Which Characteristics Are Parts Of TCP? (Choose Two.) Reliable Connectionless No Flow Control Resends

Which Characteristics Are Parts Of TCP? (Choose Two.) Reliable Connectionless No Flow Control Resends

Transmission Control Protocol (TCP) is a core protocol of the Internet Protocol Suite, ensuring reliable data transmission between network devices. When examining the characteristics of TCP, it's crucial to understand which features define its behavior and how it distinguishes itself from other protocols, particularly in terms of reliability, connection orientation, flow control, and error handling. In this article, we will explore two key characteristics of TCP from the options provided: Reliability and Resends. These features are fundamental to TCP's ability to provide a dependable communication channel over inherently unreliable networks.

Understanding TCP's Core Characteristics

Reliability in TCP

Reliability is arguably the most distinguishing feature of TCP. Unlike protocols that offer best-effort delivery, TCP guarantees that data sent from one end of a connection arrives intact and in the correct order at the destination. This reliability is achieved through several mechanisms:

- **Sequence Numbers:** TCP assigns sequence numbers to each byte transmitted, allowing the receiver to assemble data correctly and detect missing segments.
- **Acknowledgments (ACKs):** The receiver sends back acknowledgment packets indicating successful receipt of data. If the sender does not receive an ACK within a specified timeout, it retransmits the data.
- **Checksums:** TCP includes error-checking mechanisms to detect corrupted data segments during transmission.
- **Flow Control and Congestion Control:** While these are sometimes viewed as separate features, they support reliable data transfer by preventing

network overload and ensuring smooth data flow.

Through these mechanisms, TCP ensures that data is delivered accurately, without duplication or omission, which is essential for applications like web browsing, email, and file transfers where data integrity is paramount.

Resends in TCP

Resending lost or corrupted data is a fundamental aspect of TCP's reliability. When a data segment is lost, delayed, or corrupted during transmission, TCP's retransmission strategy kicks in:

1. **Timeouts:** TCP sets a timer when it sends a segment. If the timer expires before receiving an acknowledgment, the segment is retransmitted.

2. **Duplicate ACKs:** The receipt of multiple duplicate ACKs for the same segment indicates potential packet loss, prompting fast retransmission without waiting for a timeout.

3. **Adaptive Retransmission:** TCP dynamically adjusts its retransmission timeout based on network conditions, balancing promptness with avoiding unnecessary retransmissions.

This resending process ensures high reliability, making TCP suitable for applications where data accuracy is vital. Resends are transparent to the user and happen automatically, maintaining the integrity of the communication session.

Why Reliability and Resends Are Key Characteristics of TCP

Reliability: Ensuring Data Integrity

Reliability in TCP is achieved through its connection-oriented nature and robust error-checking mechanisms. Before data transfer begins, TCP establishes a connection through a three-way handshake, confirming that both sender and receiver are ready. During the transmission, sequence numbers and acknowledgments work together to verify each segment's successful delivery. If any segment is missing or corrupted, TCP's retransmission mechanisms step in, ensuring no data is lost or damaged. This reliability is essential for applications that require guaranteed delivery, such as banking transactions, file sharing, and email communication.

Resends: The Backbone of TCP's Reliability

Resends are the practical implementation of TCP's reliability guarantees. When data packets are not acknowledged within a certain timeframe, TCP automatically retransmits them without user intervention. This process is vital for overcoming the unpredictable nature of network paths, which can suffer from congestion, interference, or hardware failures. TCP's adaptive retransmission algorithms optimize the timing of these resends, reducing unnecessary network load while maintaining data integrity. The combination of resends and acknowledgment strategies forms the core of TCP's dependable data delivery system.

Distinguishing TCP from Other Protocols

Comparison with Connectionless Protocols

Unlike connectionless protocols such as User Datagram Protocol (UDP), TCP establishes a dedicated connection between sender and receiver. This connection-oriented approach enables TCP to implement reliability features like resends and acknowledgments. UDP, on the other hand, does not guarantee delivery, order, or error checking, making it faster but less reliable. Therefore, the reliability and resends are characteristic features that set TCP apart from connectionless protocols.

Flow Control and No Flow Control

While flow control is a significant characteristic of TCP, it was not selected for this particular discussion. In cases where the option "No Flow Control" is considered, TCP would not utilize mechanisms like window size adjustments to prevent overwhelming the receiver. Conversely, flow control is integral to TCP's operation, allowing the sender to adapt to the receiver's capacity and maintain reliable transmission. The choice of "Reliable" and "Resends" as the two characteristics emphasizes TCP's focus on dependable delivery rather than its flow control capabilities.

