##### School of Computer of Science

##### ASSIGNMENT BRIEFING SHEET (2019/20 Academic Year)

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| **Assignment Title** | Assignment 2 | **Date Submitted** |  |
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| **Module Title** | Routing and Switching Concepts | **Module**  **Code** | **5FTC1319** |

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| **Tutor** | **Azita Pourghasem** | **GROUP or INDIVIDUAL Assignment** | ***Individual*** |

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| **FOR INDIVIDUAL ASSIGNMENTS – *STUDENT TO COMPLETE***   |  | | --- | | **(Comments on this assignment by students can be made on the back of the assignment briefing sheet).**  By completing **BOX A** below, I certify that thesubmitted work is entirely mine and that any material derived or quoted from the published or unpublished work of other persons has been duly acknowledged. **[ref. UPR AS12, section 7 and UPR AS14 (Appendix III)].**  *Please print your forename and surname in capitals and provide your ID (srn) number.* |   **BOX A**   |  |  |  |  | | --- | --- | --- | --- | | **Student Forename**  *(in CAPS please)* | **Student Surname**  *(in CAPS please)* | **Student ID Number (SRN)** | **Signature of Student** | |  |  |  |  | |

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| **FOR GROUP ASSIGNMENTS - *STUDENTS TO COMPLETE***   |  |  |  | | --- | --- | --- | | ***Group Name/Number (if allocated by module team****)* |  |  |  |  | | --- | | **(Student comments on this assignment can be made on the back of the assignment briefing sheet)**  By completing **BOX B** below, we certify that the submission is entirely ours and that any material derived or quoted from the published or unpublished work of other persons has been duly acknowledged. **[ref. UPR AS/C/6.1, section 7 and UPR AS/C/5 (Appendix III)].**  *Please print your forenames and surnames in capitals, provide your; - ID numbers, actual time spent on the assignment and your signatures. By signing the submission you certify that this work represents equal contributions from all team members.* *If this is not the case, the module leader* ***must*** *be informed before submission.* | |

**This sheet must be submitted with the assignment, signed and either BOX A or B filled in.**

**LATE SUBMISSION WILL ATTRACT A STANDARD LATENESS PENALTY.**

1. For undergraduate modules, a score of 40% or above represents a pass mark.
2. For postgraduate modules, a score of 50% or above represents a pass mark.
3. For work submitted up to 5 working days late marked is capped to a bare pass (40% for undergraduate and 50% for postgraduate).
4. For work submitted more than 5 working days a mark of zero will be awarded for the assignment.

##### School of Computer of Science

##### ASSIGNMENT BRIEFING SHEET (2017/18 Academic Year)

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| **THE ASSIGNMENT TASK:**  ***see attached*** |
| **MODULE LEARNING OUTCOMES ASSESSED BY THIS ASSIGNMENT:**  ***see attached*** |
| **SUBMISSION REQUIREMENTS:**  ***see attached*** |
| **FEEDBACK FROM THIS ASSIGNMENT**  ***see attached*** |
| **MARKS AWARDED FOR:**  ***see attached*** ***feedback sheet*** |

### DEADLINES AND ASSIGNMENT WEIGHTINGS

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| 1 | This assignment is worth | | 50% | | of the **overall assessment** for this module. | | | |
|  |  | |  | |  | | | |
| 2 | You are expected to spend about | | | *25* | | Hours to complete this assignment to a satisfactory standard | | |
|  |  | | |  | |  | | |
| 3 | Date assignment set | 18/09/2019 | | | | Date completed assignment to be handed in | 06/12/2019 | |
|  |  |  | | | |  |  | |
| 4 | Target date for return of marked assignment | | | | | 20/12/2019 |  |  |

**INTERNAL MODERATION**

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| This assignment has been internally moderated. I confirm that the assignment set, meets the requirements of the module and that the brief provides appropriate content for students to successfully complete the assignment. | ***Moderator name, signature and date*** |

**FOUNDATION DEGREE – Computing Technologies Level 5**

**Mark: □**

**College:**  NHC / WHC \_\_\_\_\_\_

**Tutor Name: \_\_\_\_\_ Kevin Large / Azita Pourghasem**

**Module Name:**  Routing and Switching Concepts

**Module codes: 5FTC1318**

**Assignment No:**  **Assignment 2**

**Date Issued: \_\_\_\_\_\_18 September 2019**

**To be submitted by: \_\_\_\_\_6 December 2019**

## Learning Outcomes:

* *K2 - Analyse the switch operations, the functionality of Ethernet switches and network segmentation through VLANs to provide secure connections*
* *K3 - Examine DHCP and NAT operations and their usage in small to medium-sized business networks*
* *S2 - Plan and configure VLAN communication and security on Ethernet switches*
* *S3 - Design and implement DHCP and NAT operations on routers and configure network monitoring tools*

