

Student Assignment Brief

This document is intended for Coventry University Group students for their own use in completing their assessed work for this module. It must not be passed to third parties or posted on any website. If you require this document in an alternative format, please contact your Module Leader.

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The work you submit for this assignment must be your own independent work, or in the case of a group assignment your own groups' work. More information is available in the '[Assignment Task](#)' section of this assignment brief.

Assignment Information

Module Name: Networking

Module Code: 400IT

Assignment Title: Network Design and Implementation for SkyGrid Networks Ltd.

Assignment Due: 18:00 UK time

Assignment Credits: 30 credits

Word Count (or equivalent): 2000-word report +/- 10%

Assignment Type: Composite (Practical and Report)

Assignment Type: Percentage Grade (Applied Core Assessment). You will be provided with an overall grade between 0% and 100%. You have one opportunity to pass the assignment at or above 40%. Resit attempts will be capped at 40%.

Abbreviation list

Assignment Overview:

This single assignment assesses both practical and theoretical competencies in networking. It consists of:

- **Part 1 Practical Network:** Network design, implementation, testing, and reporting for a real-world case study using Cisco Packet Tracer (Practical Component - 70%.
- **Part 2 Report:** Compose a 2000-word report detailing the design of the network infrastructure for SkyGrid Networks Ltd – 30%.

Assignment Task

Practical Network Task

Task:
<p>Introduction:</p> <p>The assignment requires students to design and implement a network infrastructure for SkyGrid Networks Ltd with headquarters in York and branches in London and Warsaw respectively. The objective is to create an efficient network which is secure and scalable using the VLSM approach for IP addressing, applicable routing protocols, and VLAN configurations. Students are expected to conduct network testing and explain their findings demonstrating the reliability and applicability of the designed network.</p> <p>Task 1: Design an IP Addressing Scheme using VLSM (Total marks = 12)</p> <p>For the IP addressing scheme, assign unique subnets to the departments in branches (a department in a branch will have a unique subnet). Utilise a subnetting technique which enhances IP address distribution while allowing for future scalability. Each device in the network must be assigned an IP address.</p> <p>Given an IP address and mask of 210.165.10.0/24, design an IP addressing scheme which fulfils the following requirements in the table below using the VLSM approach for efficient use of IP addresses. You should use the number of hosts of the subnets.</p> <p>The 0th subnet is used. No subnet calculators should be used.</p>

Subnet	York Headquarters	London Branch	Warsaw Branch	Number of Hosts
Marketing Department (Subnet A)	4	6	6	16
Sales Department (Subnet B)	4	4	4	12
IT Department (Subnet C)	4	2	2	8
Total	12	12	12	36

Marketing Department (Subnet A)		
Specification	Student Input	Marks (4 marks)
Default Subnet Mask (binary)		
Custom subnet mask (decimal)		
Total number of subnets		
Total number of host addresses		
Number of usable addresses		
Number of bits borrowed		
First IP host address		
Last IP host address		

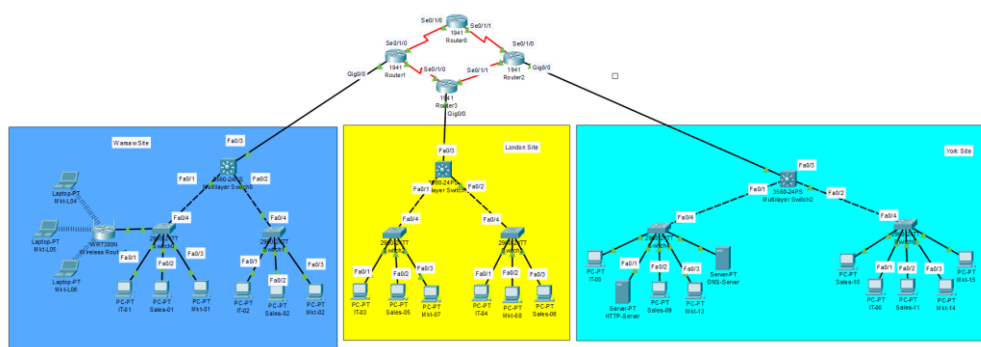
Sales Department (Subnet B)		
Specification	Student Input	Marks (4 marks)
Default subnet mask (binary)		
Custom subnet mask (decimal)		
Total number of subnets		
Total Number of host addresses		
Number of usable addresses		
Number of bits borrowed		
First IP host address		
Last IP host address		

