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Introducing computer network standard and internet protocols

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Abstract
Network standard is a communication standard that can be used to exchange data between computers by a community that is joined through the internet network. Standard computer networks as part of an information system are very important to maintain data validity and integrity and ensure the availability of services for users, because computer network systems must be protected from all kinds of attacks and disruptions at that time or scanning by unauthorized parties. Computers that are connected to a network have many security threats that are greater than hosts or disconnected computers anywhere, so that by controlling network standards, the risk can be reduced, so that the network is designed as high data communication. The purpose of this research is to improve access to computer systems, while security is designed to control access, providing network security is a balancing act between open access and security. ISO is a means of controlling what information is allowed into and out of the local network and generally hosts or ISOs on computers connected to the internet and local LAN, and LAN access to the internet is only allowed through certain networks, so that with the help of this network can control the security system computer network from what is received and sent by the internet and LAN. There are several types and methods in Network settings. The purpose of this study is used to simplify and facilitate computer networks for service users. Whether the standard computer network and internet protocol on service users can run properly and smoothly.

Keywords: Computer Network, Computer Network Standards, Internet Protocols

1. Introduction
Network Standards are important to ensure that hardware and software can work together. Without standards you could not easily develop a network to share information. Networking standards can be categorized in one of two ways Formal and de facto (Informal). Formal Standards are developed by industry organizations or government. Formal standards exist for network layer software, data link layer, hardware. Informal Standards typically emerge in the marketplace and are supported by technology vendors but have no official backing for example Microsoft Windows is a de facto standard. There are a several leading organizations for standardization including ISO (International Standardization Organization) and ANSI (American National Standards Institute). Protocol stacks such as TCP/IP or SPX/IPX provide that functionality and without them Ethernet would be useless. With the immense interest in the internet and the potential of attaching control networks to the Internet, the protocol stack of choice is TCP/IP because it provides the foundation for the Internet. This article addresses issues related to the IP portion of the TCP/IP stack as it applies to control networks.

2. Literature Review
Adopted from Hasnul A. (2019) [1], in his book entitled Computer Network a Top down Approach, it states that a computer network is a relationship of a number of devices that can communicate with each other. The devices referred to in this definition include all types computer equipment and connecting devices. According to the opinion of Jogiyanto (2018) [2] A computer network consists software and hardware that is used to send and receive data from one devices to another. The role of hardware is to prove the physical equipment that are required in order to send and receive data while software defines the set of instructions that uses the hardware equipment for data transmission. To simply networks everything is separated in layers and each layer handles specific tasks and is independent of all other layers. Network models are used to define a set of network layers and how they interact. The two most widely recognized network model include the TCP/IP Model and the OSI Network Model.

2.1 Local area network (LAN)

(Kercheval B, 2020) [3]. LAN stands for Local Area Network. LAN consists of several connected computers in a network. On this network, every computer can access data from other computers. Other than that, computers can access data from other computers. Apart from that, the computers connected in the LAN too can run hardware like a printer from other computers, chat with other computer owners, or play games together. Number of computers that are connected to a relatively small LAN, for example, computers computers at home, internet cafes, boarding houses, and some other places whose computers are included in the LAN, which is in one building. Every computer connected on the LAN have IP addresses that different.

2.2 ISO layer reference

According (Victor B, 2017) [4] ISO (International Organization for Standardization) is an international standard setting body consisting of representatives from each national standardization body in each country to measure the quality of an organization. A multinational body that was founded in 1947 is called the International Organization Standarzation (ISO) as a body that establishes international standards. ISO also issues communication network standards that cover all aspects of the Open System Interection (OSI).

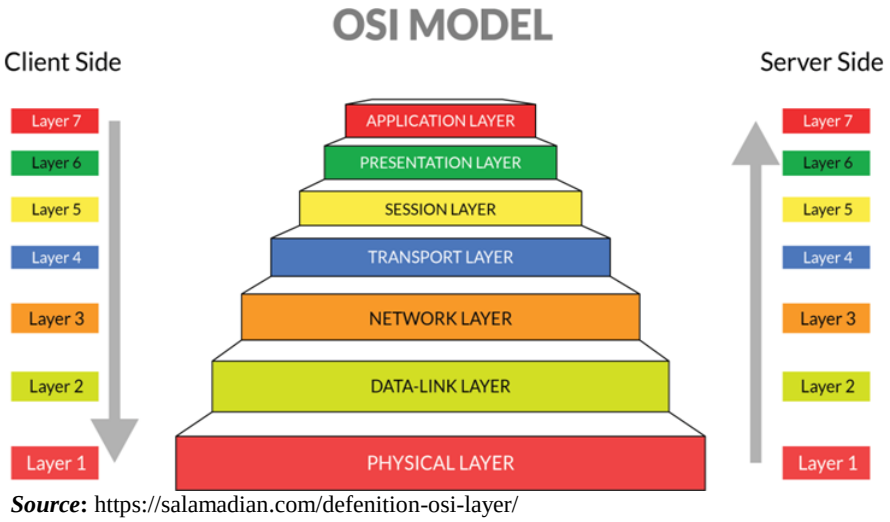
2.3 Purpose OSI

According to the opinion (Loh Z, 2020) The purpose of this OSI is to facilitate how communication can be established from different systems without the need for significant changes to Hardware and Software at the level of under lying. When ISO (International Standard Organization) standardizes protocols, a standard reference model is created that contains protocols working. The reference model was later called the Open System Interconnection (OSI). Based on the X.200 recommendation document, the OSI standard has 7 layers. Each layer has a different function definition According ISO-8402.

