Higher Nationals - Summative Assignment Feedback Form

Student Name/ID			
Unit Title	**Unit 02: Networking**		
Assignment Number	1	**Assessor**	
Submission Date		**Date Received 1st submission**	
Re-submission Date		**Date Received 2nd submission**	

Assessor Feedback		
Grade:	**Assessor Signature:**	**Date:**
Resubmission Feedback: • Please note resubmission feedback is focussed only on the resubmitted work		
Grade:	**Assessor Signature:**	**Date:**
Internal Verifier's Comments:		
Signature & Date:		

- Please note that grade decisions are provisional. They are only confirmed once internal and external moderation has taken place and grades decisions have been agreed at the assessment board.

Important Points:

1. It is strictly prohibited to use textboxes to add texts in the assignments, except for the compulsory information. eg: Figures, tables of comparison etc. Adding text boxes in the body except for the before mentioned compulsory information will result in rejection of your work.
2. Avoid using page borders in your assignment body.
3. Carefully check the hand in date and the instructions given in the assignment. Late submissions will not be accepted.
4. Ensure that you give yourself enough time to complete the assignment by the due date.
5. Excuses of any nature will not be accepted for failure to hand in the work on time.
6. You must take responsibility for managing your own time effectively.
7. If you are unable to hand in your assignment on time and have valid reasons such as illness, you may apply (in writing) for an extension.
8. Failure to achieve at least PASS criteria will result in a REFERRAL grade.
9. Non-submission of work without valid reasons will lead to an automatic RE FERRAL. You will then be asked to complete an alternative assignment.
10. If you use other people's work or ideas in your assignment, reference them properly using HARVARD referencing system to avoid plagiarism. You have to provide both in-text citation and a reference list.
11. If you are proven to be guilty of plagiarism or any academic misconduct, your grade could be reduced to A REFERRAL or at worst you could be expelled from the course
12. Use word processing application spell check and grammar check function to help editing your assignment.
13. Use **footer function in the word processor to insert Your Name, Subject, Assignment No, and Page Number on each pag**e. This is useful if individual sheets become detached for any reason.

STUDENT ASSESSMENT SUBMISSION AND DECLARATION

When submitting evidence for assessment, each student must sign a declaration confirming that the work is their own.

Student name:	Assessor name:	
Issue date:	Submission date:	Submitted on:
Programme: Pearson BTEC HND in computing		
Unit: **Unit-02 Networking**		
LAN Design & Implementation for Redco Development.		

Plagiarism

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, may be penalized. It is your responsibility to ensure that you understand correct referencing practices. As a university level student, you are expected to use appropriate references throughout and keep carefully detailed notes of all your sources of materials for material you have used in your work, including any material downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

Guidelines for incorporating AI-generated content into assignments:

The use of AI-generated tools to enhance intellectual development is permitted;
nevertheless, submitted work must be original. It is not acceptable to pass off AI-generated work as your own.

Student Declaration

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student signature: Date:

Unit 2 – Networking Assignment Brief

Student Name/ID Number	
Unit Number and Title	**Unit 2 – Networking**
Academic Year	2024/2025
Unit Tutor	
Assignment Title	**LAN Design & Implementation for Redco Developments.**
Issue Date	
Submission Date	

Submission Format

The assignment submission is in the form of the following.

Presentation - A formal 10–15-minutes presentation (8-10 slides as a guide, with supporting speaker notes) to communicate an investigation to a non-technical audience discussing the key features and characteristics of a range of network types, topologies, hardware, and software that you have been used for the new network implementation. This should demonstrate your network blueprint and the packet tracer simulation.

A Written report- The submission should be in the form of an individual report written in a concise, formal business style using single spacing and font size 12. You are required to make use of headings, paragraphs, and subsections as appropriate, and all work must be supported with research and referenced using Harvard referencing system. Please also provide an end list of references using the Harvard referencing system.

The recommended word count is 3,000–3,500 words for the report excluding annexures, although you will not be penalised for exceeding the total word limit.

