COMPUTER NETWORK

ASSIGNMENT 4

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Scenario Summary

- Sensors: 1000
- Packet size: 512 bytes
- Rate: 1 packet / second / sensor
- UDP + IP header size: 28 bytes
- Error rate: 2%

QUESTION 1:

What is the total bandwidth used?

- Step-by-step explanation:
  - Each sensor 1 packet per second
  - Each packet contains 512 bytes of data
  - Total data per second = 1000 sensors x 512 bytes

→ = 512,000 bytes / second
→ convert to kilobits: 512,000 x 8 = 4,046,000 bits/sec = 4096 Kbs
→ convert to Mbps: 4096 ÷ 1024 = 4.096 Mbps

ANSWER:

TO bandwidth used is 4.096 Mbps (only FOR data payload)

Final answer:

Question 2:

what is the header overhead if each UDP + IP header = 28 bytes)

Explanation

- Each packet also includes 28 bytes of header data (20 FOR IP + 8 FOR UDP)
- Total headers per second = 1000 packets/sec x 28 bytes = 28,000 bytes/sec
- convert to kilobits: 28,000 x 8 = 224,000 bits/sec = 224 KBPS

How many headers are sent per second?

Each of the 1000 sensors sends 1 packet per second

-> total packets per second = 1000 packets

-> Each packet has 28 bytes of header

- So total header data = 1000 x 28 bytes = 28,000 bytes/second

CONVERT to Bandwidth (bits/second)

- 1 byte = 8 bits
- 28,000 bytes = 28,000 x 8 = 224,000 bits/sec = 224 kbps

Final answer:

- Header overhead = 28,000 bytes / sec

or 224 Kbps

Question 3:

How many packets are lost in a 2% error environment?

Explanation:

- with 1000 packet sent every second
- Lost packets / sec = 2% of 1000 = 0.02 x 1000 = 20 packets
- over 1 minute: 20 x 60 = 1200 packets lost

Step-by-step calculation:

- Step 1: calculate packets sent per second

Each sensor send 1 packet / sec

→ Total = 1000 Packets/sec

- Step 2: Apply Packet Loss Rate

Packet loss rate = 2% = 0.02

→ Lost packets = 2% of 1000

→ Lost Packets = 0.02 x 1000 = 20

Packets per second

Answer:

20 packets are lost every second

- over 1 minute, 1,200 packets are lost
- over 1 hour, 72,000 packets are lost

Packet Loss Visualization

Time (1sec)

↓

[1000 packets sent] → Network → x 20 lost,

✓980 received

Hospital UDP Sensor Data Flow to cloud