**Feedback Comments to Students:**

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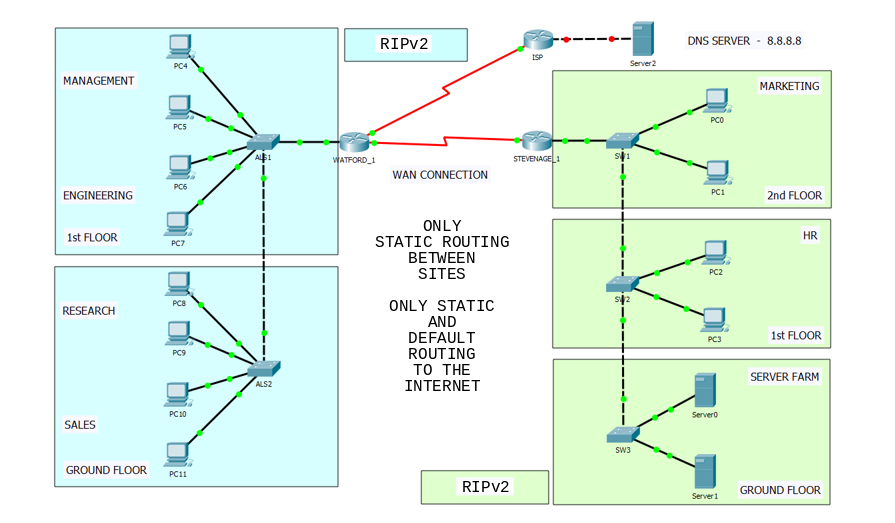
**Comments from Moderators:**

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|  | **Print Name and Sign** | **Date** |
| **Assessor** |  |  |
| Internal Moderator |  |  |
| **Cross-Moderator** |  |  |

**Scenario:**

This assignment continues from Task 1, the focus is to improve the network of the electronic test equipment manufacturer with the main site in Watford and the new site in Stevenage. A meeting with the client brought about some new decisions regarding the network design. You also have applied for a new position in your own company and the management are using this project as part of the application process.

The setup of the network is given below:



After studying the prototype you created in assignment 1 the company representatives have requested additional changes to the design.

The new requirements are:

* In order to reduce cost whilst maintaining performance and security at both the Watford and Stevenage sites, the following changes will be introduced to the design:
  + Only one router will be required at each site. Extensive use will be made of VLAN’s, trunking between switches and inter-VLAN routing.
  + Trunk links between intermediary devices should use gigabit interfaces to maximise available bandwidth. Only the VLAN’s specifically required on each site should be allowed to traverse the trunk links.
  + All PC’s in each site should obtain their full IP addressing information using DHCP configured on the respective sites router. On each subnet the last five IP addresses should not be allocated by DHCP.
  + The IP addressing scheme should remain the same as in assignment 1.
  + All PC’s at the Watford site should be able to browse to the two web servers located in the server farm **using HTTPS.** However the PC’s in the **Management** and **Research** subnets should also be able to browse the two web servers using **HTTP.**
  + All PC’s in the Watford site that have been allocated IP addresses with an even number in the fourth octet should be allowed to ping the web servers. PC’s with allocated odd numbers in the fourth octet of their IP addresses should **not** be able to ping the web servers.

You will need to configure an access control list (ACL) to meet the above two requirements.

* + Configure Port Address Translation on the edge router WATFORD\_1. All network traffic originating from hosts on the Watford Site destined for the ISP network should be translated to a public address of your choice. This will be checked by pinging the external DNS server from a host on the Watford site then running “show ip nat translations” on the WATFORD\_1 router. Port Address Translation is the most widely used version of NAT.
* You need to study the design and prepare a set of questions that arise from the analysis. The questions must reflect your analytical skills and knowledge of the configured network from the previous task. You will discuss the design and ask these questions to your project manager (tutor) in a 1:1 meeting. You will upload these questions, and the answers, together with the report for this task, as a separate section called “Questions prepared for the meeting with the client”.
* You can even make suggestions in the 1:1 meeting with your client (tutor) to make further change to the design if you think that it will improve the traffic flow in the network. However bear in mind that no addition network infrastructure devices will be supplied.

