Packet switching and routing - how data travels across a network

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- ✓ Self-management
- ✓ Perseverance

Monday, 04 April 2022

Learning Intention

To develop knowledge by
Understanding that data travels across networks as a packet

To secure understanding
Explaining the process of packet switching including advantages and disadvantages

To achieve excellence by.
Describing methods of routing packets across a network, including multi routing techniques

Keywords

Packet
A collection of data that is transmitted over a packet-switched network

Tier 2 word -Reassembled
Put something back together again

Packets

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What is a packet?

- A packet is a collection of data that is transmitted over a packet-switched network.

- Each packet of data is redirected by a computer system along the network, until it arrives at its destination.

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Packets

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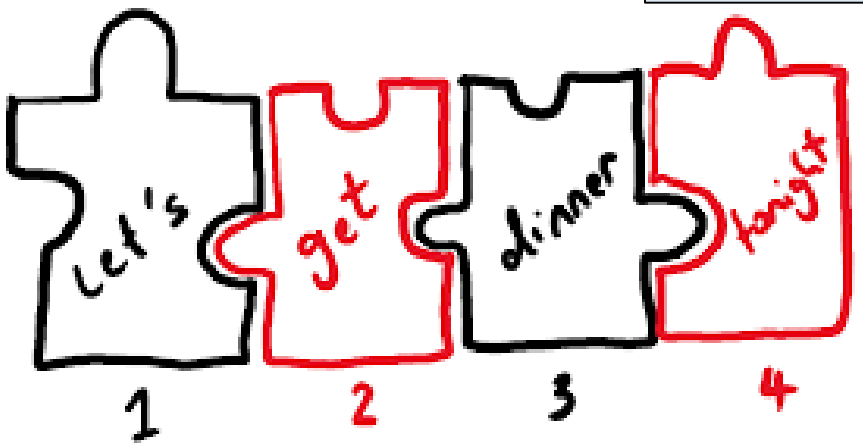
- Data may be split up into a number of packets.



- These packets are transmitted over a network and may take different routes to their destination.

- When all the packets have arrived, the data is reassembled.

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Starter

1. Draw the following diagram and label it as TCP/IP Packet:
2. Leave space around your diagram and Annotate each part of the packet

The source address	The destination address
Information which enables the data to be reassembled into its original form	
Other tracking information	
The data itself	A checksum that checks that the data has not been corrupted

Source:
Where the packet came from

Destination:
Where is it going to

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*Annotation = A note or comment to explain a diagram

Packet switching

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- Watch the video https://www.bbc.co.uk/bitesize/guides/zr3yb82/revision/7

  - Packet switching is the ***process of delivering packets from one computer system to another*** using a designated device, such as a *switch* or a *router*.

  - Packets are provided to a network for ***delivery to a specified destination.***

  - Each packet of data is redirected by a computer system along the network, until it ***arrives at its destination***.

  - The Internet is an example of a packet-switching network.

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Packet Switching

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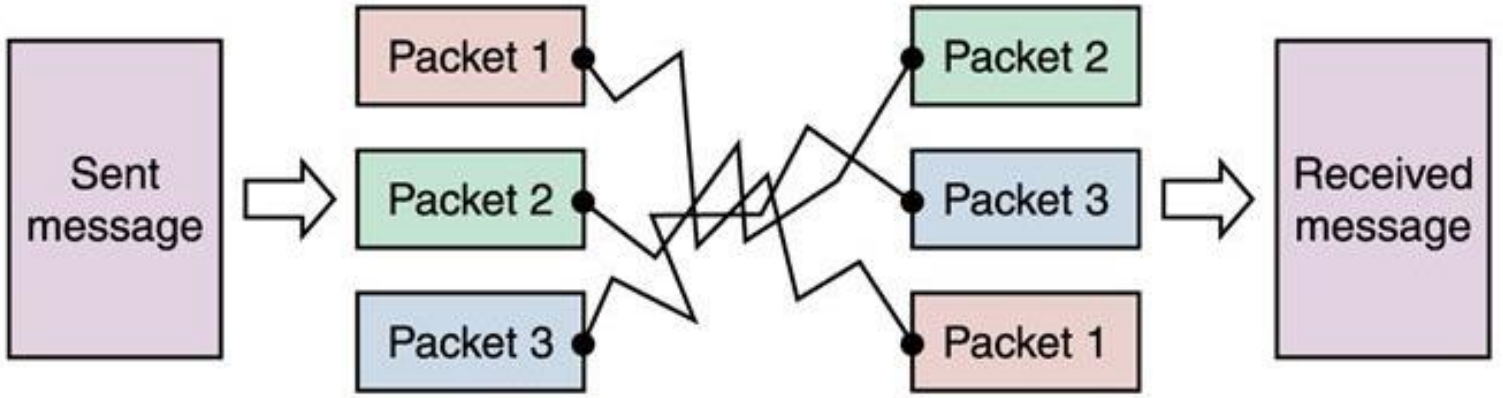
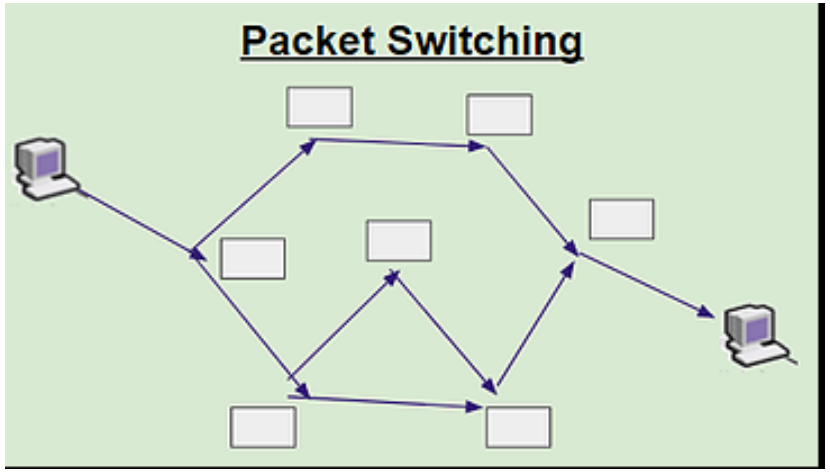


