Module

4

Standards

Lesson

13

Transport And Session Layers

Version 1 ECE , IIT Kharagpur

LESSON OBJECTIVE

General

The lesson will discuss the various transport layer protocols

4.6.1 OSI TRANSPORT LAYER PROTOCOLS

The OSI Transport layer protocol (ISO-TP) manages end-to-end control and error checking to ensure complete data transfer. It performs transport address to network address mapping, makes multiplexing and splitting of transport connections, also provide functions such as Sequencing, Flow Control and Error detection and recover.

Five transport layer protocols exist in the OSI suite, ranging from Transport Protocol Class 0 through Transport Protocol Class 4 (TP0, TP1, TP2, TP3 & TP4). The protocols increase in complexity from 0-4. TP0-3 work only with connection-oriented communications, in which a session connection must be established before any data is sent; TP4 also works with both connection-oriented and connectionless communications.

Transport Protocol Class 0 (TP0) performs segmentation (fragmentation) and reassembly functions. TP0 discerns the size of the smallest maximum protocol data unit (PDU) supported by any of the underlying networks, and segments the packets accordingly. The packet segments are reassembled at the receiver.

Transport Protocol Class 1 (TP1) performs segmentation (fragmentation) and reassembly, plus error recovery. TP1 sequences protocol data units (PDUs) and will retransmit PDUs or reinitiate the connection if an excessive number of PDUs are unacknowledged.

Transport Protocol Class 2 (TP2) performs segmentation and reassembly, as well as multiplexing and demultiplexing of data streams over a single virtual circuit.

Transport Protocol Class 3 (TP3) offers error recovery, segmentation and reassembly, and multiplexing and demultiplexing of data streams over a single virtual circuit. TP3 also sequences PDUs and retransmits them or reinitiates the connection if an excessive number are unacknowledged.

Transport Protocol Class 4 (TP4) offers error recovery, performs segmentation and reassembly, and supplies multiplexing and demultiplexing of data streams over a single virtual circuit. TP4 sequences PDUs and retransmits them or reinitiates the connection if an excessive number are unacknowledged. TP4 provides reliable transport service and functions with either connection-oriented or connectionless network service. TP4 is the most commonly used of all the OSI transport protocols, which is similar to the Transmission Control Protocol (TCP) in the TCP/IP suite. The TCP/IP is discussed in detail in module 7 later on.

Both TP4 and TCP are built to provide a reliable connection oriented end-to-end transport service on top of an unreliable network service. The network service may loose packets, store them, deliver them in the wrong order or even duplicate packets. Both protocols have to be able to deal with the most severe problems e.g., a subnetwork stores valid packets and sends them at a later date. TP4 and TCP have a connect, a transfer and a disconnect phase. The principles of doing this are also quite similar.

One difference between TP4 and TCP to be mentioned is that TP4 uses ten different TPDU (Transport Protocol Data Unit) types whereas TCP knows only one. This makes TCP simpler but every TCP header has to have all possible fields and therefore the TCP header is at least 20 bytes long whereas the TP4 header takes at least 5 bytes. Another difference is the way both protocols react in case of a call collision. TP4 opens two bidirectional connections between the TSAPs whereas TCP opens just one connection. TP4 uses a different flow control mechanism for its messages, it also provides means for quality of service measurement.

4.6.2 OSI SESSION LAYER PROTOCOLS

The session layer implementation of the OSI protocol suite consists of a session protocol and a session service. The session protocol allows session-service users (SS-users) to communicate with the session service. An SS-user is an entity that requests the services of the session layer. Such requests are made at session-service access points (SSAPs), and SS-users are uniquely identified by using an SSAP address. Figure 30-4 shows the relationship between the SS-user, the SSAP, the session protocol, and the session service.

Session service provides four basic services to SS-users. First, it establishes and terminates connections between SS-users and synchronizes the data exchange between them. Second, it performs various negotiations for the use of session layer tokens, which the SS-user must possess to begin communicating. Third, it inserts synchronization points in transmitted data that allow the session to be recovered in the event of errors or interruptions. Finally, it enables SS-users to interrupt a session and resume it later at a specific point.

Session service is defined in the ISO 8306 standard and in the ITU-T X.215 recommendation. The session protocol is defined in the ISO 8307 standard and in the ITU-T X.225 recommendation. A connectionless version of the session protocol is specified in the ISO 9548 standard.

Objective Questions

13.01

Subjective Questions

13.11

Level 2 Questions

13.21