

Pearson Edexcel GCE

Applied Information and Communication Technology Unit 9: Communications and Networks

4–22 May 2015

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

- There are **five** 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

Burt the Evil Genius's Evil Empire

Burt the Evil Genius's Evil Empire (BEGEE) has recently purchased a redundant civil defence bunker in Hertfordshire and is converting it into 'The Dungeon of Doom'. BEGEE already owns 'The Forest of Fear' in Surrey, 'The Temple of Peril' in Berkshire and 'The Caverns of Menace' in Kent.

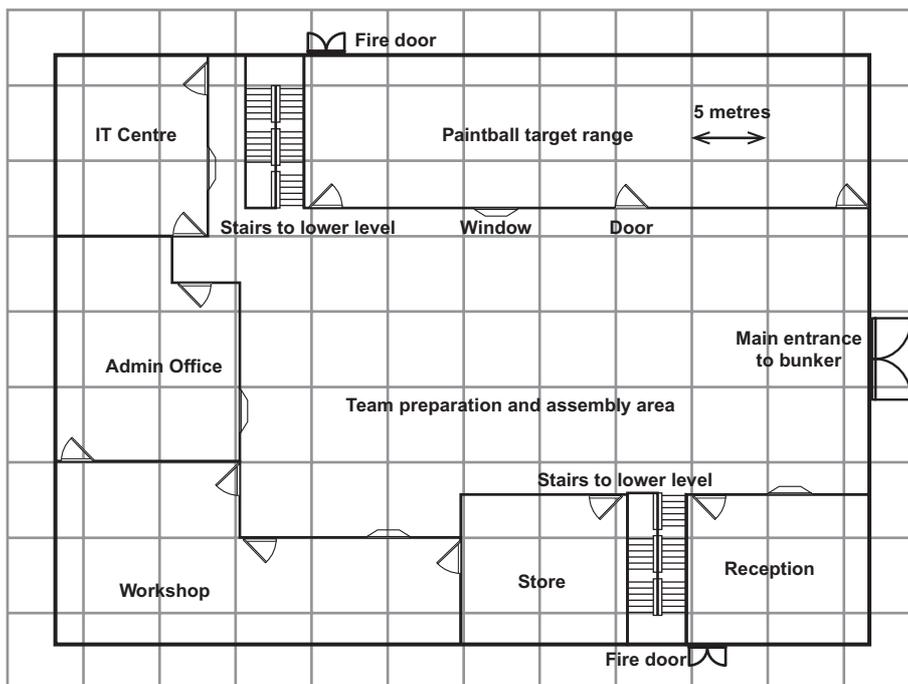
BEGEE is a paintballing company owned by Burt Wiltshire. The company's head office is in a small industrial unit near Slough and consists of a couple of offices and a workshop. Burt works from the head office or from his house, which is situated a few miles away. Each of the BEGEE sites has its own offices. These are connected to the head office via the Internet.

Most of BEGEE's business is basic paintballing, where opposing teams fight each other and BEGEE provides the equipment, training and location.

