2014-DSE
ICT
PAPER 2B

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HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2014

Candidate Number

INFORMATION AND COMMUNICATION TECHNOLOGY
PAPER 2B
Data Communications and Networking
Question-Answer Book

11.15 am – 12.45 pm (1 hour 30 minutes)
This paper must be answered in English

INSTRUCTIONS

(1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3 and 5.

(2) **ANSWER ALL QUESTIONS.** Write your answers in the spaces provided in this Question-Answer book. Do not write in the margins. Answers written in the margins will not be marked.

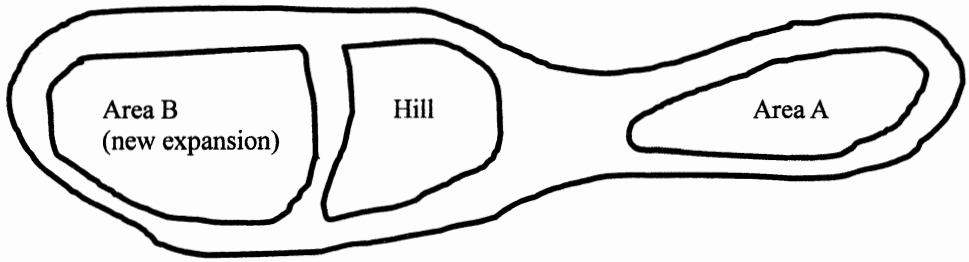
(3) Supplementary answer sheets will be supplied on request. Write your candidate number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this book.

(4) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

* A 2 0 0 E 0 2 B *

Answer all questions.

1. A theme park develops a new expansion in Area B. The map of the theme park is shown below:



Peter is the IT manager of the theme park. He is going to build a connection between the networks in Area A and Area B. The distance between the two areas is over 3 km.

(a) Suggest a transmission medium for the connection between the two areas and give a reason to support your suggestion.

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(2 marks)

Peter sets up two different subnets, a private network and a public network, in Area B.

(b) Who are the major target users? What network applications do they usually use? Give one example for each subnet.

(i) Private network

Major target user: _____

Network application: _____

(ii) Public network

Major target user: _____

Network application: _____

(2 marks)

(c) Give **two** reasons to support why the network should be divided into two subnets.

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(2 marks)

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(d) In Area B, the private network is a wired network while the public network is a wireless network. Give an advantage and a disadvantage of using a wireless network over a wired network.

(2 marks)

(e) Usually, about 1000 visitors go to the park everyday. The following table shows the performance of the wireless network in the park under different scenarios.

Scenario	P	Q	R
Number of network users	400	800	800
Number of access points (AP)	10	30	40
Average device throughput (Mbps)	0.2	0.5	0.5

(i) Consider scenarios P and Q. Installing more APs improves the network service. Why? Give **two** possible reasons.

(ii) In scenarios Q and R, the park sets a limit on the throughput. Why?

(iii) When the park releases the limit in (e)(ii), the average device throughput is not increased. Why?

(4 marks)

Answers written in the margins will not be marked.

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(f) Thousands of sensors have been installed on all the rides in the park to record the motion of each ride. Peter creates a full backup daily instead of weekly in a centralised backup server. All copies of the backup data are kept for a year.

(i) During the day, when should the backup be created? Why?

(ii) Give an advantage and a disadvantage of having a full backup every day.

(4 marks)

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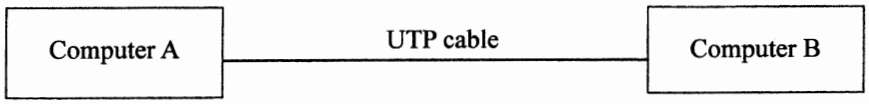
2. Susan sets up a peer-to-peer network for the Sports Day of a secondary school. She uses a UTP cable to connect and transfer files between Computer A and Computer B, as shown below:



(a) The IP configuration of Computer A is

IP address:	192.168.1.20
Subnet mask:	255.255.255.0
Default gateway:	192.168.1.10

Computer A and Computer B are in the same network. Write down a possible IP configuration for Computer B.

IP address: _____

Subnet mask: _____

Default gateway: _____

(3 marks)

(b) Susan successfully builds the network linking the two computers. However, she cannot use Computer A to transfer a file to Computer B. Give **two** possible settings that lead to this problem.

