Edexcel GCE

Applied Information and Communication Technology

Unit 9: Communications and Networks

23 May – 17 June 2011 (excluding 30 May – 3 June 2011)
Assessment window 3 weeks
Time: 10 hours

Paper Reference
6959/01

You must have:
Short treasury tag, cover sheet

Instructions

- Complete your candidate details on the cover sheet provided.
- All printouts must contain your name, candidate number, centre number and activity number.
- At the end of the examination:
  – *All printouts should be placed in the correct order.*
  – *Use a treasury tag to attach your printouts **(as shown)** to Page 2 of the cover sheet.*

Information

- The total mark for this paper is 90. There are **six** activities in this examination totalling 88 marks. **2** further marks are allocated to Standard Ways of Working.
- The marks for **each** question in an activity are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read through the Scenario carefully.
- Work through the activities in order.
- Attempt **ALL** activities.
- Label your printouts clearly as instructed.
- Printing must be undertaken within the examination period.

Turn over ▶

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Scenario

Volunteer work

You decide to have a gap year. A charity offers you a placement in Tanzania, East Africa, that will make use of your A level networking skills.

The placement involves setting up a network for a junior school and a clinic, both located in a remote village. You will be helping an experienced volunteer, Dave Grant. He is a retired network engineer who is managing several projects in the area. After the installation he will leave you to train people to run and maintain the network.

After your flight to Dar es Salaam it takes a twelve-hour drive to get to the school. You are met by the headteacher and the doctor from the clinic. They tell you that Dave has been evacuated to a hospital in Dar es Salaam. He will not return for at least a month.

Dave had just started planning the network when he was taken ill. You are shown his workshop, which contains:

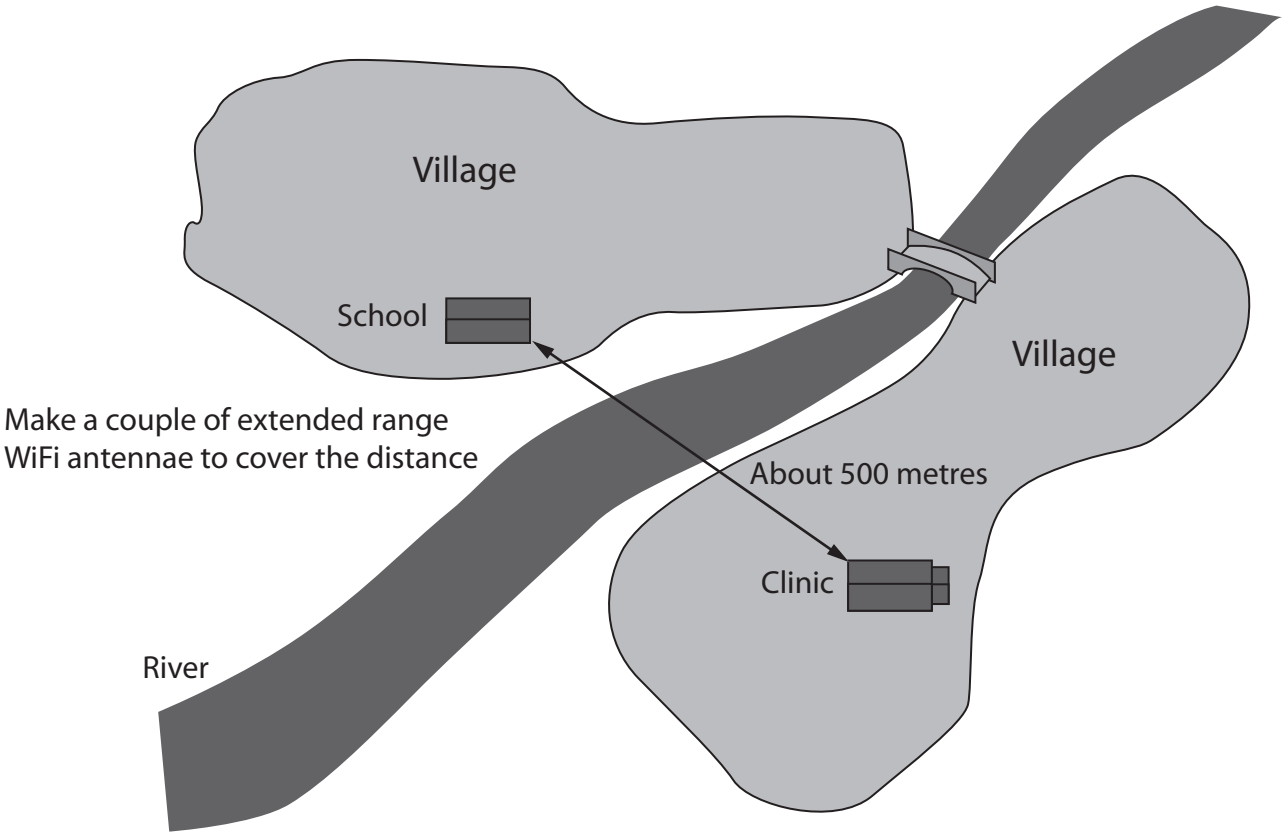
- a desk
- a toolbox containing an RJ45 crimper, network testing kits for cable and WiFi, a punchdown tool, a multimeter, and an assortment of cable clips and fasteners, screwdrivers, pliers and other small tools
- two 305m reels of CAT6 cable
- six packs of 50 RJ45 connectors
- a box of about 50 second-hand data sockets with assorted faceplates
- a box of new unmanaged switches, 10 x Netgear FS605 and 6 x Netgear FS608
- a box of new wireless access points, 10 x Netgear WN802T-200UKS Rangemax Next
- a Toshiba Tecra R10-11B laptop. This is second-hand and has a sticker saying 'tested OK March 2011, Linux Server'. It has a power pack and a spare battery
- two HP Deskjet D2660 inkjet printers. These are second-hand. One has a sticker saying 'tested OK March 2011'. The other one has a sticker saying 'tested March 2011, roller does not pick up paper from tray, must manual feed one sheet at a time'. They have USB and power leads.

