



**Programme:** **BTEC Higher National Diploma (HND) in Computing H2**  
**Unit Number and Title:** (Unit 5) Networking Concepts  
**Assignment Ref. Number:** 5.1- Investigation of network topologies and comparison of protocols with different reference model standards.  
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**Date Set:** 02<sup>nd</sup> November 2009

Learner's Name:..... Learner's ID..... Date handed-in.....

### Plagiarism Statement

I declare that, apart from properly referenced quotations, this report is my own work and contains no plagiarism; it has not been submitted previously for any other assessed unit on this or other courses.

Learner's Signature:..... Date:.....

### Learning outcomes and criteria covered by this assignment

Learners will be able to apply the concept of network architecture relevant to different network topology for solving the real world scenarios using appropriate analysis and design methodologies. This assignment will provide you with an opportunity to present evidence of achievement towards the following learning outcomes and criteria i.e. Pass, Merit Distinction.

- LO1 [5.1]: Evaluate the benefit of networks
- LO2 [5.2]: Apply architectural concepts to the design/evaluation of networks
- LO3 [5.3]: Install network software
- LO4 [5.4]: Perform network management responsibilities.
  
- P1: [5.1.01]: produce a coherent argument as to the advantages and disadvantages of using networks within an organisation
- P2: [5.1.02]: evaluate the various costs, performance, security and utility values associated with the installation of a network
- P3: [5.1.03]: provide an overview of a network operating system and how it works
  
- P4 [5.2.01]: design a LAN for a specific purpose or assess an existing network for fitness of purpose
- P5 [5.2.02]: identify the various parts (software and hardware) of a network system and relate it to the 7-layered model
- P6 [5.2.03]: differentiate between different kinds of network, network topologies and network operating systems
  
- P7 [5.2.04]: set up a software network environment, for example departments in an organisation
- P8 [17.3.01]: install a piece of network software on to a server to be used by different selected users in a group
- P9 [17.3.02]: configure user workstations on the network
  
- P10 [17.3.03]: write a report on the rights and responsibilities of the network manager and the network user
- P11 [17.3.04]: apply control mechanisms in a typical network for managing users
- P12 [17.3.05]: control printer queues and other forms of resource usage
  
- M1 [17.1]: Identify and apply strategies to find appropriate solutions
- M2 [17.2]: Select/design and apply appropriate methods/techniques
- M3 [17.3]: Present and communicate appropriate findings
- D1 [17.1]: Use critical reflection to evaluate own work and justify valid conclusion
- D2 [17.2]: Take responsibility for managing and organizing activities
- D3 [17.3]: Demonstrate convergent/lateral/creative thinking



## LEARNER'S BRIEF

<b>Programme:</b>	<b>BTEC Higher National Diploma (HND) in Computing H2</b>
Unit Number and Title:	(Unit 5) Networking Concepts
Assignment Ref. Number:	5.1- Investigation of network topologies and comparison of protocols with different reference model standards.
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## Introduction

The importance of networked solutions in the business world grows year on year. The increasingly sophisticated technologies and widening user base mean a fundamental understanding of networks is essential for many. The aim of this unit is to provide a rigorous introduction to networks, and practical experience in installing users and software on a network.

This unit will clarify the issues associated with network use and how this has developed. It will identify the architectural concepts behind networking and help develop the preliminary skills necessary to install and manage networks.

## Specification of Assessment

There is an obvious need to combine practical and theoretical assessment. The theory can be delivered by using case studies that consider existing networks. Learners can produce reports that describe features and show an understanding of the principles and definitions. The practical aspects provide an opportunity for learners to design, install and maintain a simple network. It is essential that a logbook is maintained for recording both progress and effectiveness.

Continuous assessment will be conducted throughout this unit. Your assignment report needs to cover all the questionnaire related with a real world applications described by the following criteria.

### 1 Benefit of networks

Network principles and applications definition of a network: evolution of network uses, from simple file and print networks, through small office computing, to client-server architectures, review of remote access, starting with email through to intranets and the internet, LANs (local area networks), WANs (wide area networks) and MANs, (metropolitan area networks), networked applications, overview of cost/benefits of network use Network use: an



overview of network resources (hardware and software), facilities of a network operating system, understanding of security implications and software licensing issues, constraints on capacity and performance (such as being asked to run video off a 10Mbit Ethernet connection)

## **Requirement 1 to pass:**

On Command Corporation has replaced its low-speed private-line network with a quicker virtual private network (VPN) so it can provide faster customer service to hotels worldwide that have bought its in-room TV. The VPN service is managed by Internet service provider Concentrick Networks Corporation. The virtual network has slashed the time it takes agents to access data from customer support systems from several minutes to just seconds. The virtual net links 12 regional offices with the £125 million firm's Glasgow, London, headquarters.