2.4 OSI Layer Reference Model

According Sofana (2019) [6] that The OSI reference model is conceptually divided into 7 layers or layers where each layer has a specific network function, namely is:

The layers of the OSI Model



***Source*:** https://salamadian.com/defenition-osi-layer/

Fig 1: OSI Model (Open System Interconection)

Layer 1: Physical Layer

Turban, *et al*, (2016) [6], The Physcal layer works by defining network transmission media, signaling methods, bit synchronization, network architecture (such as Ethernet or Token Ring), network topology and cabling. In addition, this level also defines how the Network Interface Card (NIC) can interact with cable or radio media.

Layer 2: Data Link Layer

It functions to determine how the data bits are grouped into a format known as a frame. In addition, at this level there is error correction, flow control, hardware addressing (such as the Media Access Control Address (MAC Address)), and determining how network devices such as hubs, bridges, repeaters, and layer 2 switches operate. The IEEE 802 specification divides this level into two child levels, namely the Logical Link Control (LLC) layer and the Media Access Control (MAC) layer.

Layer 3: Network Layer

The network layer will create a header for packets containing IP information, both the data sending IP and the data destination IP. In certain conditions, this layer will also perform routing through internetworking using routers and layer-3 switches.

Layer 4: Transport Layer

This layer will split the data into data packets and assign serial numbers to the data packets so that they can be rearranged when they arrive at the destination side. In addition, at this layer, it will determine the protocol that will be used to transmit data, for example the TCP protocol. This protocol will send data packets, as well as ensure that the packet is received successfully (acknowledgment), and retransmits lost or damaged packets in the middle of the road.

Layer 5: Session Layer

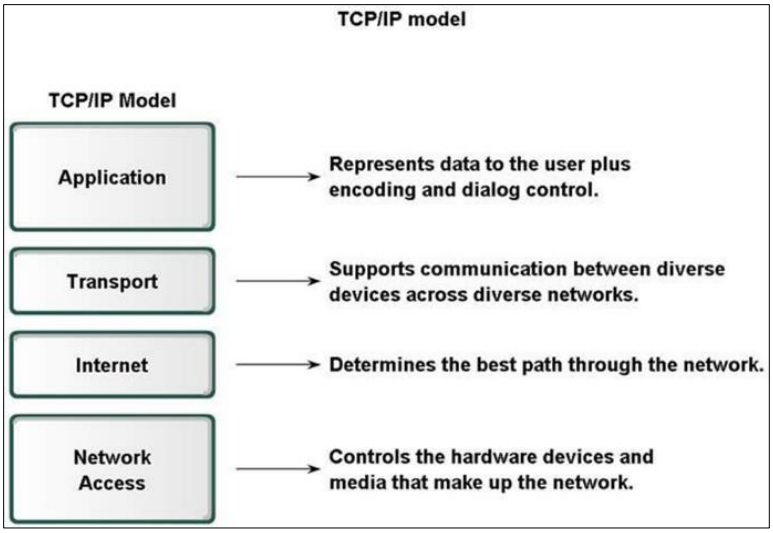
The session layer defines how connections can be made,

maintained, or destroyed. In this layer there are the Name Recognition, NFS & SMB protocols.

Layer 6: Presentation Layer
This layer works by translating the data format that the application intends to transmit over the network, into a format that can be transmitted by the network. At this layer, the data will be encrypted or described.

Layer 7: Application Layer
It is the layer where the end user interface interacts with applications that work using network functionality, adjusts how applications work using network resources, and then gives messages when an error occurs. Some of the services and protocols that are at this layer include HTTP, FTP, SMTP, etc.

TCP/IP (Transmission Control Protocol/Internet Protocols)



***Source*:** https://titistipoltektegal.wordpress.com/2019/10/28/defenition-tcp-ip/

Fig 2: TCP/IP (Transmission Control Protocol/Internet Protocols)

A. Application
Yani A, (2017) [cc], Defines TCP/IP Application protocols and how host programs interface with transport layer services to use the network. Protocol example HTTP, Telnet, FTP, TFTP, SNMP, DNS, SMPT.

B. Transport
Provides communication session management between host computers. Defines the level of service and status of the connection used when transporting data. Protocol example TCP, UDP, RTP. Y

C. Internet
Packages data into IP datagrams, which contain source and destination address information that is used to forward the datagrams between hosts and across networks. Performs routing of IP datagrams. Protocol examples IP, ICMP, ARP, RARP.