IT Department (Subnet C)		
Specification	Student Input	Marks (4 marks)
Default subnet mask (binary)		
Custom subnet mask (decimal)		
Total number of subnets		
Total number of host addresses		
Number of usable addresses		
Number of bits borrowed		

First IP host address		
Last IP host address		

Task 2: Build and Configure the Network (Total marks =15)

Build the network infrastructure as depicted in the provided diagram using Cisco Packet Tracer. Connect Warsaw and London branches to the headquarters in York using appropriate network devices such as routers and switches. Configure the devices with the designated IP addresses from Task 1. Any missing host should be included.



Step 1: Select all the devices such as PCs, servers, laptops, switches, and routers

Step 2: Cable the network as shown in the topology.

Step 3: Configure the IP addresses and default gateway for the end-user devices (PC). The network router will use the FIRST network host address. Host computers will use any address in the subnet.

After configuring each host computer, record the host network settings with the ipconfig /all command and write down the information using the table below.

Warsaw Branch

Marketing Department (Subnet A)					
Device	IP address	Subnet Mask	Gateway	MAC Address	Marks (3 marks)
Mkt-01					
Mkt-02					
Mkt-03					
Mkt-L04					
Mkt-L05					
Mkt-L06					
Sales Department (Subnet B)					
Sales-01					
Sales-02					
Sales-03					
Sales-04					
IT Department (Subnet C)					
IT-01					
IT-02					

London Branch

Marketing Department (Subnet A)

Device	IP address	Subnet Mask	Gateway	MAC Address	Marks (3 marks)
Mkt-07					
Mkt-08					
Mkt-09					
Mkt-10					
Mkt-11					
Mkt-12					
Sale Department (Subnet B)					
Sales-05					
Sales-06					
Sales-07					
Sales-08					
IT Department (Subnet C)					
IT-03					
IT-04					
York Headquarters					
Marketing Department (Subnet A)					
Device	IP address	Subnet Mask	Gateway	MAC Address	Marks (3 marks)
Mkt-13					
Mkt-14					
Mkt-15					
Mkt-16					
Sale Department (Subnet B)					
Sales-09					
Sales-10					
Sales-11					
Sales-12					
IT Department (Subnet C)					
IT-05					
IT-06					
IT-07 (HTTP)					
IT-08 (DNS)					

Step 4: Configure VLANs for different departments as shown in the topology: **(6 marks)**

- VLAN 10: Marketing
- VLAN 20: Sales
- VLAN 30: IT

Task 3: Implement a routing protocol for communication (Total marks = 19)

Implement a suitable dynamic routing protocol (EIGRP or OSPF) to facilitate communication between routers in the network. Ensure efficient routing of data packets between different subnets and branches.

Step 1: Configure the following routers and state the IP addresses of their interfaces using the table provided below: **(4 marks)**

Device	IP address
Router 1-Se0/1/0	
Router 1- Se0/1/1	
Router 2-Se0/1/0	
Router 2-Se0/1/1	
Router 3-Se0/1/0	
Router 3-Se0/1/1	
Router 4-Se0/1/0	
Router 4-Se0/1/1	

Step 2: Configure an IP address for the following routers and Layer 3 Switches interfaces using addressing scheme mentioned in Task 1.

Record IP Address for interface indicated in the table below. (3 marks)

Device	IP address	Subnet Mask
Router 1-Gig 0/0		
Router2-Gig 0/0		
Router 3-Gig 0/0		
Multilayer Switch1- Fa 0/3		
Multilayer Switch2- Fa 0/3		
Multilayer Switch3- Fa 0/3		

Step 3: Configuration tasks for each router should also include the following: **(8 marks)**

Task	Specification
Router name	Router (number)
Encrypted privileged exec password	cisco
Console access password	class (number)
Telnet access password	class (number)
Domain name	network.local
Generate RSA keys	crypto key generate rsa (1024 bits)
Configure SSH username & password	username admin password admin123
Set login banner message	banner motd # Unauthorized access is prohibited. #

Step 4: Show the Routing Table for each Router. **(4 marks – 1 mark per row)**

Device	Protocol	Networks Advertised	Configuration Commands
Router1			
Router2			
Router3			
Router4			

Task 4: Use ping and traceroute commands for basic network testing (Total marks =12)

Conduct network testing using the ping and traceroute commands for connectivity across devices. Troubleshoot and resolve any connectivity issues which may arise during testing.