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(2 marks)

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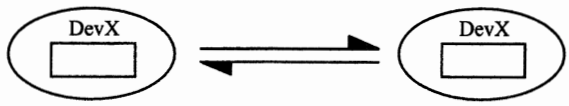
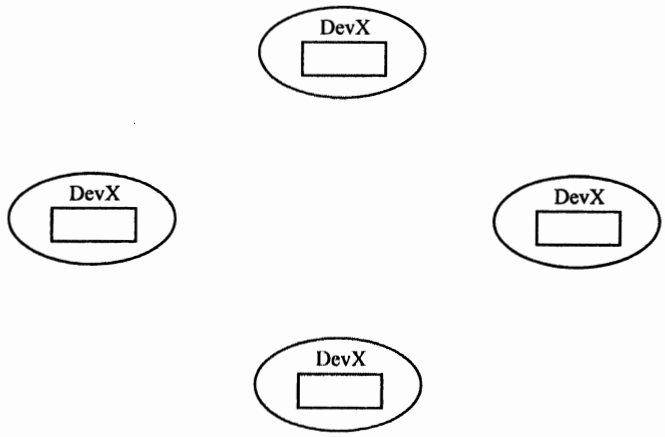
A technology company sponsors the school's purchase of DevX communication devices. Two pieces of DevX can establish a contactless communication channel by bringing them close together. They support multiple communication channels with other DevX at the same time.



(c) Susan considers setting up a peer-to-peer network and a client-server network.

(i) Complete the following diagram to illustrate the peer-to-peer network formed by four pieces of DevX.



(ii) Give a reason to support the use of the peer-to-peer network.

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(3 marks)

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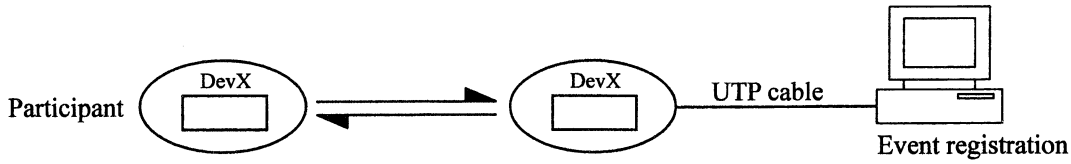
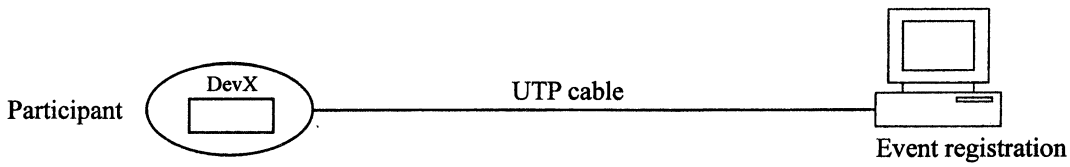
Susan implements the contactless communication for registration in all events in the Sports Day. Each participant carries a DevX as his or her identity card to register at the event. Participants' registration information should be stored in a computer. Susan has two solutions, shown below:

Solution 1



Solution 2



(d) (i) Some registration information will be transmitted from the computer to participant's DevX and displayed on the DevX. Give **two** examples of the registration information.

(ii) Susan decides to use Solution 1. Give **two** advantages of Solution 1 over Solution 2.

(iii) Suggest **two** other daily uses of DevX.

(6 marks)

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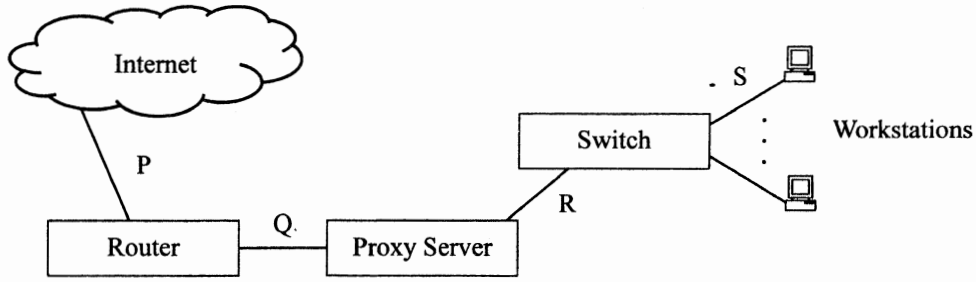
3. Mr Lau is the IT manager of a training centre. The network in the centre is shown below:



(a) Mr Lau wants to install a firewall in the network.

