Research based on OSI model

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Abstract—**OSI is an open access system interconnection reference model, is a very good agreement defined protocol specifications. OSI model has seven layers; each layer can have several sub-layers. According to the comparison of OSI and TCP/IP, and research based on the OSI model implementation models and protocols of the Internet, and the OSI model of data transmission between the layers.**

Keywords-OSI; reference model; protocol specification; TCP/IP;

I. INTRODUCTION

Network [1] is an important milestone in the development of ISO (Internet Standard Organization, ISO) on the OSI (Open System Interconnect) seven layer network model definitions. It not only before and follow-up evaluation of various network technologies, analysis of the basis, has become the network protocol design and unified reference model.

OSI (Open System Interconnection) is the Open Systems Interconnection Reference Model [2]. ISO International Standards Organization[3] as defined by the OSI model defines seven layers of function and it is a stepping stone for beginners network technology, but also analysis, evaluation based on a variety of network technologies - from the network is no longer mysterious, it is rational Follow, are based on evidence of.

OSI seven layer network model is mainly to address the heterogeneous network interconnection compatibility issues encountered when. Its biggest advantage is that services, interfaces and protocols that a clear distinction between three concepts; reduce the complexity of the issues, once the network failure, which can quickly locate the fault level, easy to find and error; service description of a layer What is the upper layer to provide some functionality, the interface shows how to use the lower layer of the service, and agreements on how to achieve this level of service; This has a strong independence between the layers, the interconnection network entities what kind of agreement is no limit, as long as up to provide the same services and the interface does not change the adjacent layers on it. Seven of the division of the network but also to the different functions of the network module (different levels) to share their diverse functions, so the network from different functional modules shares different responsibilities.

Reflects the network layer design in many projects have structured thinking, is a reasonable division. This article based on the OSI Model in the model and the Internet Protocol..

II. OSI SEVEN LAYER MODEL AND PROTOCOLS
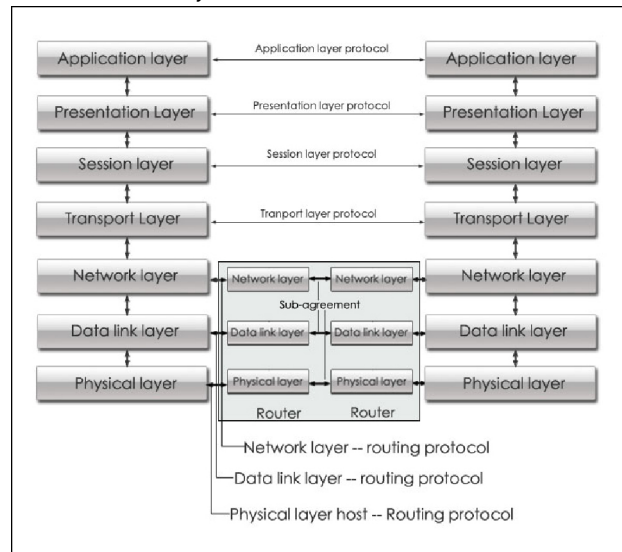
A. OSI seven layer model

Fig 1.1 OSI seven layer model

B. Physical layer

The lowest level of OSI model or the first layer, including physical networking media, such as a cable docking connector. Physical layer protocol and detection voltage generated in order to send and receive signals carrying data. Physical layer provides the activation, maintenance, close communication between the endpoint of mechanical properties, electrical properties, functional characteristics and process characteristics, characteristic

parameters including: voltage, data transfer rate, maximum transmission distance, physical connection media, often refer to these norms Standards developed by other organizations[4]. The upper physical layer data transfer protocol provides a physical media.

The main function of the physical layer adjacent nodes to complete the original bit stream between. Physical layer protocol is the use of typical problems concern what kind of physical signals for data 0 and 1.1 sustained length of time. Whether the data transmission in both directions on both. How to establish the integrity of the original and complete communication and connection to terminate. Physical interface (plug and socket) the number of needles and the needle. For example, on the desktop PC into the network interface card, to establish the basis for computer networking. In other words, provides a physical layer. Although the physical layer does not provide error correction services, but it can set the data transfer rate and error rate monitoring data. Network physical problems such as broken wires, will affect the physical layer.

The typical definition of the physical layer specifications include: EIA / TIA RS-232, EIA / TIA RS-449, V.35, RJ-45 and so on.

C. Data Link Layer

The second layer of OSI model, which controls the network layer and physical layer of communication between, and without reliable physical media to provide reliable transmission. Data link layer functions independent of the network and its nodes and the type used in the physical layer, it does not care whether you are running Word, Excel, or use the Internet. Some connected devices, such as switches; because they want to decode the frame and use the information to send data frames to the correct recipient, so they are working in the data link layer.

