

P07: Networking with TCP

Q1: Understand the Basics of Transport Control Protocol

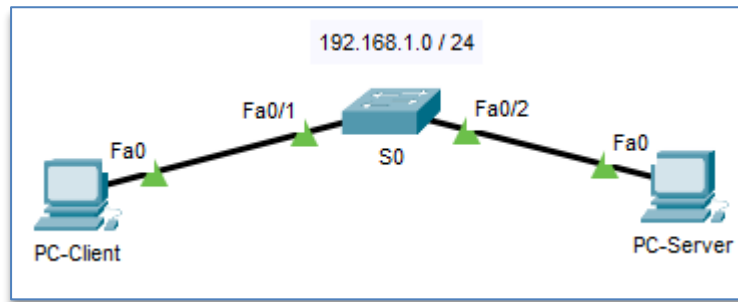
The Transmission Control Protocol (TCP) is one of the main protocols of the Internet protocol suite. It originated in the initial network implementation in which it complemented the Internet Protocol (IP). Therefore, the entire suite is commonly referred to as TCP/IP. TCP provides reliable, ordered, and error-checked delivery of a stream of octets (bytes) between applications running on hosts communicating via an IP network. Major internet applications such as the World Wide Web, email, remote administration, and file transfer rely on TCP, which is part of the Transport Layer of the TCP/IP suite. SSL/TLS often runs on top of TCP.

TCP is connection-oriented, and a connection between client and server is established before data can be sent. The server must be listening (passive open) for connection requests from clients before a connection is established. Three-way handshake (active open), retransmission, and error-detection adds to reliability but lengthens latency. TCP employs network congestion avoidance. However, there are vulnerabilities to TCP including denial of service, connection hijacking, TCP veto, and reset attack. For network security, monitoring, and debugging, TCP traffic can be intercepted and logged with a packet sniffer.

Though TCP is a complex protocol, its basic operation has not changed significantly since its first specification. TCP is still dominantly used for the web, i.e. for the HTTP protocol, and later HTTP/2, while not used by latest standard HTTP/3.

Q2: Configuring a TCP Client and a TCP Server

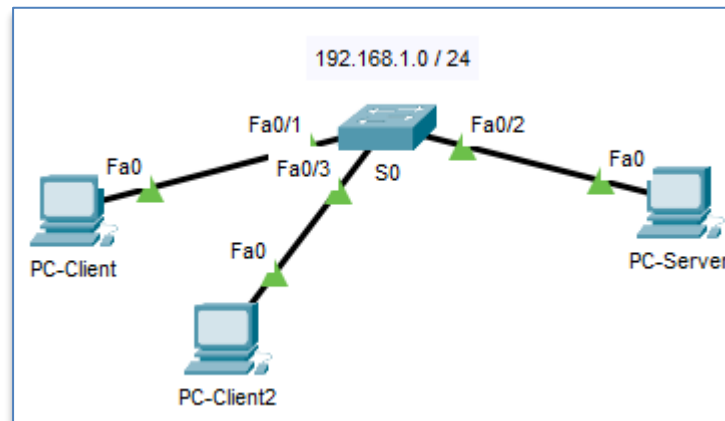
- Open **PTLab 07.2.pka** and implement the network shown below:



In this activity, a **TCP socket in Python** will be used to send data from PC-Client to PC-Server.

Q3: Try me! Questions

1. Connect another client to S0 as shown below and forward messages from PC-Client to PC-Client2 (via PC-Server) vice versa. (you may assume PC-Client, PC-Client2 are two chat clients)



2. In Q2, try to simulate a packet drop during the data transmission from PC-Client to PC-Server. See whether TCP recovers from the lost packet.

Summary

1. Understand the Basics of Transport Control Protocol
2. Configuring a TCP Client and a TCP Server
3. **Try me! Questions**



WELL DONE!