Ping and traceroute are network testing commands to check the TCP/IP network connectivity. Ping is a network administration utility used to test the reachability of a device on a network. Traceroute utility is a network diagnostic tool for displaying the route and measuring the transit delays of packets travelling on a network.

Step 1: Use the ping command to verify network connectivity.

Network connectivity can be verified with the **ping** command.

Use the following table to methodically verify connectivity with each network device. Take corrective action to establish connectivity if a test fails: **(6 marks)**

From	To (Destination)	IP Address (Destination)	Ping results (Screenshot)
IT-01	IT-02		
Sales-02	Mkt-L04		
Mkt-01	IT-05		
Sales-02	Router1 se0/1/0		
Router3 se0/1/1	Mkt-L06		
IT-01	Multilayer Switch2- Fa 0/3		

Step 2: Use the “**tracert**” command to verify network connectivity.

Use the **tracert** command to trace the path to a specific destination and write down the path to the destination. **(6 marks)**

From	To (Destination)	IP Address (Destination)	Path to destination (Screenshot)
Sales-03	Sales-01		
Mkt-L05	Router4 se0/1/1		
IT-01	Router1 se0/1/0		
Sales-05	Mkt-02		
IT-01	Multilayer Switch3- Fa 0/3		
Mkt-01	Router2 se0/1/0		

Task 5: Set Up and Configure Servers (Total marks = 12)

Configure HTTP and DNS servers on designated devices within the network. Set up necessary resources such as websites for the HTTP server and DNS records for the DNS server. Ensure proper communication and access to these servers from devices within the network.

Step 1: Configure the IP address for DNS and HTTP Server, write down the IP addresses on the table below:

Device	IP address	Default Gateway	Subnet Mask	Marks (6 marks)
DNS Server				
HTTP Server				

Step 2: Complete the DNS address field for Mkt-01 and HTTP Server with the IP address of the DNS Server

Step 3: Open the DNS Server, then add the URL: www.coventrylab.ac.uk as the domain name for the IP address of the HTTP Server

Step 4: Open the browser from Mkt-01, type in the URL: www.coventrylab.ac.uk in the address bar and open the web page. Take a snapshot of what comes up on the webpage or landing page and paste it in the text box below:

Text box	Marks (6 marks)

Report Task

Compose a 2000-word report detailing the design of the network infrastructure for SkyGrid Networks Ltd. **(Total marks = 30)**

The report should address the following points:

Addressing Schemes

- Describe the method used to develop IP addressing schemes for the different departments.
- Explain how you ensured efficient IP allocation and future scalability.

Topology

- Justify your choice of network topology for SkyGrid Networks Ltd infrastructure.
- Explain how the selected topology enhances network efficiency and resilience.

Security

- Explain the security protocols implemented to safeguard network communications.
- Elaborate on how communication between the head office and branch offices is secured.

Network Testing

- Discuss the results of the network testing using ping and traceroute commands.
- Detail any troubleshooting performed and the resolution of connectivity issues.

Reliability and Resilience

- Explain how your network design supports SkyGrid Networks Ltd by providing a reliable and resilience networking infrastructure.
- Discuss the benefits of the implemented security measures and topology in achieving this goal.