Note: Please Don't add any ZIP files to the ELMS it should be a PDF document with

relevant could links to the packet tracer files.
Unit Learning Outcomes
LO1. Examine networking principles and their protocols. **LO2. Explain networking devices and operations.** **LO3. Design efficient networked systems.** **LO4. Implement diagnose and demonstrate prepared networked systems.**
Transferable skills and competencies developed

- Computational thinking (including its relevance to everyday life)
- Demonstrate knowledge and understanding of essential facts, concepts, principles, and theories relating to computing and computer applications.
- Use such knowledge and understanding in the modelling and design of computer-based systems for the purposes of comprehension, communication, prediction, and the understanding of trade-offs.
- Recognize and analyze criteria and specifications appropriate to specific problems, and plan strategies for their solutions.
- Critical evaluation and testing: analyze the extent to which a computer-based system meets the criteria defined for its current use and future development.
- Methods and tools: deploy appropriate theory, practices and tools for the design, implementation, and evaluation of computer-based systems.

Computing-related practical skills:

- The ability to specify, design and construct reliable, secure, and usable computer-based systems.
- The ability to evaluate systems in terms of quality attributes and possible trade-offs presented within the given problem.
- The ability to deploy effectively the tools used for the construction and documentation of computer applications, with particular emphasis on understanding the whole process involved in the effective deployment of computers to solve practical problems.
- The ability to critically evaluate and analyze complex problems, including those with incomplete information, and devise appropriate solutions, within the constraints of a budget.

Generic skills for employability

- Intellectual skills: critical thinking; making a case; numeracy and literacy.
- Self-management: self-awareness and reflection; goal setting and action planning.
- Independence and adaptability; acting on initiative; innovation and creativity.
- Interaction: reflection and communication.
- Contextual awareness, e.g. the ability to understand and meet the needs of individuals, business, and the community, and to understand how workplaces and organisations are governed.

OBSERVATION RECORD

Learner name:	
Qualification:	
Unit number & title:	
Description of activity undertaken	
Assessment criteria	
How the activity meets the requirements of the assessment criteria	

Learner name:			
Learner signature:		**Date:**	
Assessor name:			
Assessor signature:		**Date:**	

WITNESS STATEMENT

Learner name:			
Qualification:			
Unit number & title:			
Description of activity undertaken (please be as specific as possible)			
Assessment criteria (for which the activity provides evidence)			
How the activity meets the requirements of the assessment criteria, including how and where the activity took place			
Witness name:		**Job role:**	
Witness signature:		**Date:**	
Learner name:			
Learner signature:		**Date:**	
Assessor name:			
Assessor signature:		**Date:**	

Assignment Brief and Guidance:

Redco Developments is a Sri Lankan based Mobile app development company, which the head office is in Kandy. The company develops mobile applications for Sri Lanaka's leading organizations for both mobile platforms IOS and Android.

The CEO plans to expand the company operations of Redco development in Southern province in Sri Lanka. The management has decided to open a new branch office in Galle and wants it to be one of the most prominent tech-oriented offices in Galle with the latest tech facilities including smart devices such as auto lighting, physical security solutions, smart gates and new ERP software IP camera Systems.

You have been appointed as the Junior implementation Engineer of Redco and your task is to design a new network for the Galle branch and restructure the existing Kandy network that connects both networks.

Prepare a network architectural design and implement it with your suggestions and recommendations to meet the company requirements.

The floor plan of the head office in Kandy is as follows:

Floor 1:

- Reception area (2 employees)
- Sales & Marketing Department (10 employees)
- Customer Services Area – with Wi-Fi facilities
- Developers (25 employees)

Floor 2:

- Director suits (3 suits)
- Boardroom with Video conferencing facility and Wi-Fi.

- Administration Department (15 Employees)
- HR Department (4 employees)

Floor 3:

- Accounting & Finance Department (12 employees)
- IT Technical support (4 employees)
- The Server Room

The newly established floor plan of the Galle is as follows:

Floor 1:

- Reception area (2 employees)
- Customer Services Area– with Wi-Fi facilities
- Developers (40 employees)
- 5 IP cameras

Floor 2:

- Administration Department (10 Employees)
- HR Department (5 employees)
- Accounting & Finance Department (12 employees)
- IT Department (5 employees)
- The Server Room
- 6 IP cameras

The following requirements are given by the Management.