Figure 15.4 Messages sent by packet switching

Message is divided into packets

Packets are sent over the Internet by the most expedient route

Packets are reordered and then reassembled



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Routing

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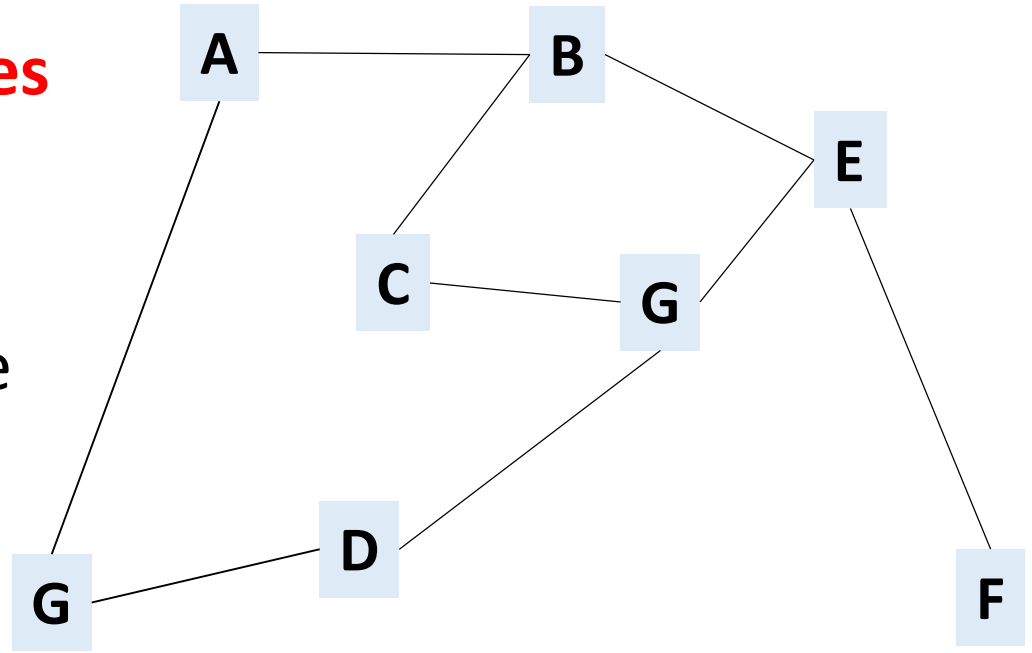
When **routing**, networks will search for **the shortest path** and the **fastest nodes** to transfer data.



Together the path between nodes and the speed of the nodes are assessed by the device transmitting data.

Computers will look for the route with the **lowest cost** (that is the shortest path and fastest nodes) and transmit data via this lowest cost route.