Abbreviation List:

Abbreviation	Full Form
AI	Artificial Intelligence
DNS	Domain Name System
EIGRP	Enhanced Interior Gateway Routing Protocol
HTTP	Hypertext Transfer Protocol
IP	Internet Protocol
MAC	Media Access Control
MOTD	Message of the Day
OSPF	Open Shortest Path First
PC	Personal Computer
RSA	Rivest-Shamir-Adleman (asymmetric encryption algorithm)
SSH	Secure Shell
TCP/IP	Transmission Control Protocol / Internet Protocol
UK	United Kingdom
URL	Uniform Resource Locator
VLAN	Virtual Local Area Network
VLSM	Variable Length Subnet Masking

Submission Instructions:

How will my assignment be assessed?

You are expected to submit the following documentation into Aula for this coursework:

- i. **Lab scenario paper:** To be uploaded with completed answers.
- ii. **Packet Tracer file (.pkt):** To be uploaded with completed topology.
- iii. **Notepad file:** Containing saved device configurations.

- iv. **Report:** Include screenshots of the topology, network testing performed and explain the network design and testing.

Instructions: Follow the instructions throughout the worksheet, complete network construction and answer the questions provided in the worksheet. Carefully read the instructions before attempting to complete the tasks. A network design topology is provided in CISCO Packet Tracer Software. You are expected to configure the devices in the network and save your work as a “.pkt” file.

IMPORTANT: The Packet Tracer file (.pkt) and device configurations are to be saved and uploaded to Aula (HandIn) when you are ready to submit. You should copy all device configurations and paste within a notepad file, save, and upload the file.

When saving these files, please ensure you save them using your **student ID** at the beginning of the filename. In total, you will be submitting four (4) files as outlined above. For example, 097586_Report.docx, 097586_topology.pkt, 097586_Device_Configuration.txt, and 097586_Lab_Scenario_Paper.docx.

All devices in the Packet Tracer file are provided for you as shown below, and you are expected to configure it with IP addressing and routing information. It is advisable to familiarise yourself with using the latest version of Cisco Packet Tracer. When the software is executed, it will require you to create a Cisco Netacad Account using your university email address with a different password. Further sessions require you to log in to Netacad when the software is started. You can also go to <https://www.netacad.com/courses/packet-tracer> where you can learn about the features of Packet Tracer in the Introduction to Packet Tracer Course.

This is an individual assignment. Each student must submit their own work. Group/team submissions are not permitted.

Be sure to keep backup copies of your submission. Failure to successfully upload does not excuse late submission.

Marking and Feedback

How will my assignment be marked?

Your assignment will be marked by the module team.

How will I receive my grades and feedback?

Provisional marks will be released once internally moderated.

Feedback will be provided by the module team alongside the grades release.

After marking is completed, you can access your marked work and feedback by clicking on the submission link. Feedback will be provided in the Turnitin viewer, and mark distributions will show you where marks were awarded or deducted. If you are unsure how to access your feedback, please ask your tutor for clarification.

Your provisional marks and feedback should be available within [2 weeks (10 working days)].

What will I be marked against?

Details of the marking criteria for this task can be found at the [bottom of this assignment brief](#).

Assessed Module Learning Outcomes

The Learning Outcomes for this module align to the [marking criteria](#) which can be found at the end of this brief. Ensure you understand the marking criteria to ensure successful achievement of the assessment task. The following module learning outcomes are assessed in this task:

1. Explain the function and operation of the main components of a computer.
2. Apply the concepts of communication within local and wide area networks and internetworks including access techniques.
3. Demonstrate an understanding of the protocols of wired and wireless technologies and their application in a professional computing context.
4. Design and implement a simple local area network (LAN).
5. Diagnose and correct simple network problems.

Assignment Support and Academic Integrity

If you have any questions about this assignment please see the [Student Guidance on Coursework](#) for more information.

Spelling, Punctuation, and Grammar:

You are expected to use effective, accurate, and appropriate language within this assessment task.

Academic Integrity:

The work you submit must be your own, or in the case of groupwork, that of your group. All sources of information need to be acknowledged and attributed; therefore, you must provide references for all sources of information and acknowledge any tools used in the production of your work, including Artificial Intelligence (AI). We use detection software and make routine checks for evidence of academic misconduct.

Definitions of academic misconduct, including plagiarism, self-plagiarism, and collusion can be found [on the Student Portal](#). All cases of suspected academic misconduct are referred for investigation, the outcomes of which can have profound consequences to your studies. For more information on academic integrity please visit the [Academic and Research Integrity](#) section of the Student Portal.