- All the departments **must be separated** with **unique subnets.**
- **The conference room of the head office and Customer Services Areas** of each branch are to be **equipped with Wi-Fi connections with the security enabled**.
- **Connectivity between two branches** (Kandy & Galle) which would allow intra-

branch connectivity between departments. (Use Inter VLAN routing RIP or any routing protocol- evidence must be provided)

- **IP range for 200.100.10.0/24** for Kandy and **200.100.20.0/24** for Galle branch and subnetting calculations must be provided within the report **except the server room**.
- **All the PC must retrieve IP from the DHCP server.**
- **The number of servers required for the Server room** needs to be decided by the Network designer and should be assigned with **200.100.50.0/24** subnet. (Uses **static IPs**)
- **The Sales and Marketing** Team also needs to access Network resources **using WIFI** connectivity.

(Note: Clearly state your assumptions. You are allowed to design the network according to your assumptions, but the main requirements should not be violated)

Activity 01

- Discuss the benefits and constraints of different network system types that can be implemented in the Galle branch as well as for the restructuring process what type of network recommended for the Galle and Kandy offices.
- Discuss the different protocols utilized for communication and the connectivity of the 2 offices which can be implemented in the Galle branch and the How the OSI and TCP model influencing in designing network for Galle office.
- Discuss the importance and impact of network topologies that are used in network design using examples.
- Recommend suitable network topologies and network protocols for the above

scenario and evaluate your answer with valid points.

Activity 02

- Discuss the operating principles of network devices (Ex: Router, Switch, Etc.).
- Explain different server types that can be used for the above scenario while exploring different servers that are available in today's market with their specifications. You should recommend a server/server for the above scenario and justify your selection with valid points.
- Discuss the inter-dependence of workstation hardware and networking software, networking operating systems you use based on the scenario. Provide examples for networking software that can be used in the above network design.

Activity 03

- Prepare a written network design plan to meet the above-mentioned user requirements including a blueprint drawn using a modeling tool (Ex: Microsoft Visio, EdrawMax). Test and evaluate the proposed design by analysing user feedback with the aim of optimizing your design and improving efficiency.
- Support your answer by providing the VLAN and IP subnetting scheme for the above scenario and the list of devices, network components and software used to design the network for the above scenario and while justifying your selections.
- Install and configure Network services, devices and applications
  Ex: VLAN, WiFi, DNS, Proxy, Web, Etc
  According to the proposed design to accomplish the user requirements. Design a detailed Maintenance schedule for the above Network.

***Note: - Screen shots of Configuration scripts should be presented in your document. Your packet tracer file must be submitted to the cloud drive and share**

the link in the appendix of document for the assessor verification purposes.

Don't add any ZIP files to the ELMS it should be a PDF document with relevant could links to the packet tracer files

Activity 04

- Implement a networked system based on your prepared design with valid evidence.

- Develop test cases and conduct verification (Ex: Ping, extended ping, trace route, telnet, SSH, etc.) to test the above Network and analyse the test results against the expected results.

- Recommend potential future enhancements for the networked system with valid justifications and critically reflect on the implemented network, including the plan, design, configurations, tests, and the decisions made to enhance the system.