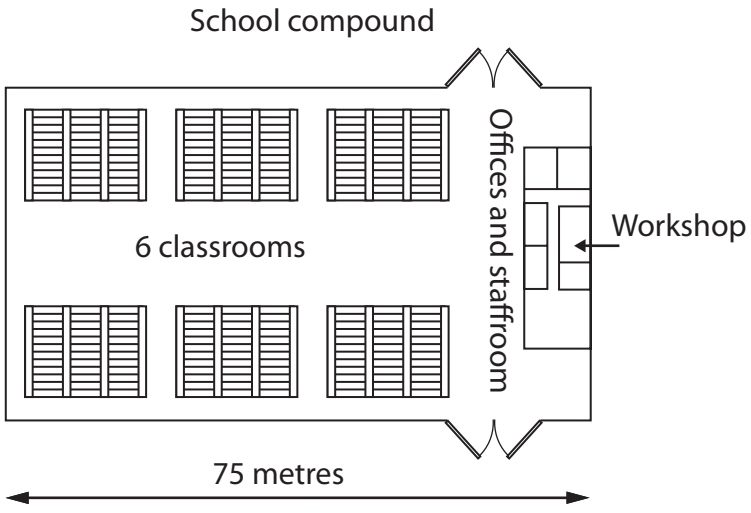
The headteacher tells you that he has a set of fifty XO laptops from the *One Laptop Per Child* project. There are enough for the 10 and 11 year olds to have a laptop each. These are the oldest children in the school.

The doctor tells you that there are three WiFi enabled laptops in the clinic. A local mobile phone business, TanCel, provides a free broadband Internet connection to the clinic. The laptops all connect to a single WiFi access point which has a CAT 6 cable connection to TanCel.

TanCel has offered to let the school use the Internet connection but you will have to connect the school to the clinic.

On the desk is a sketch of the local area. Dave has made a few notes on it.


Village
School
Village
Make a couple of extended range
WiFi antennae to cover the distance
About 500 metres
Clinic
River


School compound
Offices and staffroom
Workshop
6 classrooms
75 metres

Instructions to Candidates

All documents MUST have a header and a footer. The header must contain the activity number. The footer must contain your name, candidate number, and centre number.

A minimum font size of 10 should be used in all word processed documents, using a font type suitable for business purposes.

Diagrams should be large enough for the detail to be read.

***Activity 1 – Research, network components and design. (suggested time 1 hour and 20 minutes)**

On the sketch map Dave has written that two extended range WiFi antennae are required.

You are introduced to Hishima Mhando. He has two children at the school and runs a vehicle repair business. He has access to scrap vehicles and a garage workshop.

Hishima tells you that he will make the WiFi antennae if you give him plans and instructions. He has volunteered to help manage the network and would like to have a basic idea of how extended range antennae work.

Your preliminary research identifies three possible antennae types: dish, 'cantenna' and corner reflector.

Research these technologies and produce a set of notes for Hishima.

The notes should:

- include diagrams to illustrate your explanations
- outline how the three antennae types work
- explain how the three types differ in range and coverage
- recommend which antenna type he should make
- justify your recommendation
- identify and explain the dimensions for the recommended antenna type.

Pay particular attention to the quality of your written communication.

Evidence to be submitted

On no more than **two** word processed A4 pages:

❑ A set of notes for Hishima.

Marks will be awarded for the Quality of your Written Communication.