D. Network Interface
Yani A, (2017) [7], Specifies details of how data is physically sent through the network including how bits are electrically signalled by hardware devices that interface directly with a network medium such as coaxial cable, optic fiber, or twisted pair copper wire. Protocol examples Ethernet, Token Ring, FDDI, X.25, Frame Relay, RS-232, v.35.

3. Method
The descriptive approach was adopted in this study through the collection of previous literature on Computer Network Security System Using Method Watchguard. This study will provide a theoretical overview Network Standard and try to find out what concept and standard they use in corporate. The previous literatures were examined to complete this paper are journals that published in 2019.

4. Result & Discussion
Network standards are important for ensuring hardware and software can work together. Without standards you cannot easily develop networks for sharing information. Network standards can be categorized in one of two ways: formal and de facto (informal). Formal standards are developed by industry or government organizations. Formal standards exist for network layer software, data link layer, hardware and so on. Formal standardization is a long process of developing specifications, identifying industry options and acceptance. (Imam, Ghazali 2020) [9].

4.1 Result
After we discuss about the network model we found the Advantages and Disadvantages between OSI & TCP/IP Models:

The Advantage of ISO Models
a) It is a generic model and acts as a guidance tool to develop any network model.
b) It is a layered model. Changes are one layer do not affect other layers, provided that the interfaces between the layers do not change drastically.
c) It distinctly separates services, interfaces, and protocols. Hence, it is flexible in nature. Protocols in each layer can be replaced very conveniently depending upon the nature of the network.
d) It supports both connection-oriented services and

connectionless services.

The Disadvantage of ISO Models

a) It is purely a theoretical model that does not consider the availability of appropriate technology. This restricts its practical implementation.
b) The OSI model is very complex. The initial implementation was cumbersome, slow and costly.
c) Though there are many layers, some of the layers like the session layer and presentation layer have very little functionality when practically deployed.
d) The standards of OSI model are theoretical and do not offer adequate solutions for practical network implementation.

4.2 Discussion

The Advantage of TCP/IP Protocol

a) It is an industry–standard model that can be effectively deployed in practical networking problems.
b) It is interoperable, i.e., it allows cross-platform communications among heterogeneous networks.
c) It is an open protocol suite. It is not owned by any particular institute and so can be used by any individual or organization.
d) It is a scalable, client-server architecture. This allows networks to be added without disrupting the current services.

5. Conclusion

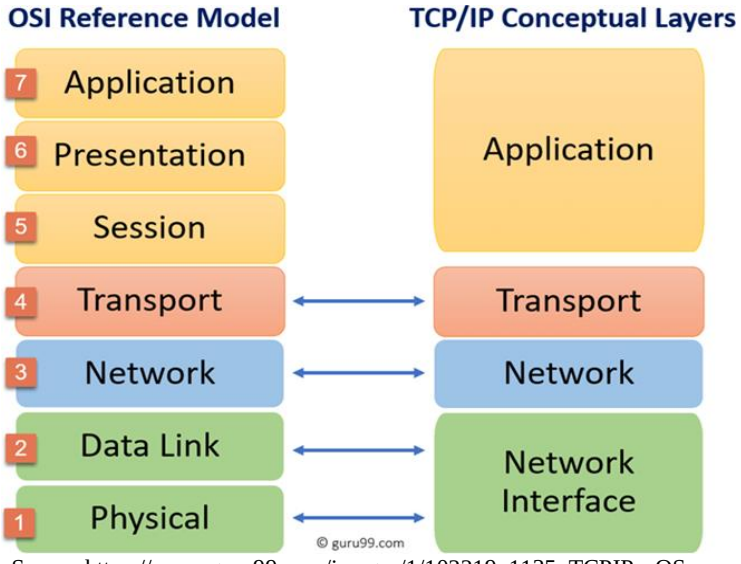
5.1 Similarities between OSI and TCP/IP Models

a) Both the reference models are based upon layered architecture.
b) The layers in the models are compared with each other. The physical layer and the data link layer of the OSI model correspond to the link layer of the TCP/IP model. The network layers and the transport layers are the same in both the models. The session layer, the presentation layer and the application layer of the OSI model together form the application layer of the TCP/IP model.
c) In both the models, protocols are defined in a layer-wise manner.
d) In both models, data is divided into packets and each packet may take the individual route from the source to the destination.

5.2 Differences between OSI and TCP/IP Models

a) OSI model is a generic model that is based upon functionalities of each layer. TCP/IP model is a protocol-oriented standard.
b) OSI model distinguishes the three concepts, namely, services, interfaces, and protocols. TCP/IP does not have a clear distinction between these three.
c) OSI model gives guidelines on how communication needs to be done, while TCP/IP protocols layout standards on which the Internet was developed. So, TCP/IP is a more practical model.
d) In OSI, the model was developed first and then the protocols in each layer were developed. In the TCP/IP suite, the protocols were developed first and then the model was developed.
e) The OSI has seven layers while the TCP/IP has four layers.

Differences OSI Model vs TCFP/IP Layers



Source:https://www.guru99.com/images/1/102219_1135_TCPIPvsOSIM1.png

Fig 3: OSI Reference Model and TCP/IP Conceptual Layer

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