Activity 05 – Presentation

- Prepare and present 10-15 minutes presentation which includes the design (Network type, topologies, devices, and software you used for the implementation. You need to justify your design with the valid reasons.
- The presentation should include,
    - Blueprint of the design
    - Packet tracer demonstration
    - Testing interface pinging's
    - Trace routes

Note: Add your presentation slides in the appendix of the report.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Examine networking principles and their protocols		**LO1 and LO2**
P1 Discuss the benefits and constraints of different network types and standards. **P2** Explain the impact network topologies have on communication and bandwidth requirements.	**M1** Assess common networking principles and how protocols enable the effectiveness of networked systems.	**D1** Evaluate the topology and protocol suite selected for a given scenario and how it demonstrates the efficient utilisation of a networking system.
LO2 Explain networking devices and operations		
P3 Discuss the operating principles of networking devices and server types. **P4** Discuss the interdependence of workstation hardware and relevant networking software.	**M2** Explore a range of server types and justify the selection of a server for a given scenario, regarding cost and performance optimisation.	
LO3 Design efficient networked systems		**LO3 and LO4**
P5 Design a networked system to meet a given specification. **P6** Design a maintenance schedule to support the networked system.	**M3** Analyse user feedback on your designs with the aim of optimising your design and improving efficiency.	**D2** Critically reflect on the implemented network, including the design and decisions made to enhance the system.
LO4 Implement and diagnose networked systems		
P7 Implement a networked system based on a prepared design. **P8** Document and analyse test results against expected results.	**M4** Recommend potential enhancements for the networked systems.	

Recommended resources

Please note that the resources listed are examples for you to use as a starting point in your research – the list is not definitive.

Weblinks:

- https://blog.netwrix.com/ (2022) Network Devices Explained [online] Available at: https://blog.netwrix.com/2019/01/08/network-devices-explained/ [Accessed 1 August 2022] https://www.checkpoint.com/ (n.d.) What is a Firewall? [online] Available at: https://www.checkpoint.com/cyber-hub/network-security/what-is-firewall/ [Accessed 1 August 2022]
- https://www.checkpoint.com/ (n.d.) What is an IoT Gateway? [online] Available at: https://www.checkpoint.com/cyber-hub/network-security/what-is-iot/what-is-an-iot gateway/ [Accessed 1 August 2022]
- https://www.cloudflare.com/en-gb/ (n.d.) A global network built for the cloud [online] Available at: https://www.cloudflare.com/en-gb/learning/network-layer/internet-protocol/ [Accessed 1 August 2022]
- https://www.comparitech.com/ (2020) Variable Length Subnet Mask (VLSM) Tutorial [online] Available at: https://www.comparitech.com/net-admin/variable-length-subnet-mask-vlsm tutorial/ [Accessed 1 August 2022]
- https://www.comptia.org/ (n.d.) What Is a Network Protocol, and How Does It Work? [online] Available at: https://www.comptia.org/content/guides/what-is-a-network-protocol [Accessed 1 August 2022]
- https://www.ibm.com/uk-en (2021) Networking [online] Available at: https://www.ibm.com/uk-en/cloud/learn/networking-a-complete-guide [Accessed 1 August 2022]
- https://www.ibm.com/uk-en (2022) TCP/IP protocols [online] Available at: https://www.ibm.com/docs/en/aix/7.2?topic=protocol-tcpip-protocols [Accessed 1 August 2022]
- https://www.lifewire.com/ (2022) What Is Bandwidth? Definition, Meaning, and Details [online] Available at: https://www.lifewire.com/what-is-bandwidth-2625809 [Accessed 1 August 2022]
- https://www.ncsc.gov.uk/ (2019) Secure design principles [online] Available at: https://www.ncsc.gov.uk/collection/cyber-security-design-principles [Accessed 1 August 2022]
- https://www.serverwatch.com/ (2021) Network Server [online] Available at: https://www.serverwatch.com/servers/network-server/ [Accessed 1 August 2022]
- https://www.techtarget.com/ (2022) IoT gateway [online] Available at: https://www.techtarget.com/iotagenda/definition/IoT-gateway [Accessed 1 August 2022]
- https://www.univention.com/ (2022) Brief Introduction: DHCP and DNS [online] Available at: https://www.univention.com/blog-en/brief-introduction/2019/03/brief-introduction-dhcp dns/ [Accessed 1 August 2022]

Virtual Network Simulators:

