First Name :…… Last Name: …… G:…….

A system is used to send data between the Earth and a satellite positioned at a distance of **36,000 km**. The system operates at a data rate of **1 Mbps**, and the signals propagate at a speed of **3×10^8 m/s**. The file to be transmitted has a size of **10 MB**, and it undergoes compression that reduces its size by **70%**.

1. **What type of network does this system correspond to (LAN, WAN, SAN, VPN)? Justify your answer.**

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2. **Calculate the file size after compression.**

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3. **Calculate the transmission time.**

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4. **Calculate the total time required to receive the file**

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Correction

Distance: 36,000 km
Data rate: 1 Mbps
Propagation speed: 3×10^8 m/s
Initial file size: 10 MB
Compression: 70%

1. What type of network does this system correspond to? [1.5 pts]

This system corresponds to a WAN (Wide Area Network) because it covers a very large distance (Earth to satellite communication over thousands of kilometers).

Answer: WAN

2. Calculate the file size after compression. [1 pt]

Compression reduces size by 70%, so 30% remains:
Compressed size = $10 \times 0.3 = 3$ MB

Convert to bits:
3 MB = $3 \times 8 = 24$ Mb

Answer: 3 MB (24 Mb)

3. Calculate the transmission time. [1.5 pts]

Transmission time = Data size / Data rate
T = 24 Mb / 1 Mbps = 24 seconds

Answer: 24 s

4. Calculate the total time required to receive the file. [2 pts]

Distance = 36,000 km = 3.6×10^7 m

Propagation delay:
$T_{prop} = 3.6 \times 10^7 / (3 \times 10^8) = 0.12$ s

Total time:
$T_{total} = 24 + 0.12 = 24.12$ s

Answer: 24.12 s