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Routing

5.1.a Routing.swf

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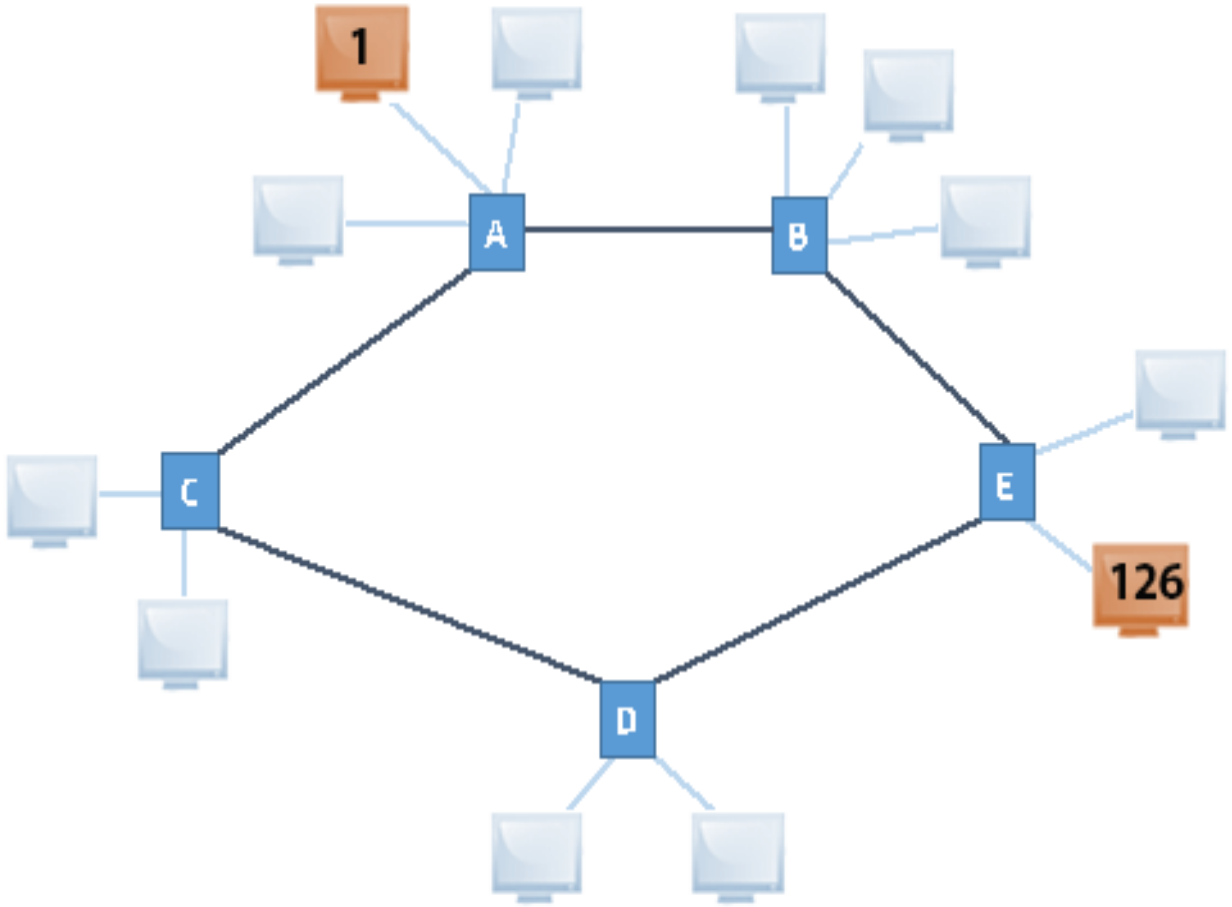
Computer system 1 is sending a packet to computer system 126.



- The **quickest route** between computer 1 and 126 is from router A, on to router B followed by router E for delivery to computer system 126.
- This path would be determined by routing, using a routing table.
- Most routers work in this way and use only one network time

