【CN】Day12

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☰ Materials	TCP and UDP and Application-Layer Protocol
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【Ch2】Application Layer

2.1 Principles of Network Applications(3)

2.1.4 Transport Services Provided by the Internet

The Internet(more generally TCP/IP networks) makes two transport protocols available to applications, UDP and TCP.

When we develop an Internet application, one of the first decisions we have to make is whether to use UDP or TCP. The following figure shows the requirements of some network applications

Application	Data Loss	Throughput	Time-Sensitive
File transfer/download	No loss	Elastic	No
E-mail	No loss	Elastic	No
Web documents	No loss	Elastic (few kbps)	No
Internet telephony/ Video conferencing	Loss-tolerant	Audio: few kbps–1Mbps Video: 10 kbps–5 Mbps	Yes: 100s of msec
Streaming stored audio/video	Loss-tolerant	Same as above	Yes: few seconds
Interactive games	Loss-tolerant	Few kbps–10 kbps	Yes: 100s of msec
Smartphone messaging	No loss	Elastic	Yes and no

Figure 2.4 Requirements of selected network applications

TCP Services

The TCP service model includes a connection-oriented service and a reliable data transfer service. When an application invokes TCP as its transport protocol, the application receives both of these services from TCP.

- Connection-oriented service. TCP has the client and server exchange transport-layer control information with each other before the application-level message begins to flow.

  This so-called handshaking procedure alerts the client and server. After the handshaking, a TCP connection is said to exist between the sockets of the two processes. The connection is a full-duplex connection in that the two processes can send messages to each other over the connection at the same time.

  When the application finishes, it must tear down the connection

- Reliable data transfer service. The communicating processes can rely on TCP to deliver all data sent without error and in the proper order.

TCP also includes a congestion-control mechanism.

UDP Services

UDP is a no-frills, lightweight transport protocol, providing minimal services.

UDP is connectionless, so there is no handshaking before the two processes start to communicate. UDP provides an unreliable data transfer service.

Furthermore, messages that do arrive at the receiving process may arrive out of order.

UDP does not include a congestion-control mechanism, so the sending side of UDP can pump data into the layer at any rate it pleases.

2.1.5 Application-Layer Protocols

An application-layer protocol defines how an application's processes pass messages to each other.

An application-layer protocol defines:

- The types of messages exchanged, for example, request messages and response messages

- The syntax of the various message types, such as the fields in the message and how the fields are delineated

- The semantics of the fields, that is, the meaning of the information in the fields

- Rules for determining when and how a process sends messages and responds to messages.