Faculty of Engineering and Technology

Coursework Title: **AS1 - Application Evaluation**

Module Name: **ADVANCED NETWORKS**
Module Code: **6514CSMM**
Level: **6**
Credit Rating: 20

Weighting: **50%**
Maximum mark available: **100%**

Lecturer: Thet Zaw Aye
Contact: If you have any issues with this coursework you may contact your lecturer.
                          Contact details are:
                          Email: thetzawaye@auston.edu.mm
                          Room: Teacher Lounge, Junction Square Campus

Hand-out Date: 6th Nov 2024

Hand-in Date: 6th Dec 2024
Hand-in Method: Assignment on Microsoft Team

Feedback Date: 15 working days after Hand-in date

Feedback Method: Feedback will be uploaded on Team

Programmes: Computer Networks

Assessment type: Individual work

Introduction

Network management includes the deployment, the integration, and the coordination of hardware, software, and network elements to monitor, test, configure, analyse, evaluate, and control the network and element resources, to address in real-time operational performance, Quality of Service (QoS) and Quality of Experience (QoE) requirements.

For this assignment, we consider the branch of a major company, which employs 30 people. Each employee has access to a Personal Computer (PC) and all PCs are interconnected forming a Local

Area Network (LAN). The branch's LAN is connected to the company headquarters (HQ) office via a leased line connection that offers 2,048Kbps bandwidth, which also allows the employees to access the Internet.

Employees at the branch can use the PCs to browse the web and to make Voice-over-IP (VoIP) calls using a specific application built by the company. This VoIP application can operate in two modes: Low Fidelity mode with 32Kbps bitrate, and High Fidelity mode with 128Kbps bitrate.

Learning Outcomes to be assessed

- Evaluate a range of state of the art developments in networking.

Detail of the task

1. Introduction to Quality of Service

You will first provide an introduction to the field of QoS management that should not exceed 500 words. This will include:

- Explanation of why QoS management is important in the Congestion Management.
- Discussion of the most common service classes and one architecture studied in this module that specifies the elements to guarantee QoS.
- Description of two QoS mechanisms studied in this module to address Congestion Management.

2. Design of Quality of Service Policy

In this task, you are required to devise a QoS policy that relies on a QoS mechanism studied in this module and prioritises VoIP traffic over web traffic in the following scenarios:

- Scenario 1: All the employees in the branch need simultaneous VoIP conversations guaranteed in Low Fidelity mode without interruption of service.
- Scenario 2: Ten employees need simultaneous VoIP conversations guaranteed in required High Fidelity mode without interruptions of service.

Assuming that the capacity limit in the QoS policy can be no more than the 40% of the link available bandwidth, you are required to address the following:

1. Discuss the traffic parameters that need to be prioritized for VoIP conversations, and the suitable QoS mechanism to be used.
2. Discuss the VoIP mode, define the corresponding bit rate and the capacity limit in the used QoS policy in order to satisfy employees' requirements, and dedicate as much bandwidth as possible for web browsing in Scenario 1.

3. Discuss the VoIP mode, define the corresponding bit rate and the capacity limit in the used QoS policy in order to satisfy employees' requirements, and dedicate as much bandwidth as possible for web browsing in Scenario 2.

3. Design of Quality of Experience Strategy

In this task, you are required to produce a report that describes a Quality of Experience (QoE) strategy to monitor the QoS policy devised in the second task, and that should not exceed 500 words.

Your report should start with a planning phase that introduces different values of QoE, which should vary between bad and good with some intermediate value.

Next, your report will describe a lab-testing phase that connects each of the QoE values introduced in the planning phase to suitable QoS values.

Third, you will explain the monitoring describing how you will involve in the test all the employees in the branch in order to judge the connection.

Finally, you will conclude the report describing a map of all the QoE values with the corresponding outcomes from the monitoring phase.

What you should hand in

The coursework is **an individual piece** of work and you should submit a **single word processed document** covering the topics outlined above.

The report should be submitted electronically via Microsoft Teams.

Marking Scheme/Assessment Criteria

Assessment Criteria	% weighting for each problem part
1. Introduction to Quality of Service	**30**
Explanation of why QoS management is important in the Congestion Management	8
Discussion of Service Classes and Architecture	10
Description of two QoS mechanisms to address Congestion Management	12
2. QoS Policy	**40**
Discussion of the traffic parameters that need to be prioritized for VoIP conversations, and the suitable QoS tool to be used	10
Consideration Scenario 1	15
Consideration Scenario 2	15
3. QoE Strategy	**20**
Planning	5
Lab-testing	5
Monitoring	5

