

## **IMPLEMENTATION NETWORK WITH IP / MPLS VPN IN INFORMATION TECHNOLOGY DIVISION IN PERUM JAMKRINDO**

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### **Abstract**

*The computer network is not something new this time. Along with the development of The computer network is not something new this time. Along with the development of technology applied by Perum Jamkrindo in its effort to support the ease and development of business which is centralized data processing, so the processing of data processing into information will be obtained quickly and accurately as well as the purpose of improving services for business needs can always be realized. How the implementation the LAN network that is in the central office connected to the VPN IP / MPLS with branch offices in various corners of the country works well and facilitate the maintenance.*

**Keywords:** Analysis, Maintenance, VPN IP / MPLS

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The computer network is not something new this time. Along with the development of technology applied by Perum Jamkrindo in its efforts to support the ease and business development of which is centralized data processing, so that in processing data processing into information will be obtained quickly and accurately and the purpose of improving services to business needs can always be realized. As a guarantee company that has been serving for 48 years of UMKM and its creditors, both banks and non banks in lending or financing facilities, Perum Jamkrindo has developed a computer system which has implemented a comprehensive networking system. In addition to the development of a computer network management system called Local Area Network (LAN) network at the central office, the management of computer network system to connect head office and branch office by connecting through Wide Area

Network (WAN) using Virtual Private Network (VPN) based on Internet Protocol (IP) or called Multi Protocol Label Switch (MPLS) so that the availability of adequate data interconnection infrastructure in supporting communication with branch offices in various corners of the country. If there is an addition of branch offices, administrators or management of computer networks must perform data collection, installation of data paths, topology settings, and others. Based on the background of the above problem, I would like to raise the title of this report on "**IMPLEMENTATION NETWORK WITH IP / MPLS VPN IN INFORMATION TECHNOLOGY DIVISION IN PERUM JAMKRINDO**".

**RESEARCH METHOD**

**Understanding Computer Network**

Computer networks are the connections of a number of devices that communicate with each other. The devices in this definition include all types of computer devices (desktop computers, laptops, smarphone, tablet PCs) and router, switch, modem, hub devices.

Computer network is defined as a set of interconnection of a number of computers that can exchange information. The form of the connection does not have to be wired through the wire but can use optical fiber, or even communications satellites.

**Types of Computer Networks**

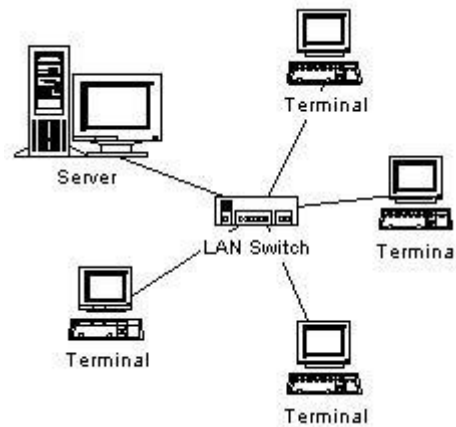
Based on the geographical location coverage of the types of computer networks seen from the scope of coverage, computer networks are divided into four groups including Local Area Network (LAN), Metropolitan Area Network (MAN), and Wide Area Network (WAN), and internet.

**1. Local Area Network (LAN)**

Local area Network (LAN), is a privately owned network within a building or campus measuring up to several kilometers. LANs are often used to connect personal computers and workstations in corporate offices or factories to share resources (for example, printers) and exchange information. LAN has a limited size, which means that the transmission time in the worst of circumstances is limited and can be known before. By knowing its limitations, it causes the possibility to use certain types of designs. It also eases network management.

LAN is the smallest computer network for personal use. LAN has a range of 1 KM to 10 KM, in the form of wire

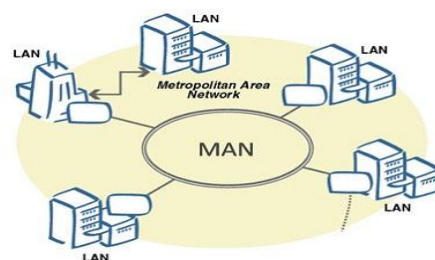
connection (Point) access (wireless), as well as the condition of both.