In order to establish connections between the VLAN networks present at each site, you will be required to configure Inter-VLAN routing using sub-interfaces on the routers and configure trunking both between the switches and between the correct access layer switch and the router.

If implemented correctly the IP addressing scheme should not require any changes.

Do you think that you will be required to modify the routing protocol configuration?

You will provide a short report of 1000 -1200 words, providing the following in a structured way:

* The questions you have prepared for the meeting with the client
* The new design which is well explained by a rationale relating to the requirements
* Explanations of the VLANs, InterVLAN routing, DHCP, ACL and PAT configuration steps.
* Benefits of using VLANs within an organisation. As you will have to carry out research, you will need to properly cite your resources and provide a reference page.

You will need to upload the new prototype with the name YourName-T1electro-VLANs and the report onto the online repository for Assignment 2.

**Mark sheet for Task 2:**

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| **Task 2 Checklist** | **Percentage awarded** |
| Preparing a good set of questions which reflect a good analysis of the design and show a good understanding of the requirements | 5 |
| Making the correct design changes  The initial configuration on the prototype works correctly and the all the devices have the right IP addressing information | 5 |
| VLANs are configured correctly in each of the two sites | 5 |
| InterVLAN routing is configured correctly and the VLANs communicate with each other. | 10 |
| Configuration of DHCP pools and excluded addresses. PCs receive the IP addressing configuration through DHCP | 5 |
| Configuration of the ACL so that it meets the traffic filtering requirements set out in the assignment brief | 10 |
| Configuration of the PAT on the edge router in the Watford site | 5 |
| Technical explanations are given throughout the report about the configuration of the switches and routers, which show a very good understanding of VLAN configuration, InterVLAN routing, DHCP and ACL configuration and implementation | 40 |
| The report is well-structured and shows very good report writing skills | 10 |
| Harvard referencing is properly used and all sources are cited in the text and reference page | 5 |
| **TOTAL** | **100** |

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| **Numeric Grade** |  | Grading Criteria | | | | |
|  | **Communication:**Presenting work, use of appropriate structures, methods, language, grammar and source materials, Harvard referencing | **Demonstration of Knowledge:**Provide solutions that show knowledge of initial problems /Configuration of default routes or route re-distribution | **Application of Technology / Demonstration of Practical Skills:** Router configuration, use of applications, applying technology to problems | **Ideas/Concept Development**Initial implementation of given designs, Design and Implementation of IP addressing scheme | **Analysis, Critical Evaluation and/or Reflection (with derivation of solution):** Demonstration of evaluation, testing and reflection. |
| **90-100** | **Outstanding** | Outstanding presentation and clarity. No grammatical / spelling or structural errors. Ideas presented with exceptional clarity. Outstanding standard of referencing in text and highly accurate | Outstanding breadth and depth demonstrated. Outstanding integration of literature and/or theory into the report.  Outstanding exploration and demonstration of topic showing in depth knowledge and understanding | Outstanding description of risks. Occasionally stepping beyond expectations using sophisticated solutions. Consistently accurate and outstanding application of skills and techniques demonstrated. | Outstanding action plan. Accurate and detailed set of tasks, including predecessor tasks (when applicable).  Outstanding risk management (e.g. consideration of optimistic and pessimistic time estimates).  Outstanding presentation and legibility. | Outstanding level of analysis, critical evaluation and/or reflection Highly developed / focused work. Original and well informed personal response |
| **80-90** | **Excellent** | Excellent presentation and clarity. No significant grammatical / spelling or structural errors. Ideas presented with exceptional clarity. Excellent standard of referencing in text and highly accurate | Excellent breadth and depth demonstrated. Excellent integration of literature and/or theory into the report.  Excellent exploration and demonstration of topic showing in depth knowledge and understanding | Excellent description of risks. Occasionally stepping beyond expectations using sophisticated solutions. Consistently accurate and Excellent application of skills and techniques demonstrated. | Excellent action plan. Accurate and detailed set of tasks, including predecessor tasks (when applicable).  Excellent risk management (e.g. consideration of optimistic and pessimistic time estimates).  Excellent presentation and legibility. | Excellent level of analysis, critical evaluation and/or Highly developed / focused work. Original and well informed personal response |
| **70-79** | **Very good** | Very good structure. Fluent writing style with very few errors. Very minor grammatical / spelling or structural errors. Ideas presented with Very good clarity. Very good standard of referencing in text, and highly accurate | Very good breadth & depth demonstrated. Very good integration of literature and/or theory into the report.  Very good level of knowledge and understanding demonstrated. Covers all relevant points and issues. | Clear identification of possible risks. Outstanding assessment of potential consequences in the context of the project.  Evidence of plan for minimizing any negative effects. | Action plan is detailed and complete, with information on progress made. Accurate and detailed set of tasks, including predecessor tasks (when applicable).  Evidence of risk management (e.g. consideration of optimistic and pessimistic time estimates).  Very good presentation and legibility. | Very good level of analysis, critical evaluation. Well-developed personal response |
| **60-69** | **Good** | Good clear structure. Articulate, fluent writing style and structure. Very few grammatical errors, spelling mistakes or structural issues. Ideas presented with clarity. Good standard referencing in text, with very accurate use with minor errors | Good breadth & depth demonstrated appropriate to topic.  Literature and/or theory integrated very well.  Good level of knowledge and understanding demonstrated. | Clear identification of possible risks. Excellent assessment of potential consequences in the context of the project. | Action plan is detailed and complete. Accurate and detailed set of tasks, including predecessor tasks (when applicable).  Accurate time estimates.  Good presentation and legibility. | Good level of, analysis, critical evaluation and/or reflection but not consistently taken to full extent. Partial personal response tends towards descriptive |
| **50-59** | **Clear Pass** | Writing is mainly clear but some spelling and / or grammatical errors with some structural issues. Ideas presented with some issues in clarity Very good standard referencing in text, with very accurate use, with some errors | Depth appropriate to topic BUT moderate breadth or vice versa. Literature and/or theory integrated into work.  Good grasp of the topic and some of its implications. Knowledge and understanding is demonstrated. Minor errors / omissions. | Clear identification of possible risks and potential consequences, but not consistently taken to the full extent. | Action plan is complete. Accurate and detailed set of tasks and time estimates, with some minor errors in technique.  Satisfactory presentation and legibility. | Evidence of analysis and/or reflection but critical evaluation could be expanded on further. Primarily descriptive personal response, sometimes restricted to immediate concerns |