Because VPN links are much cheaper than dedicated connections, On Command was able to afford much was able to afford much higher bandwidth-24 times the bandwidth of its 56K bit/sec. private-line network-for about the same price: £1200 per site per month. The 1.544M bit/sec. lines that ON Command now use give its agents access to technical data, information on trouble tickets, and contracts to handle customer inquiries faster. Before the virtual network, agents had to take information from customers, hang up, wait several minutes for the data to arrive, and then call customers back to answer their questions. Now the data arrives in a matter of seconds.

- 1.1. Produce a coherent argument as to the advantages and disadvantages of using networks and virtual private networks within an organisation [Pass-P1].
- 1.2. Select/Design and apply appropriate methods/techniques the case study discussed above [Merit – M1].
- 1.3. Evaluate the various costs, performance, security and utility values associated with the installation of a network [Pass-P2].
- 1.4. Present and communicate appropriate findings [Merit – M2].
- 1.5. Provide an overview of a network operating system and how it works [Pass-P3]

## **2 Design/evaluation of networks**

Network architecture concepts: the ISO OSI 7-layer model (and/or IEEE 802), topologies, e.g. bus, ring, structured, a description of communication devices, repeaters, bridges and hubs, standard connectors and wiring, functions of a network card, differences between peer to peer and server based networks, description of main protocols, ie Ethernet, ATM, token ring, IPX, SPX, and their relationship with the 7-layer model, the principles and resources required to connect LANs to WANs, TCP/IP as a WAN protocol, TCP/IP addressing and how routing works  
Network design: using architectural principles and definitions to design a new network or evaluate an existing one.



- 2.1 In the future, when everyone has a home terminal connected to a computer network, instant public referendums on important pending legislation will become possible. Ultimately, existing legislatures could be eliminated, to let the will of the people be expressed directly. The positive aspects of such a direct democracy are fairly obvious; discuss some of the negative aspects. [Pass-P4].
- 2.2 Use critical reflection to evaluate own work and justify valid conclusion on [Distinction – D1]
- 2.3 The Internet is made up of a large number of networks. Their arrangement determines the topology of the Internet. A considerable amount of information about the Internet topology is available on line. Use a search engine to find out more about the Internet topology and write a short report summarizing your findings. [Merit – M3].
- 2.4 Which of the OSI layers handles each of the following: (a) Dividing the transmitted bit stream into frames. (b) Determining which route through the subnet to use. Identify them by with a critiques of analysis of OSI 7 layers [Pass-P5].
- 2.5 Find out what networks are used at your college or place of work. Describe the network types, topologies, and switching methods used there. Discuss with reference to the 7-layer OSI and TCP/IP reference model. [Pass-P6].

### 3 Network software

User factors: design and definition of users and groups, the definition of directory structures on the file server, file and directory attributes, trustee rights, IRM (inherited rights management), and setting up security

Login scripts: definition of the user environment, menu systems

Hardware and software factors: printing set-up, understanding of printing options, installation and configuration of applications on the network (including operating system constraints), file server installation and utilities

- 3.1 Ethernet and wireless networks have some similarities and some differences. One property of Ethernet is that only one frame at a time can be transmitted on an Ethernet. Does 802.11 share this property with Ethernet? Discuss your answer. [Pass-P7].
- 3.2 You might have network system implemented to share a printer from different member connected in the Local Area Network. Go through the steps written on handouts and follow the instruction to setting up a network printer. Write down the steps with screen shot on your report [Pass-P8].
- 3.3 What is the principal difference between connectionless communication and connection-oriented communication? Two networks each provide reliable connection-oriented service. One of them offers a reliable byte stream and the other offers a reliable message stream. Are these identical? If so, why is the distinction made? If not, give an example of how they differ [Pass-P9].