**Figure 1.** Example A LAN

**2. Metropolitan Area Network (MAN)**

Metropolitan Area Network (MAN) is basically a larger version of LAN and typically uses the same technology as LAN. MAN is a computer network that has a larger coverage area and area than LAN. MAN has a range between 10 KM to 50 KM. A range of MAN can include a city, in which there are many buildings and settlements. This means that in a MAN has been integrated many LANs are paralleled from some existing settlements.

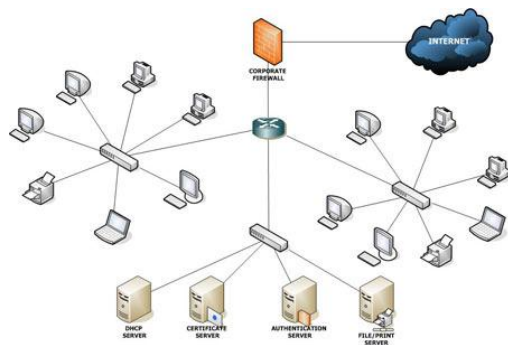


**Figure 2.** Meropolitan Area Network

### 3. Wide Area Network (WAN)

Wide Area Network (WAN) is a larger network of MAN and covers a wide geographic area, often including a country or continent. The WAN consists of two or more MANs in it. Each MAN consists of two or more LANs in it. So it can be said that this WAN is a combination of a number of computer networks that are in one area as wide as a country or continent. The WANs in Indonesia and WANs in a number of major cities in Australia, Europe, United States are interconnected with each other.

The form of communication between computers within the WAN requires a connecting device, one of which is a router. The function of the router is to help determine the path to be taken by the data packet in the process of transmitting data packets and communication between computers within the WAN. To save on infrastructure costs, WAN network systems can also use existing public (public) networks, internet .



**Figure 3.** Wide Area Network (WAN)

#### Network Topology

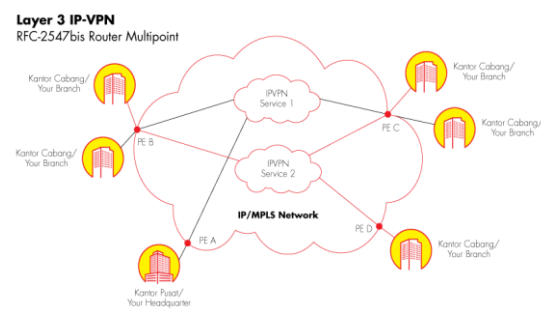
In computer networks known setidkanya 6 (six) pieces of topology on computer networks. The six types of topology on the computer network has the characteristics, advantages, and disadvantages of each. These six network topologies include Bus Topology, Star Topology, Peer to Peer Topology, Ring Topology, Tree Topology, and Mesh Topology.

### Interconnection

The interconnection of computer networks by definition, which is meant computer network (computer networks) is one set of interconnection of a number of autonomous computers. In popular languages it can be explained that the network is a collection of multiple computers (and other devices such as routers, switches and so on) that are interconnected with each other through intermediate media. These intermediate media can be either cable or wireless media (wireless).

### VPN IP / MPLS

Multiprotocol Label Switching (MPLS) is simply a data technology on high speed backbone path. Technically, in the OSI reference, MPLS works on layers or Layer 2 (two) and 3 (three). Like frame relay. MPLS is commonly used in building a closed network that connects headquarters in a city with its branch offices located in other cities via high speed links.



**Figure 4.** VPN IP / MPLS

To understand MPLS, in OSI Layer 2.5 this label is added and will also be eliminated by LER (Label Edge Router) which as a link between MPLS network and external network. This label contains the destination information of the next node to which the packet should be sent. MPLS has prepared a data flow path to all node combinations called LSP (Label Switching Path). Each router incorporated in the MPLS network participates in the manufacture of this LSP. The data packets are then routed to

each LSR (Label Switching Router) according to the predefined LSP.

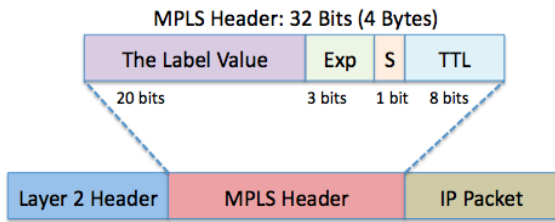


Figure 5. MPLS Label Principles

Each router device in MPLS also has a role that is generally divided into 3 types (Indrajaya, Aristo, 2018):

- P (Provider Router) - Router backbone switching (LSR). Does not involve internet routing or routing of the customer.
- PE (Provider Edge Router) - Router that does Label Popping (LER). Routers connected to various services: Internet, L3VPN, L2VPN / VPLS, TE (Traffic Engineering).
- CE (Customer Edge Router) - Devices that exist in the customer that will communicate with PE.