AI Use:

As part of your academic journey, we recognise that AI tools can offer valuable assistance in your studies. This assessment fits in the Amber category for use of AI. This means that AI use is allowed to assist in the development of an assessment in line with the student guidance.

Examples of permitted AI use include:

1. Research Assistance:

AI tools can help you find relevant sources, articles, and research papers.

AI can be used to generate ideas for topics or provide summaries of complex concepts.

2. Language and Grammar Support

AI-based grammar and spell-check tools can be used to proofread your essays.

You may use AI to enhance your writing clarity and ensure your language is academically appropriate.

3. Idea Generation and Outlining:

AI can help you brainstorm ideas or create an outline for your essay. -You may use AI to suggest ways to structure your argument or to identify key points that should be included.

4. Time Management:

AI tools can assist you in organising your study schedule, reminding you of deadlines, and managing time effectively during the writing process.

5. Understanding Complex Topics:

AI can provide simplified explanations or additional resources to help you better understand difficult concepts or theories.

Prohibited Uses of AI

1. Complete Essay Writing:

You must not use AI to write your entire essay or large sections of it. This includes generating full paragraphs, essays, or completing assignments in any automated way.

2. Plagiarism:

Submitting AI-generated content as your own is considered plagiarism and will be treated as academic misconduct. All submitted work should be your original thought and analysis.

3. Citing AI as a Source:

AI tools should not be cited as sources in your work. Your references should come from credible academic sources such as peer-reviewed journals, books, and reputable websites.

4. Avoiding Critical Thinking:

AI should not be used as a replacement for your own critical analysis and reflection.

5. Confidentiality and Ethics:

Do not input sensitive or confidential information related to clients, case studies, or your workplace or placement into AI tools, as this could breach confidentiality and ethical guidelines.

Student Acknowledgement of AI Tools

You should clearly state and acknowledge the use of AI tools before any references or bibliography. You should also provide details about the types of AI tools used along with a brief explanation of how you have used it (a sentence or 2). A simple table will suffice as below:

AI Use Category	Tool	How AI Tool was used in this assignment
e.g. Inspiring (all categories listed here under the Example Uses of AI dropdown)	e.g. ChatGPT-3.5	Key word search on topics related to learning outcomes

Any direct AI output that appears in your assignment, whether quoted, paraphrased or produced (text, images, charts, etc.) must also be referenced using the [APA Referencing guide](#).

Support for Students with Disabilities or Additional Needs:

If you have a disability, long-term health condition, specific learning difference, mental health diagnosis or symptoms and have discussed your support needs with health and wellbeing you may be able to access support that will help with your studies.

If you feel you may benefit from additional support, but have not disclosed a disability to the University, or have disclosed but are yet to discuss your support needs it is important to let us know so we can provide the right support for your circumstances. Visit [the Student Portal](#) to find out more.

Unable to Submit on Time?

The University wants you to do your best. However, we know that sometimes events happen which mean that you cannot submit your assessment by the deadline or sit a scheduled exam. If you think this might be the case, guidance on understanding what counts as an extenuating circumstance, and how to apply is [available on the Student Portal](#).

Administration of Assessment

Module Tutor Name: Mohamed Gorada

Module Tutor Email: ae0904@coventry.ac.uk

Assignment Category: Composite (Practical and Report)

