

Write your name here

Surname	Other names
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Centre Number

Candidate Number

Edexcel GCE

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Applied Information and Communication Technology

Unit 9: Communications and Networks

COVER SHEET

6 – 24 May 2013

Paper Reference

6959/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Punch a hole in the top left corner of each printout.
- Ensure your printouts are in the correct order and attach them to page 2 of this cover sheet using a treasury tag.

P41041A

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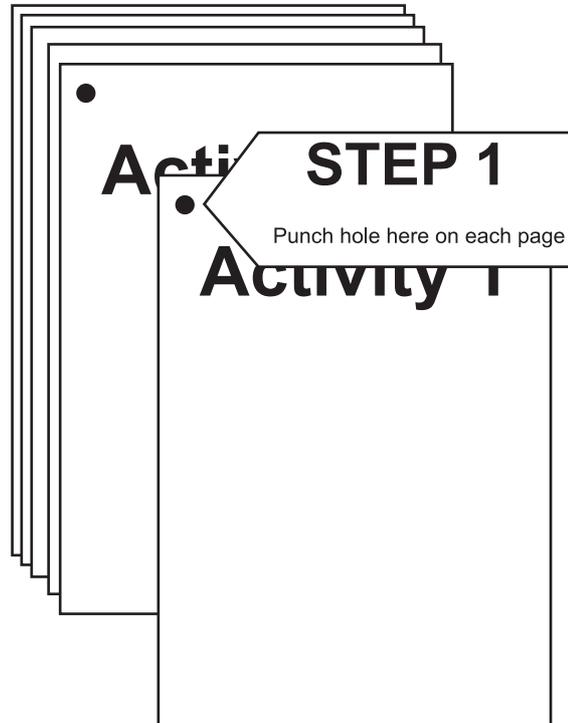
1/1/1/1



Turn over ►

PEARSON

Put 'treasury tag'
through this hole



STEP 2 Arrange your pages in this order, face up.

Activity 1
Activity 2
Activity 3
Activity 4
Activity 5

STEP 3 Put a 'treasury tag' through all
your pages

STEP 4 (last)



FOR EXAMINER'S USE ONLY

Activity 1		
(a)	1	
	2	
	3	
	4	
(b)	1	
	2	
	3	
	4	
(c)	1	
	2	
(d)	1	
	2	
Total		

Activity 3		
(a)	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
(b)	1	
	2	
	3	
	4	
	5	
Total		

Activity 4		
(a)	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
(b)	1	
	2	
	3	
	4	
	5	
	6	
Total		

SWW		
1		
2		
Total		

A1		
A2		
A3		
A4		
A5		
SWW		
Total		

Activity 2		
(a)	MB1	
	MB2	
	MB3	
(b)	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
Total		

Activity 5		
(a)	1	
	2	
	3	
	4	
	5	
	6	
(b)	1	
	2	
(c)	1	
	2	
	3	
	4	
Total		



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Edexcel GCE

Applied Information and Communication Technology Unit 9: Communications and Networks

6 – 24 May 2013

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 **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

Varma Loko Railway

The government of the tropical island of Varma Loko is trying to develop the island’s tourist industry. Resorts on the coast are attracting a large number of tourists but those in the interior are struggling. The government commissioned research to find out why the interior is not doing as well. They have concluded that the prime cause of the problem is poor transportation links.

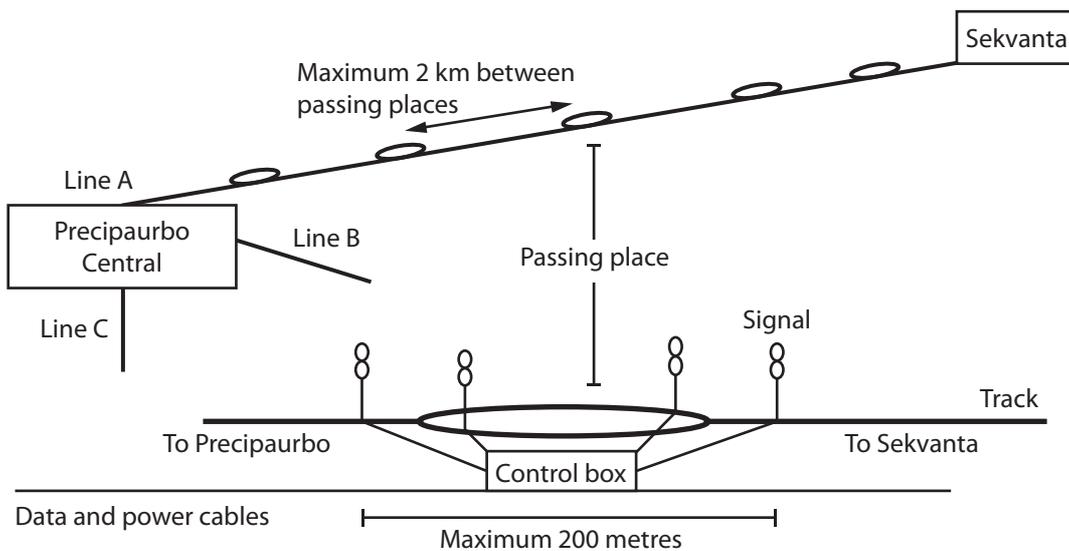
Away from the coast much of Varma Loko is mountainous and the roads are narrow and winding. There is an ongoing road improvement scheme but this will take many years to complete.

