an effective, efficient and sustainable manner. In the knowledge aspect, it is described and discussed, how training students are able to translate knowledge about the basics of networks and infrastructure and their application to VPN connectivity, with the material discussed. Evaluation of the skills aspect, in the form of demonstrations and reviews to measure the partner's ability to understand the knowledge and insight about implementation that is applied through practice, and obtain better results from the material being tested. In the implementation of this PKM, several methods were implemented from the concept of Virtualization (VPN) Tunneling Protocol and Bridging Scheme, so that knowledge and understanding were given to students and they were able to explore and provide knowledge, especially in the field of technology in the applied network connectivity. four geographically separated network connectivity in a company. Connecting Local Area Networks (LAN) that are geographically dispersed but still connected to each other by applying VPN Tunneling technology using a Mikrotik Routerboard.

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