

Lecture 3 – Links Quiz ANS

1. What are the three main properties of a link?

- A) Bandwidth, latency, and jitter
- B) Bandwidth, propagation delay, and bandwidth-delay product
- C) Throughput, loss rate, and buffer size
- D) Frequency, modulation, and signal strength

ANS: B

A link connects two devices and has three key properties: bandwidth (bits sent/received per unit time), propagation delay (time for a bit to travel along the link), and bandwidth-delay product (the capacity of the link, calculated as bandwidth \times delay).

2. What does bandwidth measure in a communication link?

- A) The time it takes for data to travel from source to destination
- B) The number of bits sent or received per unit time
- C) The maximum distance a signal can travel
- D) The number of devices connected to the link

ANS: B

Bandwidth represents the "width" of the link and is measured in bits per second (bps). It quantifies how many bits can be transmitted or received per unit time.

3. What is propagation delay?

- A) The time it takes to process a packet at a router
- B) The time it takes for a bit to travel along the link
- C) The delay caused by buffering packets in a queue
- D) The time between sending two consecutive packets

ANS: B

Propagation delay represents the "length" of the link and is the time it takes for a bit to travel from the sender to the receiver along the physical medium. It is measured in seconds.

4. What is the bandwidth-delay product?

- A) The total number of bits transmitted in one second
- B) The capacity of the link (how many bits fit in the link at a given instant)
- C) The maximum packet size that can be transmitted
- D) The ratio of transmission time to propagation time

ANS: B

The bandwidth-delay product equals bandwidth \times propagation delay and represents the capacity of the link—the total number of bits that can be "in flight" on the link at any given moment.

5. For an 800-bit packet on a link with bandwidth = 1 Mbps and propagation delay = 1 ms, what is the total packet delay?

- A) 0.0008 ms
- B) 0.8 ms
- C) 1.8 ms
- D) 1.0008 ms

ANS: C

Total packet delay = transmission delay + propagation delay. Transmission delay = 800 bits / 1,000,000 bps = 0.0008 seconds = 0.8 ms. Propagation delay = 1 ms. Total = 0.8 + 1.0 = 1.8 ms.

6. What is transmission delay?

- A) The time it takes for a bit to travel across the link
- B) The time it takes to put all bits of a packet into the link
- C) The time a packet waits in a router queue
- D) The total time for a packet to reach its destination

ANS: B

Transmission delay (also called serialization delay) is the time required to transmit an entire packet onto the link. It is calculated as: packet size / bandwidth.

7. When choosing between two links, which factor dominates for a small packet?

- A) Bandwidth
- B) Propagation delay
- C) Packet size
- D) Buffer capacity

ANS: B

For small packets, the transmission delay is negligible compared to propagation delay. Therefore, propagation delay dominates, making a link with lower propagation delay better for small packets, even if it has lower bandwidth.

8. When choosing between two links, which factor dominates for a large packet?

- A) Propagation delay
- B) Bandwidth (which determines transmission delay)
- C) Physical distance
- D) Router processing time

ANS: B

For large packets, the transmission delay becomes the dominant factor. A link with higher bandwidth will have lower transmission delay, making it better for large packets, even if it has longer propagation delay.

9. What is transient overload at a router?

- A) The router is permanently unable to handle incoming traffic
- B) Multiple packets arrive simultaneously, requiring some to be queued for later processing
- C) A link fails and packets must be rerouted
- D) The router's CPU usage exceeds 90%

ANS: B

Transient overload occurs when two or more packets arrive at a router at the same time. Since the router cannot process both simultaneously, it queues one packet for later processing. This is temporary and fairly common.

10. What is the main difference between transient overload and persistent overload?

- A) Transient overload involves packet loss; persistent overload involves queuing
- B) Transient overload is temporary; persistent overload means there's insufficient capacity
- C) Persistent overload can be resolved by adding more routers
- D) Transient overload only occurs at the edge of the network

ANS: B

Transient overload is temporary: packets can be queued and processed when the router is less busy. Persistent overload occurs when the link lacks sufficient capacity to handle incoming traffic, causing the queue to fill up and packets to be dropped.

11. What are the three components of total packet delay?

- A) Bandwidth, propagation delay, and link distance
- B) Transmission delay, propagation delay, and queuing delay
- C) Processing delay, forwarding delay, and routing delay
- D) Physical layer delay, link layer delay, and network layer delay

ANS: B

Total packet delay consists of: transmission delay (time to put packet on link), propagation delay (time for packet to travel), and queuing delay (time packet spends waiting in a router queue).

12. What happens to a new arriving packet when the router's queue fills up?

- A) The packet is automatically re-sent
- B) The packet is moved to another router's queue
- C) The packet is dropped
- D) The packet is compressed to make room

ANS: C

When a router experiences persistent overload and its queue fills up, there is no more buffer space. New arriving packets are dropped rather than queued. This packet loss must be handled by higher-layer protocols.