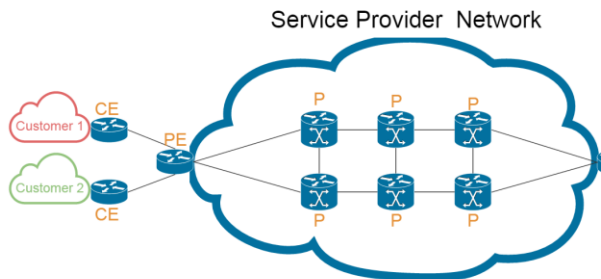


Figure 6. MPLS topology

**OSI Layer Modeling**

Open System Interconnection (OSI) Layer modeling is the first modeling used in computer networks and defined by International Standard Organization (ISO). Conceptually, on OSI Layer modeling there are seven layers inside.

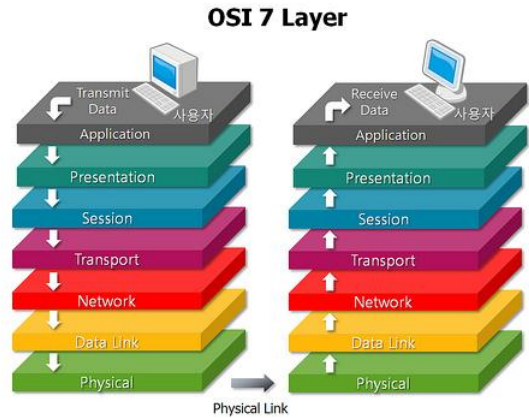


Figure 8. OSI Layer Modeling

**TCP / IP Layer Modeling**

In the OSI modeling there are various deficiencies and are beginning to be irrelevant with the development of the era, especially the application and the computer network itself. For this purpose, a new modeling modeling of Layer Transmission Control Protocol / Internet Protocol (TCP / IP) is simpler and simpler.

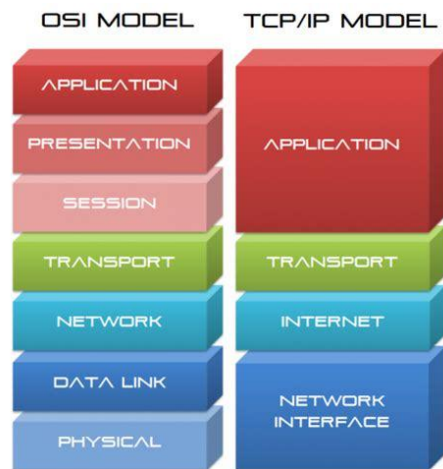
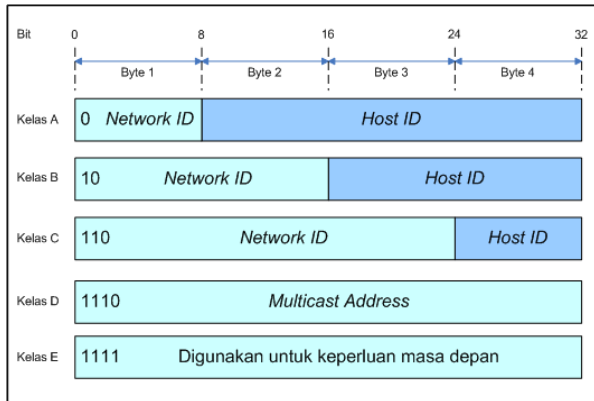


Figure 9. Comparison of OSI Modeling and TCP / IP Layer OSI Layer Modeling

**Class IP Address**

IP addresses are grouped into classes. Each class has various IP addresses. IPv4 addresses can be divided into 5 (five) parts, namely class A, class B, class C, class D, and class E. However, the most widely used classes are class A, B, and C only, because class D is used for a multicast address that

does not have network ID and host ID, while



class E is used for special use.