Mapping	5
Report format and presentation	**5**
References	**5**
Total	**100**

Grade descriptors

Mark Range	Characteristic	Criteria
90-100	Exceptional pass	Exemplary attainment of all learning outcomes Demonstrates an exceptional grasp of key concepts with comprehensive application to systems analysis and design The material covered is accurate and relevant The argument is highly sophisticated The writing style is refined Well-presented and organised in an appropriate academic style
80-89	Outstanding pass	Excellent attainment of all learning outcomes, with some met to an exemplary standard Demonstrates an outstanding grasp of key concepts with comprehensive application to systems analysis and design The material covered is accurate and relevant The argument is generally very astute The writing style is refined Well-presented and organised in an appropriate academic style
70-79	Excellent pass	Excellent attainment of all learning outcomes Demonstrates an excellent grasp of key concepts with wide-ranging application to systems analysis and design The material covered is accurate and relevant The argument is persuasive and there are very perceptive elements The writing style is highly advanced Well-presented and organised in an appropriate academic style
60-69	Good pass	Good attainment of all learning outcomes Demonstrates a good grasp of key concepts with generally sound application to systems analysis and design The material covered is accurate and relevant The argument is persuasive The writing style is well clear and readable, with some sophisticated phrasing Well-presented and organised in an appropriate academic style
50-59	Clear pass	Adequate attainment of all learning outcomes, with some met to a good standard Demonstrates a good grasp of key concepts with limited application to systems analysis and design The material covered is mostly accurate and relevant The argument is straightforward and relatively clear

		The writing style is clear and readable. Generally well presented and organised, but does not always conform to conventions of academic presentation
40-49	Threshold / satisfactory pass	Adequate attainment of all learning outcomes Demonstrates a reasonable grasp of key concepts with limited application to systems analysis and design There are some inaccuracies or irrelevant materials, but there is sufficient accurate material to suggest a threshold level of understanding The argument is relatively clear, although some elements are difficult to understand The writing style is reasonable and there are very few areas of confusion and/or errors in spelling/grammar. Good presentation that may include some organisational errors and/or tendency not to conform to conventions of academic presentation
30-39	Needs improvement	Meets most, but not all learning outcomes Demonstrates a reasonable grasp of key concepts, but no application to systems analysis and design Some materials is accurate, but the amount of inaccurate or irrelevant materials indicates insufficient understanding of key concepts The argument is poorly defined and defended Writing style is acceptable. The structure is reasonable, but there are some areas of confusion and/or some errors in spelling/grammar Acceptable presentation that may include some organisational errors and a tendency not to conform to conventions of academic presentation
20-29	Needs significant revision	Does not meet most learning outcomes Demonstrates a poor grasp of key concepts with no application to systems analysis and design The argument is very weak Writing style tends to be weak. The structure is confused and/or there are numerous errors in spelling/grammar. Generally weak or untidy presentation that may include some organisational errors and does not to conform to conventions of academic presentation

0-19	Needs substantial work	Does not meet any learning outcomes
		Demonstrates a fundamentally flawed understanding of key concepts
		The material covered is inaccurate or irrelevant
		The argument is incoherent
		Writing style is poor. The structure is disorganised and/or there are too many errors in spelling/grammar.
		Weak or untidy presentation

Recommended reading

Course notes and reading list suggested during the course. Moreover, you are free to consult research works published by IEEE Explore, the ACM Digital Library, or any other repository.

Extenuating Circumstances

If something serious happens that means that you will not be able to complete this assignment, you need to contact the module leader as soon as possible. There are a number of things that can be done to help, such as extensions, waivers and alternative assessments, but we can only arrange this if you tell us. To ensure that the system is not abused, you will need to provide some evidence of the problem.

More guidance is available at https://www.ljmu.ac.uk/about-us/public-information/student-regulations/guidance-policy-and-process

Any coursework submitted late without the prior agreement of the module leader will receive 0 marks.

Academic Misconduct

The University defines Academic Misconduct as 'any case of deliberate, premeditated cheating, collusion, plagiarism or falsification of information, in an attempt to deceive and gain an unfair advantage in assessment'. This includes attempting to gain marks as part of a team without making a contribution. The Faculty takes Academic Misconduct very seriously and any suspected cases will be investigated through the University's standard policy (https://www.ljmu.ac.uk/about-us/public-information/student-regulations/academic-misconduct). If you are found guilty, you may be expelled from the University with no award.

It is your responsibility to ensure that you understand what constitutes Academic Misconduct and to ensure that you do not break the rules. If you are unclear about what is required, please ask.

For more information you are directed to following the University web pages:

- Information on *study skills*:

https://www.ljmu.ac.uk/microsites/library/skills-ljmu
- Information regarding *referencing*:
https://www.ljmu.ac.uk/microsites/library/skills-ljmu/referencing-and-endnote