

CSN 341 - Assignment 4

1. Why is flow control important in the transport layer, and how does TCP implement flow control through mechanisms like sliding windows? Discuss how improper flow control can lead to issues like buffer overflow and network congestion, and explain the potential impact on overall network performance.
2. Why are port numbers significant in the transport layer, and how do they facilitate multiplexing and demultiplexing of data streams? Provide examples of specific port numbers associated with well-known services, such as HTTP and DNS, and discuss the potential issues that can arise due to port number conflicts or misuse.
3. Compare and contrast the Selective-Repeat and Go-Back-N protocols in the context of reliability and efficiency. How does piggybacking in bidirectional communication improve efficiency, and what are the practical considerations when implementing piggybacking in real-world applications?
4. In scenarios where low latency is critical, how would you evaluate the trade-offs between using TCP and UDP? Consider the impact on reliability, error correction, and the specific needs of applications:
 - a) online gaming
 - b) video conferencing
 - c) stock trading.
5. Discuss the importance of sequence numbers and acknowledgments in TCP. How do these mechanisms ensure reliable data transmission and prevent issues of:
 - a) packet duplication
 - b) out-of-order delivery
 - c) Provide an example of how TCP recovers from lost or out-of-order packets.