The main function of the data link layer is how unreliable physical lines of reliable data transfer. In order to ensure transmission received from the network layer of data can be divided into specific physical layer transmission frame. Frame is used to move data structure package, which includes not only raw data, but also the sender and the recipient's network address, and error correction and control information, and its characteristic parameters include: physical address, network topology, error warning mechanism , The sorting data frame transmission and flow control, etc., where the physical network layer address is the address relative terms, it represents the data link layer of the node identification technology, which identifies where the frame will be sent to, and correction and Control information is to ensure error-free frame arrives. In addition, the sending location to calculate each data block CRC (cyclic redundancy check) and added to the frame, so the receiver can recalculate the CRC to judge by the received data is correct. Once the receiver has received data found in error, then the sender must re-transmit the data. However, multiple send the same data may also be the recipient receives duplicate data. Data link layer is another problem to solve high-speed sending the data to prevent low-speed receiver to "drown." Therefore need some kind of information flow

control mechanism allows the sender that the receiver how much buffer space currently. In order to facilitate control, flow control and error handling are often together to achieve. In the wide area network, data link layer is responsible for the host IMP, IMP-IMP and reliable transmission of data between. In the local area network, data link layer is responsible for system and reliable data transmission between.

Data link layer protocols include: SDLC, HDLC, PPP, STP, Frame Relay and so on.

D. Network Layer

The third layer of OSI model, considering the transmission priority, level of network congestion, quality of service and optional routing to determine the cost of a network from another network node A to node B, the best path. As the network layer processing route, and routers that connect to the network because of the paragraphs, and intelligent guide data transfer, is a network layer. In the network, "routing" is based on the addressing scheme, the use of models and guidelines for accessibility to data transmission. End to end network layer of packet transmission is defined, it defines all the nodes that can identify the logical address, also defines the routing implementation and learning approach. In order to adapt the length of the maximum transmission unit smaller than the packet length of the transmission medium, the network layer also defines how a packet into smaller packets of the segmentation method.

Network layer (network layer) of the main function is to complete the network packet transmission between the hosts; the key issue is the use of the data link layer services to each packet transmitted from the source to the destination. In the wide area network, this includes generation from source to destination route and requires as little as possible through this path of IMP. If the subnets at the same time too many packets, may form subnet congestion, because of the need to avoid this from happening. Network layer is the network address translation into the corresponding physical address, and determine how to route data from the sender to the receiver is responsible for pair Internetwork routing data packets. Network layer also can control, internetworking functions.

Network layer protocols include: IP, IPX, RIP, OSPF, etc.

E. Transport layer

OSI model the most important layer. Session layer transport layer to determine the user (end-users on the network) to provide what services. The best transport connection is a no errors in the pipeline in order to transmit data, the transport layer connection to the real point to point. Flow control protocol at the same time in order to receive or receiving data based on how quickly provide appropriate sending rate. In addition, the transport layer in accordance with the maximum size of the network can handle long packets will force the split. Work in the transport layer of a service is the TCP / IP protocol suite of TCP (Transmission

Control Protocol), another transport layer service is IPX / SPX protocol set the SPX (Sequence Packet Exchange).

The primary function of the transport layer for network users on different hosts and reliable data communication between processes, including error recovery protocol is selected or no error recovery protocol, and in the same host different applications on the input data stream multiplexing , But also the order of the received packet does not re-sorting. Transport layer provides transparent top (do not rely on specific networks) for reliable data transmission. If the network layer is concerned, "point to point" of the transmitting point by point, we can say that the transport layer is concerned that "end"(source to destination) of the final results. Its features include: flow control, multiplexing, virtual circuit management and error correction and recovery. Where technology enables a number of different multi-application data can be shared to achieve a single physical link transmission; virtual circuit is a logical channel data transmission, the transport layer establishment, maintenance and termination; correction function can detect the occurrence of errors And to take measures (such as retransmission) to solve the problem.

Transport layer protocols include: TCP [5, 6], UDP, SPX and so on.

F. Session Layer

Session layer is responsible for the two nodes in the network between the establishment and maintenance of communications. It defines how to start, control, and end a session, including the number of hours of control and management of two-way in order to complete only part of a continuous message can inform the application so that the data layer that is continuous, in a Some cases, If that layer all the data received, then the representative with the data layer. Session layer management session between the host process that is responsible for creating, managing, terminating the session between processes. Session Layer also used to insert check points in the data to achieve data synchronization.

Session layer functions include: the establishment of communication links and maintain the smooth flow of communication link during a session, the dialogue between the two nodes simultaneously decide whether the communication is interrupted, and communication interruption to decide where to re-send. Session layer allows different machines to establish sessions between users. A similar session layer transport layer sequential ordinary data transmission, in some cases also provides enhanced services useful. . Allows the user to use a session time-sharing system in a remote land, or transfer files between two machines. One of the services provided by the session layer is to manage dialogue control. Session layer allows two-way transmission of information at the same time, or at any one time only one-way transmission. If the latter, similar to the physical channel half-duplex mode, the session layer will be recorded at this time which side of the turn. A dialogue control and token management-related services (token management). Some agreements will ensure that the parties cannot simultaneously the same operation, it is very important. To manage these activities, the session layer

provides tokens; tokens can be moved between the two parties in the session, and only the party holding the token can perform certain critical operations. Another session layer services are synchronized. After each transmission fail in the middle, have had to send the file. When the network again, big failure, may well be halfway. To address this problem, the session layer provides a way to insert the synchronization point in the data. After each network fails, only the last retransmission of data after the synchronization point (this is actually the principle of breakpoint download).