(Total for Activity 1 = 12 marks)

Activity 2 - Network topology and connectivity. (suggested time 1 hour 30 minutes)

The XO laptops have been designed to work in a mesh WiFi topology.

Hishima wants some support material for himself and other people involved.

You need to produce answers to four frequently asked questions (FAQs).

(a) What is meant by mesh WiFi?

(5)

(b) What features of the XO laptops have been designed for the purpose of forming and using the mesh?

(5)

(c) In terms of speed and coverage, what is the expected performance of the mesh?

(2)

(d) What will limit the performance of the mesh and what effects will be seen?

(2)

Evidence to be submitted for (a), (b), (c), and (d)

On no more than **two** word processed A4 pages:

- ❑ Answers to the questions in the form of FAQs. Each question followed by an answer, written in the context of the scenario.

(Total for Activity 2 = 14 marks)

Activity 3 – Components of a network. (suggested time 1 hour 30 minutes)

Hishima makes two long range WiFi antennae. These work well enough to allow the school to make a connection to the clinic.

You now need to plan the network.

You need to decide which of the items in the workshop you will use in your network.

The workshop contains a toolbox plus:

(a) two 305m reels of CAT6 cable

(b) six packs of 50 RJ45 connectors

(c) a box of about 50 second-hand data sockets with assorted faceplates

(d) a box of new unmanaged switches, 10 x Netgear FS605 and 6 x Netgear FS608

(e) a box of new wireless access points, 10 x Netgear WN802T-200UKS Rangemax Next

(f) a Toshiba Tecra R10-11B laptop. This is second-hand and has a sticker saying 'tested OK March 2011, Linux Server'. It has a power pack and a spare battery

(g) two HP Deskjet D2660 inkjet printers. These are second-hand. One has a sticker saying 'tested OK March 2011'. The other one has a sticker saying 'tested March 2011, roller does not pick up paper from tray, must manual feed one sheet at a time'. They have USB and power leads.

For each of **(a) to (g)** write a paragraph that explains:

- what you will use and where the item(s) will be located
- why the item(s) will be used.

Evidence to be submitted for (a) to (g)

On no more than **two** A4 pages:

❑ An explanatory paragraph for each of the items (a) to (g).

(Total for Activity 3 = 14 marks)

Activity 4 – Network design. (suggested time 2 hours 20 minutes)

Having thought about the available equipment, you now need to design an appropriate network solution for the school and clinic.

(a) Use network design software to produce a network design for the complete project.

(13)

(b) Explain and justify any decisions that you have made regarding the **positioning** of network devices and equipment.

(6)

Evidence to be submitted for (a)

On **one** A4 page of computer output:

❑ Your network design.

Evidence to be submitted for (b)

On **one** word processed A4 page:

❑ Notes justifying each major decision made regarding the **positioning** of network devices and equipment.

(Total for Activity 4 = 19 marks)

Activity 5 – Network addressing and protocols. (**suggested time 2 hours**)

In order to communicate with each other, each network device must have a unique identifier.

The owners of TanCel have agreed to run a DHCP system for your network.

They have:

- allocated you a private class C network 192.168.3.X
- asked if you would like different scopes for the clinic and the school
- asked if you want any reservations.

(a) Prepare notes for Hishima to explain what is meant by:

(i) DHCP and how it could help him in managing the network

(5)

(ii) private class C network

(2)

(iii) scope

(2)

(iv) reservation.

(2)

(b) Answer TanCel's questions about scopes and reservations. Give reasons for your answers.

(i) Would you like different scopes for the clinic and the school?

(3)

(ii) Do you want any reservations?

(3)

Evidence to be submitted for (a) and (b)

On **one** word processed A4 page each produce:

❑ Notes for Hishima.

❑ Answers to TanCel's questions, with reasons for your answers.

(Total for Activity 5 = 17 marks)

Activity 6 – Network management. (suggested time 1 hour and 20 minutes)

Hishima will be managing the school part of the network. The clinic side and the Internet connection will be handled by someone else.

For example, one network management task that Hishima might perform is system configuration. For this network he might need to add a networked printer. To do this he will need to allocate it an I.P. address and tell TanCel about the change.

Prepare some guidance notes for **six** other network management tasks that Hishima could reasonably be expected to perform.

Evidence to be submitted

On **one** word processed A4 page produce:

- ❑ Guidance notes for Hishima.

(Total for Activity 6 = 12 marks)

Standard Ways of Working.

All printouts must contain the activity number, your name, candidate number and centre number.

Pages must be securely fastened to the cover sheet and in the correct order.

Minimum font size of 10 should be used for all word processed documents.

(Standard Ways of Working = 2 marks)

TOTAL FOR PAPER = 90 MARKS

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