The capital city, Precipaurbo, has three rail links. Line A leads to several towns in the interior. These towns have the potential to become tourist centres. Line B goes to the airport and Line C connects the coastal resorts. The railway is single track for most of its length. This severely restricts the number of trains that can be run. The Transport Minister has decided that it will be quicker to improve the railway than to wait for the new roads to be completed.

There are a number of stations on the railway. The maximum distance from one station to the next is 20 km. Making the entire railway double track would be difficult. Instead, passing places will be created, controlled by a signal system. The passing places will be a maximum of 2 km apart.

The railway is naturally divided into sections by the stations along its length. Each section will have the same basic design and will be controlled by a station. For example, the first section on Line A is controlled by Precipaurbo Central station. The next section is controlled by the first station along the line, Sekvanta, and so on.

The basic section design is illustrated in the diagram, which shows the track between Precipaurbo Central and Sekvanta. There are 50 stations on the entire railway.



The project manager, Viro De Ordoni, has hired you to advise on IT matters. The project has a multi-million-pound budget and Viro has indicated that money and manpower will not be a problem.

You will be dealing with the installation of an IT system at Precipaurbo Central. The IT system will:

- monitor and control the first section of track on each of the three lines
- provide a centralised web-based booking system for the entire railway
- provide administrative and booking/ticket office facilities at Precipaurbo Central
- support a bookings database for the entire railway that can be accessed from any station when people book tickets.

Varma Loko Railway will need a Wide Area Network (WAN) to connect the stations and passing places. Each station already has a small Local Area Network (LAN) with an internet connection.

The WAN must be able to handle:

- control signals to and from the control boxes
- telephone messages between stations
- data for the bookings database.

Due to the mountainous terrain, it is essential that all communication links follow the railway track, as this will allow easier installation and maintenance.

The WAN must be:

- self-contained, with permanent communication links
- secure
- robust and reliable.

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 types and components (suggested time 2 hours)

Varma Loko Railway will need a Wide Area Network (WAN).

Viro tells you that the WAN must be able to handle:

- control signals to and from the control boxes
- telephone messages between stations
- data for the bookings database.

The railway already owns private telephone wires running beside the track. Viro needs to understand the technical issues involved. Viro asks you to produce a briefing document to help him do this.

Research the technology and produce a briefing document for Viro that:

- (a) describes the functions of the devices needed to connect the LANs to a:
- telephone wire WAN
 - fibre optic cable WAN
- (4)
- (b) explains, with the aid of diagrams, how data signals are passed along a:
- telephone wire
 - fibre optic cable
- (4)
- (c) explains how a single **telephone** wire can handle data signals and telephone messages at the same time
- (2)
- (d) explains how a single **fibre optic** cable can handle data signals and telephone messages at the same time.
- (2)

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

On **two** word processed A4 pages:

- A briefing document for Viro.

(Total for Activity 1 = 12 marks)

Activity 2 – Connectivity and network management (suggested time 2 hours and 20 minutes)

Viro decides that the WAN will use a new fibre optic cable as well as the existing telephone wires. The fibre optic cable will be used by the signalling system and the telephone wires will carry voice and data.

Viro decides to concentrate the railway's IT facilities at Precipaurbo Central and provide services to the other stations by using the WAN.

*(a) Two limiting factors for telephone wires are bandwidth and contention.

In an A4 document:

- explain the meaning of bandwidth and contention
- describe how bandwidth and contention issues might lead to problems when providing services to other stations
- describe a strategy that would reduce these problems and make best use of the WAN.

Pay particular attention to the Quality of your Written Communication.

(12)

(b) Viro knows that the railway staff at most of the stations have limited IT expertise. Viro decides to implement the management of services centrally. He asks you for some ideas for implementing central management.

Prepare a document advising Viro on how to implement central management of:

- backup
- security
- administration
- user support.

(9)

Evidence to be submitted for (a)

On **one** word processed A4 page:

- A document about bandwidth and contention.

Marks will be awarded for the Quality of your Written Communication

Evidence to be submitted for (b)

On **one** word processed A4 page:

- A document for Viro giving advice on implementing central management.