Multipath routing

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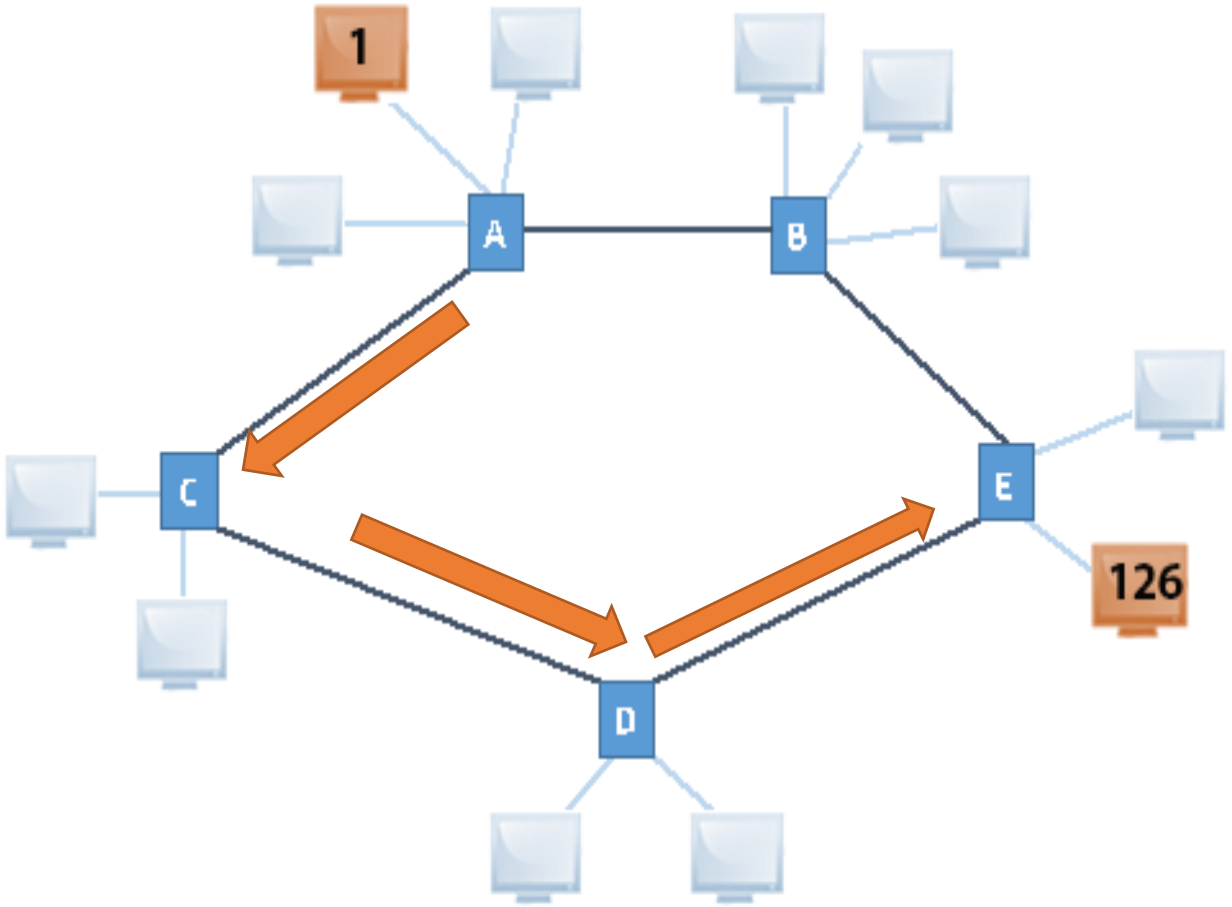

- Enables **the same packets** to be sent using **multiple alternative paths at the same time.**

- So if ***Router B fails*** in the example, **the same packet would also have been sent via the alternative longer route** to ensure that the packet arrives at its destination.

Test Route

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Example: When you open www.universityofcalifornia.edu **the route the packets take are as follows:**