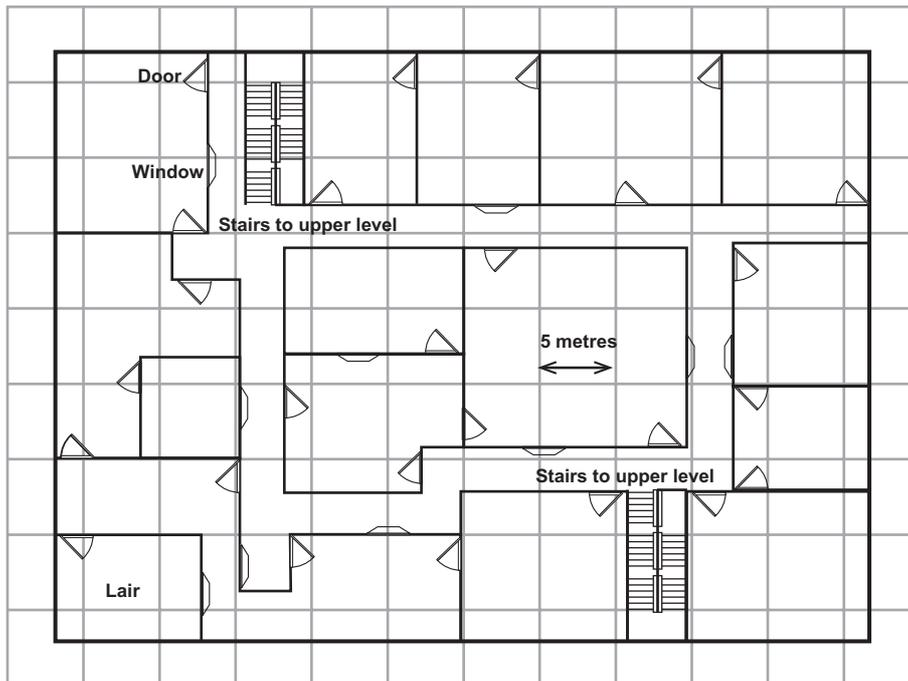
BEGEE's unique selling point is to provide an enhanced paintballing experience. A Lair has been constructed at the heart of each site. Teams pay a premium price to pit themselves against an 'Evil Genius' and his henchmen in order to capture the Lair. The idea has proved popular with corporate entertainment clients and Burt is expanding this aspect of BEGEE.

At first the Lairs were defended by BEGEE employees, but automation has gradually taken over. The Lairs are now protected by a large number of networked devices that trigger booby traps and automatic paint guns, which the attacking team must avoid. Burt wishes to develop the idea further in 'The Dungeon of Doom'.

The civil defence bunker, which is being used as 'The Dungeon of Doom', has two levels. The layout is shown in the diagrams.



Upper Level



Lower Level

The upper level is built above ground and was used as a garage and workshop for civil defence vehicles. Burt has already had this level remodelled to his requirements. Interior walls are built of wood and plasterboard, exterior walls are thick concrete and Burt has no plans to make any further changes to the layout. The IT Centre already has an external telephone/internet connection. No other network cabling or equipment has been installed.

All areas of the upper level will need network and internet access for mobile devices. The rest of the network design is still being discussed.

The lower level is ten metres underground and very solidly built. Changing the layout would be difficult and expensive, so Burt has decided to keep all the walls in place. Some extra doors and windows have been cut to make the layout more maze-like.

Burt has had false ceilings installed throughout the lower level to give it a more closed-in feel. This left a useful area above the ceiling, which now holds the air conditioning system and power cables. The space will also be used for any other infrastructure that is needed. No network cabling or equipment has been installed.

Burt employs IT staff at each site but would like some fresh ideas for 'The Dungeon of Doom' project. You have been hired to advise Burt on all IT matters for the project. This will include:

- setting up a network for the site
- advising on technology for Lair defence ideas
- producing documentation for Burt and BEGEE employees.

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 – Network topologies and transmission media (suggested time 2 hours and 30 minutes)

Although the BEGEE sites have different types of buildings they all use the same outline specification for their networks. Burt wants to use the same specification in 'The Dungeon of Doom'.

The specification states that:

- the network has two subdomains; Admin and Paintball
- the Paintball subdomain deals with the live paintball area and must be secure from anything that could affect the automated equipment
- the Admin subdomain deals with all other aspects of the business
- both subdomains are administered from the IT Centre
- there is a back-up administration facility in the Lair.

Burt is flexible about how the specification is implemented at 'The Dungeon of Doom', provided that all of the requirements are met. He asks you to produce a discussion document that outlines some options for the network topology and transmission media that could be used.

Network topology options: tree, star, mesh and hybrid.

Transmission media options: twisted pair cable, fibre optic cable and radio link.

