



## Transport Layer Protocols And Services

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**Abstract:** This paper includes a brief survey on Transport Layer Protocols like User Datagram Protocol (UDP), Transmission Control Protocol (TCP) and Stream Control Transmission Protocol (SCTP). It also includes Port Addressing. This paper lists out features and services, problems and comparison of these protocols.

**Keywords:** UDP, TCP, SCTP, SEGMENT, IANA

### INTRODUCTION

Transport layer is responsible for process to process delivery. At Transport Layer the real communication takes place between two processes (application programs). Port addressing are used at transport layer like IP addressing at Network layer or like MAC addressing at Data link Layer and due to Port addressing Transport Layer is enable to deliver data to the right process.

Transport layer protocols may be connectionless or connection oriented. Connectionless protocol does not establish any connection [1] before sending data and treats every segment as an independent packet and deliver data to the destination process blindly, while on the other hand Connection oriented protocol first establish a connection before transferring data and when all data is transferred the connection is terminated [2-3].

At transport layer data of application program is transmitted into segments. Now many protocols are used for data transferring. UDP is a connectionless protocol, which treats every segment as independent packet [4-6], and deliver it blindly from source to destination process, so it does not use flow and error control mechanism. TCP and SCTP are connection oriented protocols that establish a virtual connection before transferring of segments from source to destination process, so TCP and SCTP use flow and error control mechanism. The function of the transport Layer is to insure packets have no errors, and that all packets arrive and are correctly reassembled.

### SERVICES OF TRANSPORT LAYER CONNECTION ORIENTED SERVICES

Transport layer provides a connection oriented service to the upper layer. Before the transferring of data a virtual connection is established between source and destination, after all data is transferred the connection is terminated. Transport layer providing stream oriented mechanism.

### CONNECTIONLESS SERVICES

Transport layer also provides a connection less service to the upper layers. There is no need to establish a virtual connection between source and destination to transfer data. Connectionless service is used for fast data transfer than connection oriented but when there is no congestion.

### FLOW CONTROL

Transport layer provide flow control mechanism, receiver of the data control the amount of data that are to be send by the sender and this is done through Sliding Window or Go Back N. if the receiver has buffer of 4kb and received 2kb unprocessed data so the receiver has the ability to receive 2kb more.

### ERROR CONTROL

It is the responsibility of transport layer to provide error free data transmission. For error controlling three simple tools Checksum, ACK and Timeout are used. Error control includes mechanism for detecting lost, damaged or unordered and also duplicated segments [7-11]. After errors are detected, it includes methods for correcting them.

### CONGESTION CONTROL

Congestion control mechanism is used to control the entry of traffic on a link in order to avoid congestion. For example if the network cannot deliver the data as fast as

the data created by the sender or if the receiver is unable to receive, it must tell the sender to slow down.

### ***MULTIPLEXING and DEMULTIPLEXING***

If there are many processes at sender side and they need to send data but there is only one transport layer protocol at any time, this requires multiplexing and the receiver side it requires de-multiplexing if there are many processes [12-18]. The single protocol accept data from different processes differentiating them by port numbers.

### ***RETRANSMISSION***

In this mechanism the transport layer provides the facility of retransmission. Those packets or segments that are lost, corrupted are retransmitted OR if ACK is lost, times is out and also in case of out of order delivery retransmission take place.

## **I. PORT ADDRESSING**

At transport layer every protocol use an address, port number which is used in TCP or UDP header to choose among multiple processes running on the destination host. Port number of the destination process is used for the delivery and the port number of the sender is used for reply. Port numbers are 2byte long, range is in between 0 and 65535. Port numbers identify which upper layer service is needed, and are needed when a host communicates with a server that uses multiple services. Port numbers ranges: 0-255 used for public applications 255-1023 are assigned to marketable applications 0-1023 also called well-known ports, regulated by IANA. 1024 through 49151 Registered Ports, not regulated. 49152 through 65535 are Dynamic and/or Private Ports. Transport layer protocol

### **TCP(Transmission control protocol)**

TCP is one of the basic protocol of transport layer. Application Layer send data to Transport layer and it is handle by Transmission control protocol. when the host system send large amount of data the TCP manages the IP Packets it from the previous layer. TCP also arrange the packets into sequential manner in case of packets were delivered out of order. it also take a lost packets and merges them into the file that was originally sent. If some packet are not received then the TCP can send ICMP message to have a specified packet. TCP have the function of reliability.

### ***UDP(User datagram protocol)***

UDP is also one of the basic protocols of the transport layer. host to host transmission is in the form of datagram in a network without requiring to set up a transmission channel before the actual communication is started. UDP is like TCP but UDP don't have the guarantee of the delivery. UDP has neither a lower overhead by nor requiring the acknowledgments of packet receipt retransmission of data and packet ordering.

UDP is fast but the problem in it data definitely will be lost. UDP is more used for the multicasting data in streaming of video. While the data are lost in steaming that packet will be skipped and the video may seem jumpy.

### **DCCP(Datagram congestion control protocol)**

DCCP is a transport layer protocol which is message oriented. It offers certain features like congestion control mechanism, reliable connection setup, feature negotiation, and Explicit Congestion Notification.

DCCP handles setup and teardown of reliable connections while generating ECP messages when congestion occurs. Since DCCP is at the Transport Layer, applications do not need to be programmed to use DCCP. DCCP is usually implemented for multicast operations [19-23] such as telephony, streaming media and online gaming. DCCP uses UDP for a faster transport mechanism since lost packets and resending those packets are not necessary.

### **SCTP(Stream control transmission protocol)**

SCTP is also a standard protocol of the transport layer it is also same function like TCP and UDP. SCTP both have the features of TCP which is to provide ordered delivery of message and UDP message oriented. It sends multiple streams though one stream e.g mostly browsers treat each image on a web page as a connection and then one connection for the text with SCTP these can be sent as one connection.

SCTP is also support connection between two hosts which is two connection In a network local network and in it if one connection goes down then the other one is used as a redundant connection to resume the transmission.

### ***RSVP(Resource reservation protocol)***

RSVP is an transport layer protocol and has a function of resource reservation across the network for an integrated services internet. it also provide the setup of resources reservation which is initiated at a receivers side for a multi-casting(one-host-to-many-host) or uni-casting(one-

host-to-one-host).It can be utilized on routers to provide the QOS to the hosts [24].

### **RIP(Routing information protocol)**

RIP as a name mention routing protocol which is use for the hop count as a metric for the routing, it implements a limit constrain on the number of hops allow in apath from the source to a destination to prevent routing loops.

## **II. CONCLUSION AND FUTURE WORK**

TCP protocol should be used where reliability is required such as in internet banking and UDP should be used for broadcasting and multicasting purposes like in internet gaming, internet radio etc. where some loss of packets is accepted . This is why, these two protocols TCP and UDP have been considered for the survey, because TCP and UDP are the main protocols of the transport layer and each of them have a certain advantage over each other but in different cases. There are some other cases which can be considered like, UDP performs better and is suitable for applications where time is a constraint irrespective of reliable delivery, whereas TCP is suitable where time is not a constraint and reliable delivery is important. Thus, the purpose of this survey is to study and analyze the basic operation of TCP and UDP in detail, to understand the basic functions of these protocols, to find the key differences between the two protocols and finally to make a summary comparison between them. Future work is intended to optimize the TCP and UDP protocol for understanding its performance for suitable.

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