G. Presentation Layer

Said application and network layer is the translator between the data network can be understood in accordance with the program format; this format is also used by the network due to different types and different, it defines a series of codes and code conversion To ensure that the data source can be identified in the same destination, for example everyone is familiar with the ASCII text data code, said image, said animation GIF or MPEG and so on.

The main function of the presentation layer is to manage the decryption and encryption of data, such as system password processing. For example, FTP allows you to select the binary format for transmission or ASII. If you choose to binary, then the sender and the receiver does not change the contents of the file. If you choose ASII format, the sender will text from the sender to convert the character set to send data after the standard ASII. In the receiver converts the standard recipient ASII computer character set. Example: encryption, ASII and so on. Said upper layer to transform the data or information to ensure that host application layer information can understand of the application to another host. Presentation layer of data conversion including data encryption, compression, format conversion and so on. Presentation layer (presentation layer) for the completion of certain features, these features often want to find common solutions, rather than by each user to achieve. Only interested in the following layers of the presentation layer from the source machine to the target transmission reliability bit stream, and the presentation layer is concerned with the information sent by the syntax and semantics. A typical presentation layer services, unanimously selected example is the standard method to encode data. Most users are not switching between programs random bit, but exchange information such as names, dates, currencies like the number and invoice information. These objects using strings, integers, floating point form, and composed by several simple types of data structures to represent. In addition, the presentation layer is also involved in data compression and decompression, data encryption reconciliation meters, etc. (WinRAR that set.)

H. Application Layer

Application layer is the highest level of user-oriented, networked software applications through direct dialogue with users, such as: find the communication to each other, identify available resources and synchronization, etc., it is the application layer for the operating system or network applications to access network services Interface.

The main function of application layer software is responsible for providing an interface to allow programs to use network services. The term "application layer" does not mean running on the network of a particular application, the application layer provides services including file transfer, file management and e-mail the information processing. Communicate with other computers an application; it is the corresponding application's communication services. For example, word processors without communication function cannot execute the code to communicate, engage in word-processing work of programmers do not care about OSI Layer 7. However, if you add a file transfer option, then the word processor programmer's need to implement OSI Layer 7.

Application layer protocols include: Telnet, FTP, HTTP, SNMP and so on.

III. THE COMPARISON OF OSI AND TCP/IP

TCP / IP protocol is based on two networks: TCP protocol [7], IP protocol name combinations .TCP / IP (Transmission Control Protocol / Internet Protocol shorthand, the Chinese translation for the Transmission Control Protocol / Internet Protocol) protocol is the most basic Internet Agreement, simply, is that the underlying IP protocol and TCP protocol consisting of .TCP / IP protocol development work began in the 70s, is for the Internet

The first set of protocol [8]. TCP/IP is hardware and software architecture allows different computers to communicate with the protocol suite, Internet is built on TCP / IP protocol on top of, TCP / IP protocol is divided into four layers, namely the network layer, Internet layer, transport layer and application layer [9].

OSI and TCP / IP compared in Figure 2.1. OSI Reference Model and TCP / IP reference model architecture was similar in common, unique. OSI reference model as a complete, robust network architecture, difficult to adapt to change and the reality, but must be adjusted again, and gradually change and will be widely used. TCP / IP protocol architecture of the Internet to promote the success of the development, but also expanded the development of Internet TCP / IP, influence, and gradually the TCP / IP has been widely used, this is the fact that it has become the premise of standards and industry standards [10].
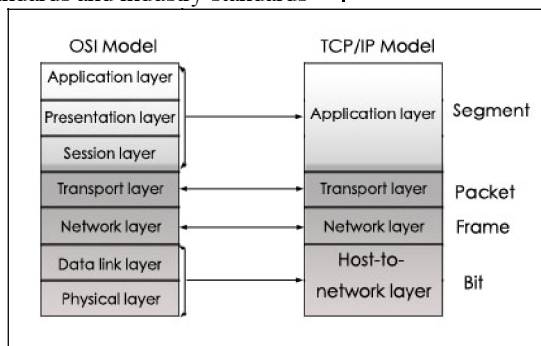

Fig 2.1 the comparison of OSI and TCP/IP

IV. SUMMARY

According to The comparison of OSI and TCP/IP,and research based on the OSI network model and model implementation of the agreement, OSI application layer in the network has an important role, it allows people to easily discuss and learn the details of protocol specifications, the standard interface between the layers to facilitate the engineering module, And then to create a better environment for the interconnection, while reducing the complexity, make the program easier to modify, faster product development. Therefore, OSI model and layer protocol has an important role.

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