BRYANT WATKINS

CYSE 608 | Dr. Gladden

TCP/IP Research

1/28/26

Prompt: "What are the fundamental principles and functions of TCP/IP protocols? How do they differ from those of the OSI model in the context of network architecture?"

CYSE 608 TCP/IP Research

The TCP/IP model is a cornerstone of all things pertaining to information technology. TCP stands for Transmission Control Protocol, and IP stands for Internet Protocol. The TCP/IP model works to outline data communications amongst network devices. TCP is a communications standard responsible for ensuring successful delivery and receiving of packets containing data and messages. TCP is found at the transport layer of the TCP/IP model. There are numerous protocols that utilize the services of TCP, and these protocols are responsible for sending data or messages in a secure and accurate state. The following protocols are known users of TCP – HTTP/HTTPS, SMTP, FTP, IMAP, etc.

IP operates at the network layer of the TCP/IP model. IP is known to provide network devices with their unique identifier address and internet connection. IP was predominantly used in its IPv4 configuration, but in recent history its use has evolved more towards the IPv6 configuration. The other cornerstone protocol for communications is known as User Datagram Protocol (UDP). UDP has a few areas where it differs greatly from TCP/IP - connection state, speed, and reliability. UDP does not prioritize the integrity of transferred data as seen with TCP/IP, instead UDP conducts the quickest transfer of data with no regard for accuracy, order, or established connection.

Another widely known protocol model is known as the OSI model, standing for Open Systems Interconnection. There is a plethora of differences between the TCP/IP model and the OSI model. The first notable difference found is that the TCP/IP model encompasses four or five layers, and the OSI model encompasses seven layers. The OSI model is known to operate independently of protocol. Meanwhile, the TCP/IP model operates upon commonly used communication protocols. Also, the reason the two models differ in number of layers is due to the fact that the TCP/IP model simply combines the functions of 3 OSI layers into a single layer. The Application, Session and Presentation layers of the OSI model are combined into one single layer of the TCP/IP model – Application layer.

The OSI model also differs from the TCP/IP model in its functional purpose. The OSI model is catered more towards a theoretical outline of the network communications process. The TCP/IP model is more of a practical functioning version of the OSI model. The purpose of OSI is truly for learners to gain a comprehensive understanding of how network communications take place. Meanwhile, the TCP/IP model is a practical fruition of the concepts learned from the OSI model. The TCP/IP model also integrates functions across multiple layers to a degree that the OSI model simply does not, due to the OSI model's strict layer independence. The final major difference of note is the fact that the TCP/IP model is seen as being far more flexible than the rigidity of the OSI model.

There is also a plethora of similarities found amongst the TCP/IP and OSI models. Both models utilize a layered approach, with each layer responsible for specific functions. Both models are known to encapsulate or package their data packets. Troubleshooting is a direct beneficiary of both models' layered approach, as knowing what the issue is can help a user

pinpoint the defective layer of either model. Both ultimately provide a framework and infrastructure for network communications and data transfer.

WORK CITED

"TCP/IP Model." *GeeksforGeeks*, GeeksforGeeks, 21 Jan. 2026, www.geeksforgeeks.org/computer-networks/tcp-ip-model/.

"What Is TCP/IP in Networking?" *Fortinet*, www.fortinet.com/resources/cyberglossary/tcp-ip. Accessed 26 Jan. 2026.

"OSI and TCP/IP Model." *GeeksforGeeks*, GeeksforGeeks, 9 Dec. 2025, www.geeksforgeeks.org/computer-networks/difference-between-osi-model-and-tcp-ip-model/.

"TCP/IP Model vs. OSI Model: Similarities and Differences." *Fortinet*, www.fortinet.com/resources/cyberglossary/tcp-ip-model-vs-osi-model. Accessed 26 Jan. 2026.