Produce a document for Burt that:

- (a) describes, with the aid of a diagram in each case, how each topology option could be used at 'The Dungeon of Doom' site (12)
- (b) identifies, with reasons, the best place(s) to use each type of transmission media at 'The Dungeon of Doom' site. (9)

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

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

- A document, including diagrams, for Burt.

(Total for Activity 1 = 21 marks)

***Activity 2 – Research, network design and benefits (suggested time 1 hour and 30 minutes)**

The automatic defences in 'The Dungeon of Doom' will include booby traps and automated paint guns. Burt wants the defences to be triggered by the presence of the paintballers. He asks you to find information on some methods that could be used to detect people at ranges from 1 to 20 metres.

The methods are:

- passive IR
- RFID
- **one** other method of your choice.

Produce a briefing document for Burt, describing for **each** method:

- how people are detected
- the useful range of the detection device(s)
- **one** benefit and **one** drawback in the context of 'The Dungeon of Doom'.

Pay particular attention to the quality of your written communication.

Evidence to be submitted

On **one** word processed A4 page:

- A briefing document for Burt.

Marks will be awarded for the quality of your written communication.

(Total for Activity 2 = 12 marks)

Activity 3 – Components of a network (suggested time 2 hours)

During a meeting with Burt, you agree the following points for 'The Dungeon of Doom' network.

1. The system must comply with the BEGEE outline specification, stated in Activity 1.
2. The network in the upper level will be mainly connected by WiFi.
3. The network in the lower level will be mainly connected by cables.
4. The admin office and reception will each need a PC and networked printer.
5. All of the upper level will need network and internet access for mobile devices.
6. Defence devices such as paint guns may be placed in any part of the lower level. They must be networked and will often be relocated between paintballing sessions. Provision must be made to locate several devices in any room or corridor.
7. Each of the defence devices has a control box and RJ45 port and may be adjusted via internal web pages hosted on that control box. The web pages must be accessible from the IT Centre and the Lair.

Produce a table that details the hardware and cabling components to be used in 'The Dungeon of Doom' network. Give a reason for the inclusion of each component.

Do not include power sockets or power cables.

Do not include the paint guns and other defence devices.

Evidence to be submitted

- On no more than **two** A4 pages, a table which details, with quantities and reasons, the hardware and cabling components for 'The Dungeon of Doom' network.

(Total for Activity 3 = 18 marks)

Activity 4 – Network design (suggested time 2 hours)

You now need to design an appropriate network solution.

- (a) Use network design software to produce a network design for 'The Dungeon of Doom' network.

The design must show both the Admin and Paintball subdomains.

The design does not need to include the defence devices themselves but must show an example of defence device connections in **one** room or corridor.

(16)

- (b) Explain any major decisions that you have made with regard to 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 explaining each major decision made with regard to network devices and equipment.

(Total for Activity 4 = 22 marks)

Activity 5 – Network management (suggested time 2 hours)

- (a) Burt requires that the Paintball subdomain, which deals with the live paintball area, must be secure from interference or unauthorised access that could affect the automated equipment.

Explain, with reference to the network you have designed, how this will be achieved.

(4)

- (b) Each of the networked paint guns comes with a control box and may be adjusted via internal web pages hosted on that control box.

Describe what network settings and software are required for Burt to be able to access these internal web pages from the IT Centre or Lair.

(3)

- (c) Burt needs to be able to access the server at any of the BEGEE sites from the company head office or from his house. He needs to be able to do this at any time, even if there is nobody present at the site being accessed. Explain how this may be achieved. The explanation should include information about the required software and hardware, network settings and procedures involved.

(8)

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

On **one** word processed A4 page:

- An explanation of how security may be achieved for the Paintball subdomain.
- Description of the required network settings and software for accessing the internal web pages.

Evidence to be submitted for (c)

On **one** word processed A4 page:

- An explanation of how Burt could access the BEGEE sites.

(Total for Activity 5 = 15 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.

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

(Standard Ways of Working = 2 marks)

TOTAL FOR PAPER = 90 MARKS