1.4-64

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Problem 12

Statement: Match the three layers (Link, Network, and Transport) with the guarantees each layer *could* provide to higher layers:

- Best effort delivery

- Reliable delivery

- In-order delivery

- Byte-stream abstraction

- Point-to-point link abstraction

Answer

Guarantee	Layer
Best effort delivery	Network layer
Reliable delivery	Transport layer
In-order delivery	Transport layer
Byte-stream abstraction	Transport layer
Point-to-point link abstraction	Link layer

Problem 13

Statement: Two network endpoints have a round-trip time of $100\,\mathrm{ms}$, and the sender transmits exactly 5 packets every round trip. Each packet is 1500 bytes. We want to find the *effective transmission rate* in bytes per second.

Solution

- **Total data per round trip:** $5 \times 1500 = 7500$ bytes.

- **Round-trip time (RTT):** $100\,\mathrm{ms} = 0.1\,\mathrm{s}$.

$$\text{Rate} \;=\; \frac{\text{(bytes sent per RTT)}}{\text{(RTT in seconds)}} \;=\; \frac{7500\,\text{bytes}}{0.1\,\text{s}} \;=\; 75{,}000\,\text{bytes/second.}$$

Answer: $75{,}000\,\text{bytes/s}$.

Question

The subnet of Fig. 1–12(b) was designed to withstand a nuclear war. How many bombs would it take to partition the nodes into two disconnected sets? Assume that each bomb wipes out a node and all links connected to it.

Answer

It takes $\boxed{3}$ bombs to split Baran's highly connected "distributed" network into two disjoint components.