Attempt Type: Standard

Component Code: Cw

Assessment Marking Criteria

Coventry University Generic Assessment Criteria: Undergraduate

Mark band	Outcome	Guidelines
80-100%	Meets learning outcomes	1 st - Exceptional work with very high degree of understanding, creativity, and critical/analytic skills. Evidence of exceptional research well beyond minimum recommended using a range of methodologies. Exceptional understanding of knowledge and subject-specific theories. Demonstrates creative flair, a high degree of originality and autonomy.
1st		Exceptional ability to apply learning resources. Demonstrates well-developed problem-solving skills. Work completed with very high degree of accuracy and proficiency and autonomy. Exceptional communication and expression, significant evidence of professional skill set. Student evidence deployment of a full range of exceptional technical, including proficiency in the English Language, and/or artistic skills.
70-79%		1 st - Excellent work with clear evidence of understanding, creativity, and critical/analytical skills. Thorough research well beyond the minimum recommended using methodologies beyond the usual range. Excellent understanding of knowledge and subject-specific theories with evidence of considerable originality and autonomy.
1st		Excellent ability to apply learning resources. Demonstrates consistent, coherent substantiated argument and interpretation. Demonstrates considerable creativity and clear problem-solving skills. Assessment completed with accuracy, proficiency, and considerable autonomy. Excellent communication and expression, some evidence of professional skill set. Student evidence deployment of a highly developed range of technical, including proficiency in the English Language, and/or artistic skills.
60-69%		2:1 - Very good work demonstrating strong understanding of theories, concepts, and issues with clear critical analysis. Thorough research, using established methodologies accurately, beyond the recommended minimum with little, if any, irrelevant material present. Very good understanding, evidencing breadth and depth, of knowledge and subject-specific theories with some originality and autonomy.
2:1		Very good ability to apply learning resources. Demonstrates coherent substantiated argument and interpretation. Demonstrates some originality, creativity, and problem-solving skills. Work completed with accuracy, proficiency, and autonomy. Very good communication and expression with evidence of professional skill set. Student has a thorough command of a good range of technical, including proficiency in the English Language, and/or artistic skills.

50-59%		<p>2:2 - Good understanding of relevant theories, concepts, and issues with some critical analysis. Research undertaken accurately using established methodologies, enquiry beyond that recommended may be present. Some errors may be present and some inclusion of irrelevant material. Good understanding, with evidence of breadth and depth, of knowledge and subject-specific theories with indications of originality and autonomy.</p> <p>Good ability to apply learning resources. Demonstrates logical argument and interpretation with supporting evidence. Demonstrates some originality, creativity, and problem-solving skills but with inconsistencies. Expression and presentation mostly accurate, proficient, and conducted with some autonomy. Good communication and expression with appropriate professional skill set. Student consistently demonstrates a well-developed range of technical, including proficiency in the English Language, and/or artistic skills.</p>
40-49%		<p>3rd - Meet the learning outcomes with a basic understanding of relevant theories, concepts, and issues. Demonstrates an understanding of knowledge and subject-specific theories sufficient to deal with concepts. Assessment may be incomplete and with some errors. Research scope sufficient to evidence use of some established methodologies. Some irrelevant material likely to be present.</p> <p>Basic ability to apply learning resources. Demonstrates ability to devise and sustain an argument. Demonstrates some originality, creativity and problem-solving skills but with inconsistencies. Expression and presentation sufficient for accuracy and proficiency. Sufficient communication and expression with basic professional skill set. Student demonstrates technical, including a basic level of proficiency in the English Language, and/or artistic skills.</p>
30-39%	Fails to achieve learning outcomes	<p>Fail – Outcomes not met. Limited understanding of relevant theories, concepts, and issues. Little evidence of research and use of established methodologies. Some relevant material will be present. Deficiencies evident in analysis. Fundamental errors and some misunderstanding likely to be present.</p> <p>Limited ability to apply learning resources. Student's arguments are weak and poorly constructed. Limited originality, creativity, and struggles with problem-solving skills. Expression and presentation insufficient for accuracy and proficiency. Insufficient communication and expression and with deficiencies in professional skill set. Student demonstrates some deficiencies in technical, including in their use of the English Language, and/or artistic skills.</p>
0-29%		<p>Fail – Outcomes not met. Clear failure demonstrating very little understanding of relevant theories, concepts, and issues. Minimal evidence of research and use of established methodologies and incomplete knowledge of the area. Serious and fundamental errors and aspects missing.</p> <p>Very little evidence of ability to apply learning resources. Student's arguments are very weak and with no evidence of alternative views. Little evidence of originality, creativity, and problem-solving skills. Expression and presentation</p>
Fail		

		deficient for accuracy and proficiency. Insufficient communication and expression and with deficiencies in professional skill set. Student demonstrates a lack of technical, including in their use of the English Language, and/or artistic skills.
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