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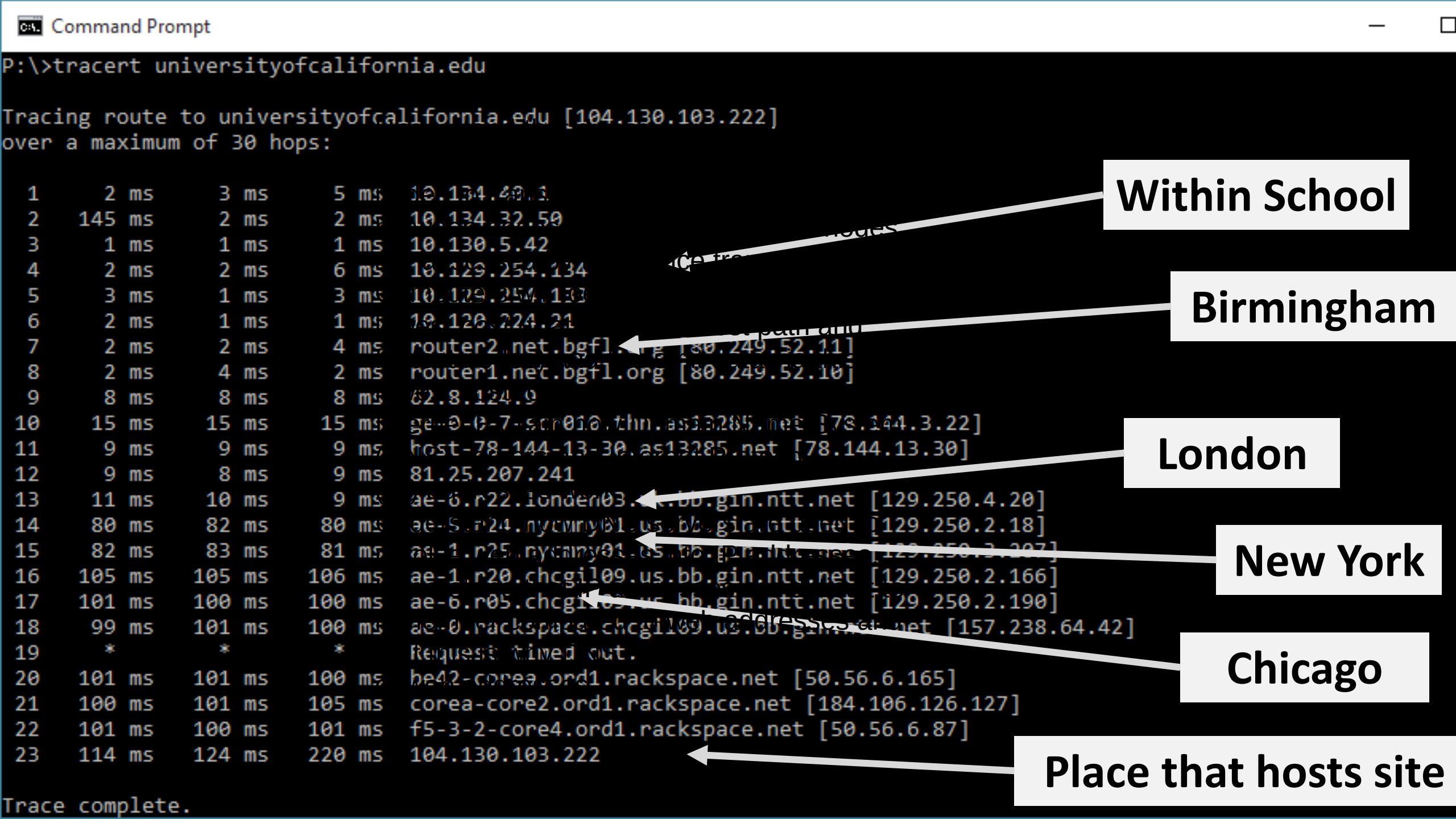
Command Prompt
P:\>tracert universityofcalifornia.edu
Tracing route to universityofcalifornia.edu [104.130.103.222]
over a maximum of 30 hops:
1 2 ms 3 ms 5 ms
2 145 ms 2 ms 2 ms 10.134.32.50
3 1 ms 1 ms 1 ms 10.130.5.42
4 2 ms 2 ms 6 ms
5 3 ms 1 ms 3 ms
6 2 ms 1 ms 1 ms
7 2 ms 2 ms 4 ms router2.net.bgfl.org [80.249.52.11]
8 2 ms 4 ms 2 ms router1.net.bgfl.org [80.249.52.10]
9 8 ms 8 ms 8 ms 62.8.124.9
10 15 ms 15 ms 15 ms
11 9 ms 9 ms 9 ms host-78-144-13-30.as13285.net [78.144.13.30]
12 9 ms 8 ms 9 ms 81.25.207.241
13 11 ms 10 ms 9 ms
14 80 ms 82 ms 80 ms
15 82 ms 83 ms 81 ms
16 105 ms 105 ms 106 ms ae-1.r20.chcgil09.us.bb.gin.ntt.net [129.250.2.166]
17 101 ms 100 ms 100 ms
18 99 ms 101 ms 100 ms
19 * * * Request timed out.
20 101 ms 101 ms 100 ms
21 100 ms 101 ms 105 ms corea-core2.ord1.rackspace.net [184.106.126.127]
22 101 ms 100 ms 101 ms f5-3-2-core4.ord1.rackspace.net [50.56.6.87]
23 114 ms 124 ms 220 ms 104.130.103.222
Trace complete.
Within School
Birmingham
London
New York
Chicago
Place that hosts site

Task

http://www.teach-ict.com/technology_explained/packet_switching/packet_switching.html

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1. Ensure packet diagram is complete

Answer the following questions in FULL sentences.

1. Draw a diagram to represent packet switching
2. Describe packet switching
3. Add 2 advantages and 2 disadvantages of packet switching

Routing

1. Use a diagram to help explain the process of routing

THINK IT:

Add additional information about how ***multi routing techniques*** *would affect the transmission of packets*

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