(i) At which position, P, Q, R or S, should he install the firewall? Explain briefly.

(ii) Give a similarity and a difference between a firewall and a proxy server in terms of their functions.

Similarity:

Difference:

(4 marks)

(b) During a lecture, 20 students use workstations to download a lot of image files from a web site.

(i) How does the proxy server benefit the lecture?

(ii) Give a security risk of using the proxy server and suggest a way of preventing the risk.

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(iii) Mr Lau finds that the proxy server cannot improve the speed of the Internet access in some cases. Give **two** examples.

(6 marks)

(c) Mr Lau finds that no anti-virus program is installed in the network. He is worried about virus attacks. He compares the following two solutions.

Solution 1: Install an anti-virus program in the proxy server.
Solution 2: Install an anti-virus program in every workstation.

(i) Give **two** benefits of using Solution 1.

(ii) Give **two** potential problems of using Solution 1.

(4 marks)

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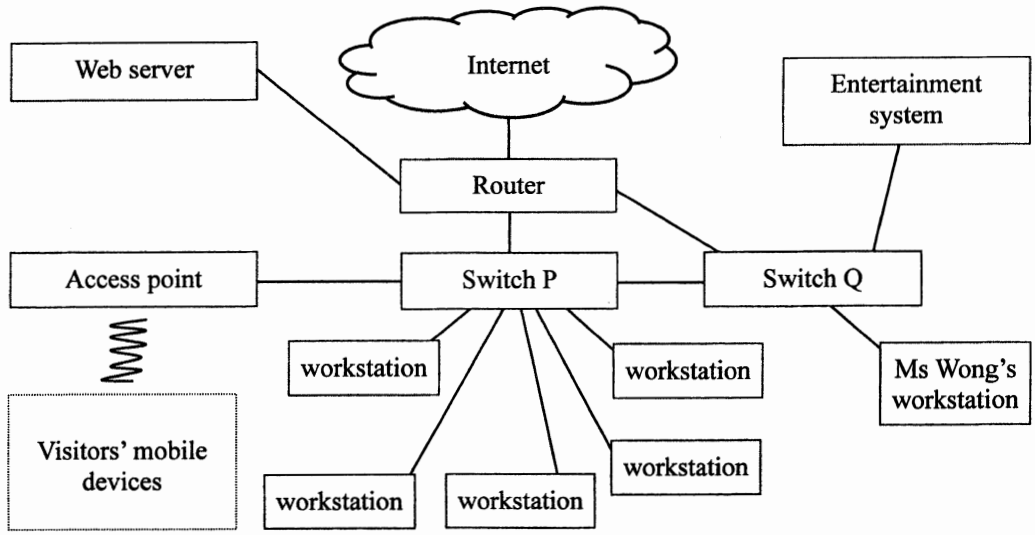
4. Ms Wong and Peter are going to set up a network in the hall of a museum. Thousands of visitors visit the hall every day. The hall will provide a web-based entertainment system and wireless Internet connections for visitors via their mobile devices. Ms Wong drafts the network design shown below:



(a) (i) Peter suggests connecting the access point to the router instead of Switch P. What is the advantage and disadvantage of his suggestion?

(ii) Ms Wong decides to connect the web server to Switch P. What is the advantage and disadvantage of her decision?

(iii) The five workstations should only be used to access the entertainment system. What network settings need to be used to prevent users from doing other network activities?

(6 marks)

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(b) Ms Wong uses her workstation to access a web page but cannot do so. Suggest **three** ways of troubleshooting the connectivity problem and explain your answer briefly. Name the commands and tools used if appropriate.

(1) _____

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(2) _____

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(3) _____

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(6 marks)

(c) Peter suggests that Ms Wong establish an access control list which includes MAC addresses of visitors' mobile devices. This would mean that only these mobile devices can connect to the access point.

(i) Ms Wong disagrees with Peter's suggestion. Give **two** reasons to support her opinion.

_____

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(ii) Apart from the access control list, suggest **two** security measures Ms Wong can implement when setting up the access point.

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(4 marks)

END OF PAPER

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