Bachelor of Information and Communication Technology (BICT) Honours Degree

CTEC 12052: Data Communication and Networking

Assignment 2: Subnetting

Network Design and Implementation for ABC Productions

Background:

'ABC Productions' is the largest advertising company in Sri Lanka, planning to rent a new building to establish its IT, Finance, HR, and Production departments. The building has four floors and a reception area on the ground floor.

- **Ground floor:** Reception unit (3 hosts)

- **1st floor:** HR department (15 hosts) and Finance department (7 hosts)

- **2nd floor:** IT department (55 hosts)

- **3rd floor:** Production department (23 hosts)

Assignment Tasks

a) Network Design

You have been hired as a 3rd-party network engineer to design the network for 'ABC Productions.' Your task is to:

1. **Design a network diagram** for ABC Productions, assigning suitable IP addresses to each department/unit.

2. Ensure **each department/unit has a separate network subnet** to enhance information security.

3. All devices must have **internet connectivity**.

4. Select and **justify suitable network devices** (routers, switches, etc.) and **cabling types** (copper, fiber, etc.) to meet the requirements.

Deliverables:

- **Create a report** including A clear, labeled network diagram.

- Include an IP addressing scheme table, showing subnet masks and ranges for each department/unit **in your report.**

- Explanation and justification for chosen network devices and cabling **in the report.**

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b) Network Implementation

Implement your designed network using a network simulation tool such as **Cisco Packet Tracer** or any other preferred tool.

Requirements:

- Simulate connectivity between all PCs (you can symbolize PC bulk using 2/3 PCs) within each department and unit.

- Demonstrate connectivity from each department/unit to the internet (simulate global network connectivity).

- Include configuration of routers, switches, and IP addressing according to your design.

Deliverables:

- Packet Tracer (.pkt) file or equivalent simulation file.

- Include screenshots with brief explaining of **each configuration** and **connectivity tests** (ping, traceroute, etc.) **in your report.**

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c) Network Redundancy Improvements

Analyze your network design and propose methods to **improve redundancy** and availability.

Considerations:

- Redundant links or devices to avoid **single points of failure.**

- Backup power solutions.

Deliverables:

- List and explanation of **recommended redundancy solutions** for ABC Productions' network **in your report.**

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d) Network Security Suggestions

Suggest ways to **secure the internal network** against unauthorized access from outside global networks (internet).

Considerations:

- Firewall deployment and configuration.

- Use of VPNs or secure tunnels.

- Intrusion detection/prevention systems.

- Network segmentation, access control lists (ACLs), and other security measures.

Deliverables:

- Include detailed suggestions and justifications for **enhancing network security** for ABC Productions **in your report.**

Submission Guidelines

- Submit a single zipped folder containing:

    o A detailed report including answers for each question (PDF format).

    o Maximum word count of the **report: 4000 words**

    o Network simulation file(s).

- Clearly label all files with your name and student ID.

Grading Criteria

Criteria	Weight
Network design accuracy and IP addressing	30%
Justification of network devices and cables	15%
Successful network simulation implementation	30%
Redundancy improvement suggestions	10%
Network security suggestions	15%

Caution

- ✓ This assignment will be subjected to **plagiarism detection** and **AI-generated content checks** using **appropriate** software.