TRADITIONAL TCP

TCP is an alternative transport layer protocol over IP.

TCP provides:

- Connection-oriented
- Reliable
- Full-duplex
- Byte-Stream

Connection-Oriented

- *Connection oriented* means that a virtual connection is established before any user data is transferred.
- If the connection cannot be established – the user program is notified.
- If the connection is ever interrupted – the user program(s) is notified.

Reliable

- *Reliable* means that every transmission of data is acknowledged by the receiver.
- If the sender does not receive acknowledgement within a specified amount of time, the sender retransmits the data

Byte Stream

- *Stream* means that the connection is treated as a stream of bytes.

- The user application does not need to package data in individual datagrams (as with UDP).

Buffering

- TCP is responsible for buffering data and determining when it is time to send a datagram.

- It is possible for an application to tell TCP to send the data it has buffered without waiting for a buffer to fill up.

Full Duplex

- TCP provides transfer in both directions.

- To the application program these appear as 2 unrelated data streams, although TCP can piggyback control and data communication by providing control information (such as an ACK) along with user data.

TCP Ports

- Interprocess communication via TCP is achieved with the use of ports (just like UDP).

- UDP ports have no relation to TCP ports (different name spaces).

TCP Segments

The chunk of data that TCP asks IP to deliver is called a *TCP segment*.

Each segment contains:

- data bytes from the byte stream
- control information that identifies the data bytes

TCP Lingo

- When a client requests a connection it sends a “SYN” segment (a special TCP segment) to the server port.
- SYN stands for synchronize. The SYN message includes the client’s ISN.
- ISN is Initial Sequence Number.
- Every TCP segment includes a *Sequence Number* that refers to the first byte of *data* included in the segment.
- Every TCP segment includes an *Acknowledgement Number* that indicates the byte number of the next data that is expected to be received.
- All bytes up through this number have already been received.

There are a bunch of control flags:

- URG: urgent data included.
- ACK: this segment is (among other things) an acknowledgement.
- RST: error – connection must be reset.
- SYN: synchronize Sequence Numbers (setup)
- FIN: polite connection termination

- MSS: Maximum segment size (A TCP option)
- Window: Every ACK includes a Window field that tells the sender how many bytes it can send before the receiver will have to toss it away (due to fixed buffer size).

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