3.4 Demonstrate convergent /lateral/creative thinking in understand the principles.[Distinction – D3].

## 4 Network management

Management responsibilities: the problems of creating large numbers of accounts on a network and keeping it up-to-date, management of users, workgroup managers, network security and virus protection (elements of good practice) Resource management: control resource usage estimation and tracing of resource usage, managing printer queues, connecting of the network to the outside world, advantages (e.g. internet) and disadvantages (e.g. hackers), firewalls.

- 4.1 The *ping* program allows you to send a test packet to a given location and see how long it takes to get here and back. Try using ping to see how long it takes to get from your location to several known locations. List the IP address of five PCs on your college IT lab and use ping command to do the observations. (Hints: use *cmd* on start menu then on run box. Write ping with your computer IP address) [Pass-P10].
- 4.2 Record the data from experiment 4.1 i.e. average time required for travelling a packet from your PC to other IP address. From these data, plot the one-way transit time over the internet as a function of distance. You can also use universities since the location of their servers is known very accurately. For example, *city.ac.uk* in London, Berkeley.edu is in Berkeley, California, [www.usyd.edu.au](http://www.usyd.edu.au) is in Sydney [Pass-P11].
- 4.3 Do some research on net and write a report on the rights and responsibilities of the network manager and the network user [Pass-P12].
- 4.4 Take responsibilities for managing and organizing activities of your network simulation [Distinction – D2].



## Outcomes and assessment criteria

<b>Outcomes</b>	<b>Assessment criteria for pass</b> <b>To achieve each outcome a learner must demonstrate the ability to:</b>
1 Evaluate the <b>benefit of networks</b>	<ul style="list-style-type: none"><li>• Produce a coherent argument as to the advantages and disadvantages of using networks within an organization</li><li>• Evaluate the various cost, performance, security and utility values associated with the installation of a network</li><li>• Provide an overview of a network operating system and how it works</li></ul>
2 Apply architectural concepts to the <b>design/evaluation of networks</b>	<ul style="list-style-type: none"><li>• Design a LAN for a specific purpose or assess an existing network for fitness of purpose</li><li>• Identify the various parts (software and hardware) of a network system and relate it to the 7-layered model</li><li>• Differentiate between different kinds of network, network topologies and network operating systems</li></ul>
3 Install <b>network software</b>	<ul style="list-style-type: none"><li>• Set up a software network environment, for example departments in an organization</li><li>• Install a piece of network software on to a server to be used by different selected users in a group</li><li>• Configure user workstations on the network</li></ul>
4 Perform <b>network management responsibilities</b>	<ul style="list-style-type: none"><li>• Write a report on the rights and responsibilities of the network manager and the network user</li><li>• Apply control mechanisms in a typical network for managing users</li><li>• Control printer queues and other forms of resource usage</li></ul>



Merit Descriptor	Indicative Characteristics
In order to achieve a merit The learner must:	The learner's evidence shows:
<b>M1</b> <ul style="list-style-type: none"><li>Identify and apply strategies to find appropriate solutions</li></ul>	<ul style="list-style-type: none"><li>That judgment has been made for successful research to take place.</li><li>Problems have been identified and overcome</li></ul>
<b>M2</b> <ul style="list-style-type: none"><li>Select/Design and apply appropriate methods/techniques</li></ul>	<ul style="list-style-type: none"><li>That the case study demonstrates that a range of information sources have been used.</li><li>That techniques used for obtaining and presenting information gathered is appropriate and justified.</li></ul>
<b>M3</b> <ul style="list-style-type: none"><li>Present and communicate appropriate findings</li></ul>	<ul style="list-style-type: none"><li>That the case study is structured following a logical format.</li><li>A range of methods have been used to present the information for the case study</li></ul>
Distinction Descriptor	Indicative Characteristics
In order to achieve a merit The learner must:	The learner's evidence shows:
<b>D1</b> <ul style="list-style-type: none"><li>Use critical reflection to evaluate own work and justify valid conclusions</li></ul>	<ul style="list-style-type: none"><li>Conclusion reached through your work have been justified.</li><li>Your case study provides evidence that self evaluation of your information has taken place and realistic improvements proposed.</li></ul>
<b>D2</b> <ul style="list-style-type: none"><li>Take responsibility for managing and organizing activities</li></ul>	<ul style="list-style-type: none"><li>Activities have been identified and undertaken at the appropriate level and within agreed deadlines.</li></ul>
<b>D3</b> <ul style="list-style-type: none"><li>Demonstrate convergent/lateral/creative thinking</li></ul>	<ul style="list-style-type: none"><li>The case study shows that ideas have been generated, decisions taken and problems have been overcome.</li><li>Convergent and lateral thinking have been applied and receptiveness to new ideas is evident.</li><li>Your case study demonstrates that innovation and creative thought have been applied.</li></ul>



## Achievement of Pass grade

A pass grade is achieved by meeting all the requirements defined in the assessment criteria for each individual unit.