Conclusion

In summary, among the characteristics listed—Reliable, Connectionless, No Flow Control, and Resends—reliability and resends are fundamental to TCP's design. Reliability ensures that data reaches its destination accurately and in order, achieved through sequence numbers, acknowledgments, and error-checking. Resends are the mechanism by which TCP recovers from lost or corrupted packets, maintaining the integrity of data transfer even over unreliable networks. These features work synergistically to make TCP a robust, dependable protocol essential for many critical internet

applications. Understanding these characteristics underscores why TCP remains a cornerstone of network communication, ensuring that data transmission is trustworthy and efficient.

Frequently Asked Questions

Is reliability a characteristic of TCP?

Yes, TCP provides reliable data transfer by ensuring all data is delivered accurately and in order.

Does TCP operate as a connectionless protocol?

No, TCP is a connection-oriented protocol that establishes a connection before data transfer.

Does TCP include flow control as part of its features?

Yes, TCP uses flow control mechanisms to prevent sender from overwhelming the receiver.

Is resending lost packets part of TCP's functionality?

Yes, TCP resends packets that are detected to be lost or corrupted during transmission.

Can TCP be classified as a connectionless protocol?

No, TCP is connection-oriented, establishing a dedicated connection before data transfer.

Is 'No flow control' a characteristic of TCP?

No, TCP actively employs flow control to manage data flow between sender and receiver.

Additional Resources

TCP (Transmission Control Protocol) stands as a cornerstone in the architecture of the internet, facilitating reliable and ordered data transfer across diverse networks. Its design addresses the inherent uncertainties and variabilities in network communication, ensuring that data packets reach their destination accurately and in sequence. As a fundamental component of

the TCP/IP suite, it underpins a multitude of applications—from web browsing and email to file transfer and streaming—making its characteristics critical to understanding modern network operations.

In this article, we delve into the core characteristics of TCP, specifically examining the options among "Reliable," "Connectionless," "No Flow Control," and "Resends." Through detailed analysis, we clarify which features truly define TCP's behavior, emphasizing the importance of reliability and control mechanisms in network communication.

Understanding the Core Characteristics of TCP

To grasp what makes TCP distinctive, it is essential to analyze its fundamental features. These features are not merely technical details; they define how TCP interacts with network infrastructure and applications, shaping its strengths and limitations.

What Are the Key Characteristics?

Broadly, TCP is characterized by the following traits:

- Reliability: Ensuring data arrives intact and in order.
- Connection-oriented communication: Establishing a connection before data transfer.
- Flow control: Managing the rate of data transmission to prevent congestion.
- Congestion control: Adjusting transmission based on network capacity.
- Resends: Retransmitting lost or corrupted segments.
- Ordered delivery: Guaranteeing data is received in the same sequence it was sent.
- Full duplex communication: Sending and receiving data simultaneously.

Contrasting these with other protocols, such as UDP (User Datagram Protocol) which is connectionless and less reliable, highlights why TCP is considered the backbone of dependable data exchange.

Analyzing the Given Options: Which Are Part of TCP?

The question at hand revolves around selecting two characteristics that are integral parts of TCP:

- Reliable

- Connectionless
- No Flow Control
- Resends

Let's analyze each in detail to determine their association with TCP.

Reliability in TCP

Reliability is arguably the defining characteristic of TCP. It guarantees that data sent from sender to receiver arrives complete and unaltered. TCP achieves this through a combination of mechanisms:

- Sequence Numbers: Each byte of data is assigned a sequence number, allowing the receiver to reassemble data in the correct order and detect missing segments.
- Acknowledgments (ACKs): The receiver sends acknowledgments back to the sender confirming receipt of data.
- Timeouts and Retransmissions: If an acknowledgment isn't received within a specified timeframe, TCP resends the data segment.
- Error Detection: Checksums are used to verify data integrity.

This reliability feature makes TCP suitable for applications where data accuracy is paramount, such as file transfers, emails, and web browsing. It contrasts sharply with protocols like UDP, which do not guarantee delivery.

Connectionless Nature?

The term connectionless refers to protocols that transmit data without establishing a dedicated end-to-end connection beforehand. Examples include UDP and IP (Internet Protocol). These protocols send data in independent packets, often with minimal overhead and no guarantee of delivery.

In the context of TCP, connectionless is not a characteristic; in fact, TCP is inherently connection-oriented. It establishes a reliable connection through a handshake process before data transfer begins, maintaining state throughout the session. This connection-oriented approach ensures reliability and ordered delivery but at the cost of additional overhead and latency.

Thus, TCP is not connectionless; it is designed to create a reliable, persistent connection.

No Flow Control?

Flow control is a mechanism that manages the rate at which data is transmitted between sender and receiver, preventing the sender from overwhelming the receiver's buffer capacity. TCP employs flow control via windowing mechanisms (specifically, the sliding window protocol), which dynamically adjust the amount of data sent based on feedback.