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| **40-49** | **Marginal Pass** | Satisfactory structure. Not always written clearly and has grammatical and / or spelling errors. Ideas not always clearly presented. Satisfactory standard referencing in text, relatively accurate but showing errors | Sections of the report that are without comment where necessary. Satisfactory content / level of knowledge of the topic. Addresses part of the question. Some errors / omissions. | Most but not all possible risks and potential consequences identified | Action plan is complete. Good set of tasks and time estimates, with some errors in technique.  Satisfactory presentation and legibility. | Satisfactory level of analysis and/or reflection but limited evidence of critical evaluation. Descriptive personal response mainly restricted to immediate concerns |
| **30-39** | **Marginal Fail** | Poor structure. Has many spelling and /or grammatical errors. Poor presentation of ideas. Limited referencing in text, references use shows inaccuracy and/or many errors | Limited in breadth and depth demonstrated. Limited content / knowledge. Limited or muddled understanding of the topic/question. | Routine identification of possible risks and potential consequences. | Almost complete action plan Gantt chart. Key tasks/resources sections have been missed. Timelines need to be reviewed and/or tasks/ dependencies have been missed. | Limited evidence of analysis, critical evaluation and/or reflection. Too descriptive in parts. Limited personal response. |
| **20-29** | **Clear Fail** | Lacking Structure –arguments difficult to follow. Poorly written and/or poor spelling and grammar. Few clear ideas presented. Lacking referencing within text with a high level of inaccuracy. | Lacking in breadth and depth. Some parts of the report are irrelevant to the topic area. Lacking knowledge Content irrelevant / inaccurate.  Does not address the question and therefore does not meet the learning outcomes. | Few risks and/or potential consequences identified. | Partially completed action plan or Gantt chart. | Lacking in its level of analysis / critical evaluation and/or reflection.  Mainly descriptive, lacking in personal response. |
| **0-19** | **Little or Nothing of Merit** | No appropriate structure. Very difficult to follow. Many grammatical errors. Many spelling mistakes. No presentation of ideas. Unsatisfactory referencing within text. Reference list does not match references in text.  References list has incorrect citations and/or is not the recommended format. No reference list included. | No / unsatisfactory evidence used and irrelevant to topic area  No / unsatisfactory level of knowledge demonstrated.  Content not appropriate to the topic. | None submitted, or irrelevant. | Minimal or no evidence of an action plan or Gantt chart. | Unsatisfactory level of analysis / critical evaluation and or reflection.  Wholly descriptive. No personal response. |