

计算机网络 HW1

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1. C. packet
2. D. datagram service
3. (a) Data Link Layer
(b) Network Layer
4. 总报头大小: $7 \times 20 = 140$ bytes
总数据大小: $1000 + 100 = 1140$ bytes
报头比例: $\frac{140}{1140} \times 100\% = 12.3\%$
5. Speed of light in coax: $\frac{2}{3}c = 2 \times 10^8$ m/s
Time to transmit a byte: $\frac{1}{10}\text{Mbps} = 1 \times 10^{-7}\text{s}$
Length of a byte: 2×10^8 m/s $\times 1 \times 10^{-7}\text{s} = 20\text{m}$
6. Request distance: 2×40000 km $= 8 \times 10^7\text{m}$
Response distance: 2×40000 km $= 8 \times 10^7\text{m}$
Total delay: $\frac{8 \times 10^7\text{m} + 8 \times 10^7\text{m}}{c} = 533.3$ ms (or 0.5s)
7. Total pixels: $1024 \times 768 = 786,432$
Total bytes: $786,432 \times 3 = 2,359,296$
Total bits: $2,359,296 \times 8 = 18,874,368$
(a) Transmit time: $18,874, \frac{368}{56,000 \text{ bits/s}} = 337.0\text{s}$
(b) Transmit time: $18,874, \frac{368}{1,000,000 \text{ bits/s}} = 18.9\text{s}$
(c) Transmit time: $18,874, \frac{368}{10,000,000 \text{ bits/s}} = 1.9\text{s}$
(d) Transmit time: $18,874, \frac{368}{100,000,000 \text{ bits/s}} = 0.2\text{s}$
8. Number of router pairs: $\binom{5}{2} = 10$
Number of topologies: $4^{10} = 1,048,576$
Total time: $0.1\text{s} \times 1,048,576 = 104,857.6\text{s}$ (or 29.1h)