The phrase "No Flow Control" implies the absence of this regulation, which would risk data loss or buffer overflow. Since TCP does implement flow

control to maintain efficient and reliable communication, the characteristic "No Flow Control" is not part of TCP.

Resends as a Characteristic

Resends refer to retransmitting data segments that were lost, corrupted, or not acknowledged within a timeout period. This process is an essential part of TCP's reliability mechanisms.

When the sender does not receive an acknowledgment for a data segment within a specified timeout, it resends that segment. This ensures that data reaches its destination even in unreliable network conditions. The retransmission process, combined with sequence numbers and acknowledgments, guarantees data integrity and order.

Therefore, Resends are definitely characteristic of TCP.

Summarizing Which Characteristics Are Part Of TCP

Based on the detailed analysis:

- Reliable: Yes. TCP guarantees data delivery through acknowledgments, sequence numbers, checksums, and retransmissions.
- Connectionless: No. TCP is inherently connection-oriented, establishing a session before data transfer.
- No Flow Control: No. TCP employs flow control mechanisms to prevent overwhelming the receiver.
- Resends: Yes. TCP retransmits lost or unacknowledged segments to ensure reliable delivery.

Thus, the two characteristics that are part of TCP from the given options are Reliable and Resends.

Deep Dive into Reliability and Resends in TCP

Understanding the significance of these features requires a closer look at how they operate within TCP.

Reliability: The Cornerstone of TCP

TCP's reliability stems from a combination of mechanisms that work together

to ensure data integrity and correctness:

- Sequence Numbers: These uniquely identify each byte in the stream, enabling the receiver to detect missing or out-of-order data.
- Acknowledgment Packets: The receiver sends ACKs indicating successful receipt, which informs the sender whether to proceed or retransmit.
- Checksums: Every TCP segment includes a checksum that verifies data integrity during transmission.
- Flow and Congestion Control: These mechanisms help prevent packet loss due to network congestion, indirectly supporting reliability.

By implementing these features, TCP creates a virtual reliable pipeline over an unreliable network infrastructure (like IP), which does not guarantee packet delivery.

Resends: Ensuring Data Completeness

Resending lost or corrupted data is vital to TCP's reliability. The process involves:

- Timeouts: After sending a segment, TCP starts a timer. If an acknowledgment isn't received before the timer expires, it assumes the segment was lost or corrupted.
- Retransmission: The segment is resent, often with exponential backoff to avoid network congestion.
- Duplicate ACKs: Sometimes, the receipt of duplicate acknowledgments can trigger fast retransmission, expediting recovery from packet loss.

This retransmission process is transparent to applications, providing a seamless experience where data integrity is maintained without user intervention.

Implications for Network Performance and Application Design

Recognizing which characteristics define TCP has practical implications:

- Application Suitability: Applications requiring guaranteed delivery (e.g., file transfer, email) prefer TCP. Conversely, real-time applications like voice or video streaming might opt for UDP due to its lower latency, despite its lack of reliability.
- Network Congestion Management: TCP's flow and congestion control mechanisms help maintain network stability, especially under heavy loads.
- Resource Utilization: The overhead of establishing connections and performing retransmissions consume bandwidth and processing power, which is a trade-off for reliability.

Challenges and Limitations

While TCP's reliability mechanisms are advantageous, they introduce latency and overhead that can be detrimental in time-sensitive scenarios. Understanding the characteristics helps network engineers optimize configurations and troubleshoot issues effectively.

Conclusion

In the landscape of network protocols, TCP's design prioritizes reliable, ordered, and error-checked delivery of data. Its characteristics of Reliability and Resends are fundamental to its operation, ensuring that applications and users experience a consistent and dependable communication medium. On the contrary, Connectionless and No Flow Control are not traits of TCP; rather, they are associated with protocols like UDP and IP, which serve different purposes in the network stack.

By dissecting these features, network professionals and developers can better appreciate TCP's strengths and limitations, making informed decisions about protocol usage based on application requirements. The reliability mechanisms embodied in TCP—particularly the use of resends—remain central to its role as the backbone of dependable network communication.

Which Characteristics Are Parts Of Tcp Choose Two Reliable Connectionless No Flow Control Resends

Which Characteristics Are Parts Of Tcp Choose Two Reliable Connectionless No Flow Control Resends

Related Articles

- When A Company Buys Equipment For $150,000 And Pays For One Third In Cash And The Other Two Thirds Is
- (a) An Amplitude Modulated (AM) DSBFC Signal, VAM Can Be Expressed As Follows: Vm 2 Where, (i) (ii) Vm
- What Is The Literary Term For A Story That Introduces Another Story (a Story Within A Story) And That

Back to Home