

First Name :..... **Last Name:** **G:**.....

A compressed video file of **50 Mb** must be transmitted between two cities separated by a distance of **5000 km**.The communication link has the following characteristics:

- Data rate: **10 Mbps** , Propagation speed: 2×10^8 m/s , Processing time: **0.5 s** , Waiting time: **0.5 s**

1. Calculate the time required to send the file over the link.

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2. Determine the delay associated with the propagation of the signal between the two cities.

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3. Calculate the total time for the file to be completely received, including processing and waiting times.

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4. Between a VPN and a SAN, which technology would be more suitable for this type of long-distance transmission? Justify your choice.

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Correction

File size: 50 Mb
Distance: 5000 km
Data rate: 10 Mbps
Propagation speed: 2×10^8 m/s
Processing time: 0.5 s
Waiting time: 0.5 s

1. Calculate the time required to send the file over the link. [1 pt]

Transmission time = Data size / Data rate
 $T = 50 \text{ Mb} / 10 \text{ Mbps} = 5 \text{ s}$

Answer: 5 s

2. Determine the propagation delay. [2 pts]

Distance = 5000 km = 5×10^6 m

$T_{\text{prop}} = \text{Distance} / \text{Speed}$
 $T_{\text{prop}} = (5 \times 10^6) / (2 \times 10^8) = 0.025 \text{ s}$

Answer: 0.025 s

3. Calculate the total time including processing and waiting. [2 pts]

Total time = Transmission + Propagation + Processing + Waiting
 $T_{\text{total}} = 5 + 0.025 + 0.5 + 0.5 = 6.025 \text{ s}$

Answer: 6.025 s

4. VPN or SAN: which is more suitable? Justify. [1 pt]

A VPN (Virtual Private Network) is more suitable because it is designed for secure long-distance communication over wide-area networks.

A SAN (Storage Area Network) is typically used for local high-speed storage connections, not for long-distance transmission.

Answer: VPN