Figure 10. IPv4 Address Class Division

RESULTS AND ANALYSIS

Backbone FO

Allocation of backbone devices connected to the Rack switches per floor as follows. The following Figure 3.10 and 3.11 Backbone Installation Structure Switch Floor 5 (five) s / d 10 and floors B1 s / d 4 (four).

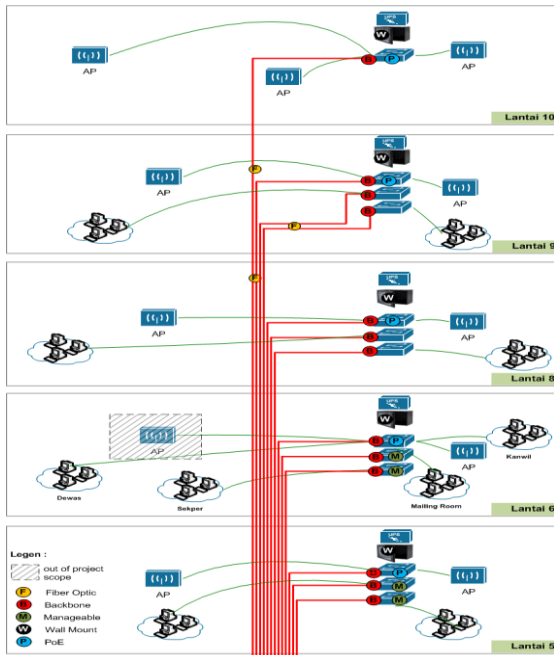


Figure 11. Floor Switching Structure B1 to 10

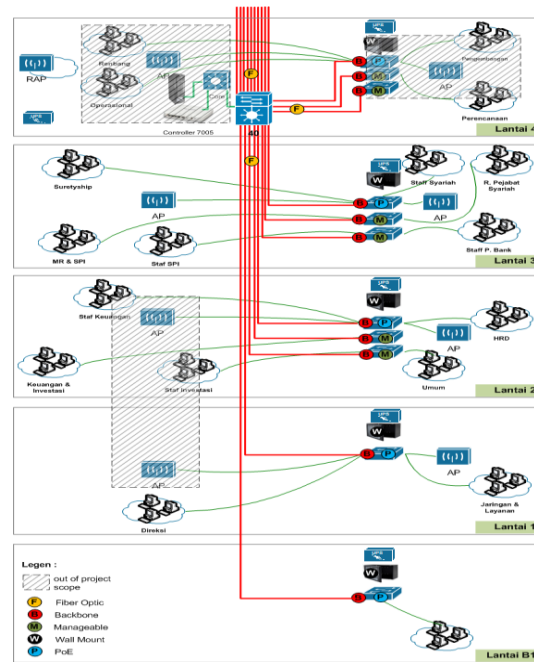


Figure 12. Installation Structure Backbone Switch Floor 5 to 10

IP / MPLS VPN Topology

Interconnection of the Jamkrindo / head office (HO) building with branches / sites across Indonesia using the IP / MPLS VPN provided by the Internet Service Provider (ISP) at any manageable level, the equipment provided from the ISP / Propider to PE is provided and managed by provider concerned. While devices from CE to HO network devices or sites are provided by the consumer itself.

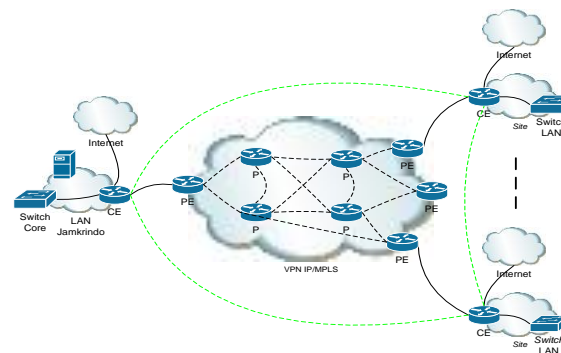


Figure 13. HO and Site Interconnection Topology With IP / MPLS VPN

## CONCLUSION

The use of LAN and MPLS is quite optimal at headquarters with multiple sites to make it easier to access applications on an intranet. But this application has a very clear resource (bandwidth) and when a failure nodes or links will result in huge losses.

One solution is to apply actively using MPLS backup that is by using MPLS with different providers. Do this by cutting it first to compare it with the technology that has been used today.

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