- https://www.adobe.com/ (n.d.) DNS/DHCP/EMAIL VIA PACKET TRACER [online] Available at: https://express.adobe.com/page/7ogipygZfOh0B/ [Accessed 1 August 2022]
- https://techgenix.com/ (2019) Tips and tools for simulating a complex network in a virtual lab [online] Available at: https://techgenix.com/simulating-network-in-virtual-lab/ [Accessed 1 August 2022]
- https://www.eve-ng.net/ (2022) EVE - The Emulated Virtual Environment For Network, Security and DevOps Professionals [online] Available at: https://www.eve-ng.net/ [Accessed 1 August 2022]
- https://www.gns3.com/ (2022) The software that empowers network professionals [online] Available at: https://www.gns3.com/ [Accessed 1 August 2022] https://www.netacad.com/ (n.d.) Cisco Packet Tracer [online] Available at: https://www.netacad.com/courses/packet-tracer [Accessed 1 August 2022]

Journal articles.

- Agyemang, J., Kponyo, J. and Klogo, G., 2022. The State of Wireless Routers as Gateways for Internet of Things (IoT) Devices. [online] Pubs.sciepub.com. Available at: [Accessed 1 August 2022].
- Oje, A. (2021) Optimization and analysis of the packet switched network with focus on the 3G network. Journal of Physics: Conference Series, Volume 1734, International Conference on Recent Trends in Applied Research doi:10.1088/1742-6596/1734/1/012037 Available at: https://iopscience.iop.org/article/10.1088/1742-6596/1734/1/012037/meta [Accessed 1 August 2022].
- Tyagi, A. (2020) TCP/IP Protocol Suite. International Journal of Scientific Research in Computer Science Engineering and Information Technology doi:10.32628/CSEIT206420 Available at: https://www.researchgate.net/publication/346829282_TCPIP_Protocol_Suite [Accessed 1 August 2022].
- Van der Toorn et al. (2022) Addressing the challenges of modern DNS a comprehensive tutorial. Computer Science Review, Volume 45, 2022, 100469, https://doi.org/10.1016/j.cosrev.2022.100469
- Xu, G. (2021) Research on the Application of the IPv6 Network Protocol. Journal of Physics: Conference Series doi:10.1088/1742-6596/2031/1/012040 Available at: https://iopscience.iop.org/article/10.1088/1742-6596/2031/1/012040/pdf [Accessed 1 August 2022].
- Bonaventure, O. (2011) Computer Networking: Principles, Protocols and Practice, The Saylor Foundation, Available at: https://resources.saylor.org/wwwresources/archived/site/wp content/uploads/2012/02/Computer-Networking-Principles-Bonaventure-1-30-31-OTC1.pdf

Grading Rubric

Grading Criteria	Achieved	Feedback
LO1: Examine networking principles and their protocols		
P1 Discuss the benefits and constraints of different network types and standards.		
P2 Explain the impact of network topology, communication, and bandwidth requirements.		
M1 Assess common networking principles and how protocols enable the effectiveness of networked systems.		

LO2: Explain networking devices and operations.		
P3 Discuss the operating principles of networking devices and server types.		
P4 Discuss the interdependence of workstation and software relevant networking software		
M2 Explore a range of server types of hardware configuration and justify the selection of a server for a given scenario, regarding cost and performance optimization.		

D1Evaluate the topology, protocols and networking software selected for a given scenario and how it demonstrates the efficient utilization of a networking system.		
LO3: Design efficient networked systems		
P5 Design a networked system to meet a given specification.		
P6 Design a maintenance schedule to support the networked system.		

M3 Analyze user feedback on your designs with the aim of optimizing your design and improving efficiency of the new network implementation.		
D2Critically reflect on the implemented network, including the design and decisions made to enhance the system.		
LO4: Implement and diagnose networked systems.		
P7 Implement a networked system based on a prepared design.		
P8 Present the network types of topologies and the blueprint to the audience with simulation testing.		

M4 Recommend potential enhancements for the networked systems.		
D2 The PowerPoint and the packet tracer demonstration fulfil the pinging, extended pinging trace root and telnet or SSH in the implementation. Document test results against expected results (ping tests and DCHP results).		