Chp 2 - Exercise 3

•For our message system:
• It takes 2 operations to create the message and 2 operations to establish the connection. So Startup Time is 4 operations.
•Per-Hop time is so far it essentially costs 0 operations.
•Per-Word transfer time is we can send 2 words per operation.
•We have a processor that needs to communicate two hops away.
1. How long does it take it to send a single message that is 4 words long using Store-and-Forward Routing?
2. How long does it take to send two messages that are each 2 words long using Store-and-Forward Routing?
3. How long does it take it to send a single message that is 4 words long using Packet Routing that sends 2 word packets?

Answer:

1. How long does it take to send a single message that is 4 words long using Store-and-Forward Routing?

- Startup time: 4 operations (2 for creating the message, 2 for establishing the connection).
- Word transfer time: 2 operations (since we transfer 2 words per operation, and the message has 4 words).
- First hop: 4 (startup) + 2 (word transfer) = 6 operations.
- Second hop: Another 6 operations .
- Total time: 6 operations + 6 operations = **12 operations**.

2. How long does it take to send two messages that are each 2 words long using Store-and-Forward Routing?

- **Startup time for each message:** 4 operations .
- **Word transfer time for each message:** 1 operation per message (since each message is 2 words, and we transfer 2 words per operation).

For each message:
- First hop: 4 (startup) + 1 (word transfer) = 5 operations.
- Second hop: Another 5 operations.

For both messages:
- First message total: 5 operations + 5 operations = 10 operations.
- Second message total: 5 operations + 5 operations = 10 operations.

- Total for both messages: 10 operations + 10 operations = **20 operations.**

3. How long does it take to send a single message that is 4 words long using Packet Routing that sends 2-word packets?

- Startup time: 4 operations (only needed once for the entire message).
- Packet 1 transfer time: 1 operation (since the packet is 2 words).
- Packet 2 transfer time: 1 operation (since the packet is 2 words).

For the first hop:
- Startup time: 4 operations.
- Transfer both packets: 2 operations (1 operation per packet).
  - **First hop total:** 4 + 2 = 6 operations.

For the second hop:
- Each packet is forwarded as it arrives:
  - Packet 1 forwarding: 1 operation.
  - Packet 2 forwarding: 1 operation.

- Second hop total: 2 operations.

- Total time: 6 operations + 2 operations = **8 operations.**

Final Answers TLDR:
1. Store-and-Forward Routing (4-word message): 12 operations.
2. Store-and-Forward Routing (two 2-word messages): 20 operations.
3. Packet Routing (4-word message, 2-word packets): 8 operations.