## Achievement of a merit or distinction grade

All the assessment criteria and merit grade descriptors need to be completed within a unit to achieve a merit grade.

All the assessment criteria merit and distinction grade descriptors must be completed within a unit to achieve a Distinction grade.

Assessment Criteria	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
Requirements	1.1	1.3	1.5	2.1	2.4	2.5	3.1	3.2	3.3	4.1	4.2	4.3

Grading Criteria	M1	M2	M3	D1	D2	D3
Requirements	1.2	1.4	2.3	2.2	4.4	3.4

The pass criteria and merit and distinction grade will be analysed and justified from the THREE parts of the assessment as shown in the table below.

Assessment No.	Type
1	Project with documentation – 3000 words
2	A CD showing your Programming code.

## Support materials

### Books

#### Core:

- [1]. Tanenbaum, A — Computer Networks — (Prentice Hall PTR, 2002) ISBN: 0130384887
- [2]. Parnell, T — Network Administrator’s Reference — (McGraw Hill, 1999) ISBN: 0078825881
- [3]. William Stallings – Data and Computer Communications. ISBN-10: 0132433109
- [4]. Networking Complete (Sybex International, 2002) ISBN: 0782141439

#### Recommended:

- [5]. James A. O’Brien, 2004, Management Information System, The McGraw-Hill Companies, 6th edition. ISBN: 0-07-282311-9

#### Website:

Relevant web sites and online tutorials on specific technologies, including those found at:

- <http://computer.howstuffworks.com/internet-infrastructure.htm> – contains a series of introductory articles describing Internet technologies;
- <http://williamstallings.com/Crypto/Crypto4e.html> – contains links concerning cryptography and general security;
- <http://msdn.microsoft.com/> – similar content to the previous site.
- <http://technet.microsoft.com/en-us/library/cc783078.aspx>



## Assessment Information

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**Email:** [G.Murshed@theiet.org](mailto:G.Murshed@theiet.org)/[gmtbd@yahoo.com](mailto:gmtbd@yahoo.com)

Learner name:

Learner ID

### Information/feedback on assessment and grading criteria

Assessment criteria (Pass-p)	Achieved	Evidence	Feedback
P1: produce a coherent argument as to the advantages and disadvantages of using networks within an organisation	Y/N	Software	
P2: Evaluate the various cost, performance, security and utility values associated with the installation of a network	Y/N	Software	
P3: Provide an overview of a network operating system and how it works	Y/N	Software	
P4: Design a LAN for a specific purpose or assess an existing network for fitness of purpose	Y/N	Software	
P5: Identify the various parts (software and hardware) of a network system and relate it to the 7-layered model	Y/N	Software	
P6: Configure user workstations on the network	Y/N	Report	
P7: Write a report on the rights and responsibilities of the network manager and the network user	Y/N	Report	



P8: Apply control mechanisms in a typical network for managing users	Y/N	Report	
P9: Control printer queues and other forms of resource usage	Y/N	Report	

<b>Grading criteria (Merit-M Distinction-D)</b>	<b>Achieved</b>	<b>Evidence</b>	<b>Feedback</b>
<b>M1</b> Identify and apply strategies to find appropriate solutions	Y/N	Report	
<b>M2</b> Select/Design and apply appropriate methods/techniques	Y/N	Report	
<b>M3</b> Present and communicate appropriate findings	Y/N	Report	
<b>D1</b> Use critical reflection to evaluate own work and justify valid conclusions	Y/N	Report	
<b>D2</b> Take responsibility for managing and organizing activities	Y/N	Report	
<b>D3</b> Demonstrate convergent/lateral/creative thinking	Y/N	Report	



## Assessor's general comments

Assessor's Signature

Date

Print Name:

## Learner's comments

Signature

Date

Print Name:

\* The feedback will be given to students four weeks after the submission of an assignment.