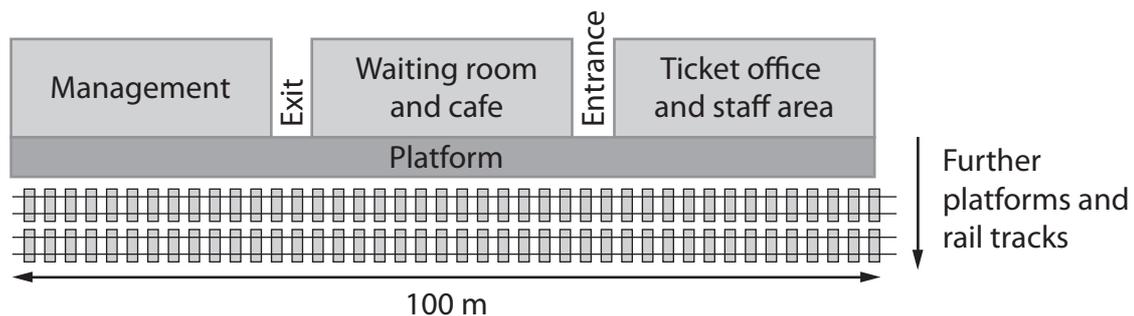
(Total for Activity 2 = 21 marks)

Activity 3 – Network components (suggested time 1 hour and 50 minutes)

At a meeting with Viro you discuss the LAN that is to be created at Precipaurbo Central. He tells you that:

- all existing IT equipment and cabling is to be replaced
- the installation work will be done by railway electricians. They are not IT specialists and equipment should be selected for ease of installation, using plug and play systems wherever possible
- the Varma Loko power supply has the same specification as in the UK
- all the equipment must comply with EU (European Union) standards.

Viro also gives you a plan of the buildings at Precipaurbo Central. The buildings are all single storey and under a single roof that covers the entire station. There is plenty of room in the roof-space for cable runs.



The management block has:

- an office for the Varma Loko Railway Director
- one office for each of the three Line Managers
- one office for each of the Precipaurbo Central Station Master and Deputy Station Master
- an open plan area for administration staff
- WiFi access for staff and visitors from the Transport Ministry.

Each of the six offices will be equipped with a good quality business PC and a printer for private printing.

The open plan area will be equipped with ten basic business PCs, a shared colour laser printer and a shared black and white laser printer.

The waiting room and cafe block has a large passenger lounge, with a cafe area at one end. This occupies the half of the building nearest to the management block; the rest is storage space. Viro wants to provide free WiFi access for passengers in the lounge and cafe.

A network management area will be created in part of the storage space and be equipped for running the LAN and the WAN.

The ticket office and staff area block contains three ticket windows and the staff canteen and rest area. These areas do not require a WiFi service.

Each ticket window will have a basic business PC running bespoke ticketing software and ticket printers. The software and ticket printers will be supplied by a specialist company. The ticket office PCs will share a black and white laser printer.

- (a) Produce a table for Viro, which identifies the hardware and cabling components to be used in the Precipaurbo Central system, giving a reason for each component.

Do not include the ticket printers or any electrical power cables and sockets.

(14)

- (b) Produce a table for Viro, which specifies the software components to be used in the Precipaurbo Central system, giving a reason for each component.

Do not include the ticketing software.

(5)

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

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

- A table which identifies, with reasons, the hardware and cabling components.
- A table which specifies, with reasons, the software components.

(Total for Activity 3 = 19 marks)

Activity 4 – Network design (suggested time 2 hours and 30 minutes)

Having talked to Viro about his requirements and investigated the possible options, you now need to design an appropriate network solution.

- (a) Use network design software to produce a **labelled** network design for Precipaurbo Central.

NOTE. You should only show devices in **one** management block office. The others may be indicated by a label and a network connection.

(18)

- (b) Write notes justifying each major decision made with regard to the network design.

(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 with regard to the network design.

(Total for Activity 4 = 24 marks)

Activity 5 – Network configuration and protocols (suggested time 1 hour and 20 minutes)

WiFi access in the management block is required for staff and visitors from the Transport Ministry.

Free WiFi access will be provided for passengers in the lounge and cafe.

It is essential that:

- staff cannot gain access to Transport Ministry laptops via the WiFi links
- passengers cannot gain access to the Precipaurbo Central LAN via the WiFi links.

(a) Explain the security measures that could be used to ensure that these conditions are met.

(6)

People often log on to their own home or business network with their mobile devices. The settings on these devices may not allow connection to the Precipaurbo Central WiFi.

(b) Describe the settings that a passenger's laptop would need to have in order for it to connect to the Precipaurbo Central WiFi.

(2)

(c) Explain the configuration that would need to be performed on the server to allow passengers to use the WiFi.

(4)

Evidence to be submitted for (a)

On **one** word processed A4 page:

- An explanation of security measures.

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

On **one** word processed A4 page:

- A description of laptop settings and an explanation of server configuration.

(Total for Activity 5 = 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
