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| **Qualification Details** | | | |
| **Training Package Code & Title** | **UEE11 – Electrotechnology Training Package (Release 2.0)** | | |
| **Qualification National Code & Title** | **UEE40720 – Certificate IV in Electronics and**  **Communications** | **State code:** | **BFP4** |
| **UEE40120 – Certificate IV in**  **Computer Systems** | **BFL8** |
| **UEE50520 – Diploma of Electronics and**  **Communications Engineering** | **BFP5** |
| **UEE50120 – Diploma of**  **Computer Systems Engineering** | **BFQ6** |

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| --- | --- | --- | --- |
| **Assessment Title** *(as per DAP)* | Portfolio 1 | **Location** | 10F80 |
| **Date Due** | Week 12 | **Date Received** |  |

|  |  |
| --- | --- |
| **Student Name** |  |
| **Student Declaration** | I declare that the evidence submitted is my own work: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Assessor Name** | **Jamal Abu Shnaf** | | | |
| **Assessment Decision** | Satisfactory | | Not Yet Satisfactory | |
| **Is student eligible for reassessment (Re-sit)?** | No | Yes | **Reassessment Date:** |  |
| **Assessor Signature** |  | | **Date** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Feedback to student** | | | |
| See BB | | | |
| **Feedback from student** | | | |
|  | | | |
| **Student signature** |  | **Date** |  |

**Student Instructions**

This is a practical assessment. You will configure a wireless network and enable basic security using the commands in CLI using a 1252 Access Point. You will investigate selection of equipment, wireless parameters, performance, safety and regulations for a wireless network.

* Time Allocations: You will be given three hours to complete this task.
* Location of Assessment: In class
* Resources required: Computer, access to Internet, Access Point, cables, putty and Blackboard
* Adjustments to assessments may be made for you, providing the adjustments comply with the principles of assessment and rules of evidence.
* You must answer all nine questions satisfactorily. Answers must be provided for all sections that are highlighted by green. Answer in the space provided. Use a different color font so your answer stands out from the question. Submission must be through Black Board (BB).
* You must ensure that you have answered all parts of a question. You must include at least a paragraph for a 'briefly explain' question. One sentence will be deemed unsatisfactory.
* Feedback will be given through Black Board (BB). In case of not passing this assessment, you can re-sit for another assessment in Week 10 or 20 (the assessor will confirm with you the date).
* You may be asked verbal questions in class to prove authenticity and further proof of understanding of the submitted assessment.

**Preparation and OHS**

Students will be observed on the following throughout this assessment:

The following table (Table 1) contains:

Established OHS risk control measures and procedures in Electrotechnology.

Student Check Lists (please tick when you have completed the following)

|  |  |  |
| --- | --- | --- |
| **Assessment Criteria** | | |
| To be deemed satisfactory:  Answer all questions satisfactorily.  The following OHS checklist must be demonstrated by student. | | |
|  | **Student Check list** | **Observed** |
| OHS processes and procedures for Electrotechnology area followed. | Only used approved power packs. |  |
|  | Turn off power while making changes to a circuit connection. |  |
|  | Anti-static protection of ICs are followed. |  |
| Established OHS risk control measures and procedures in Electro-technology (Thornlie Campus) are followed. | Students are able to identify location of Circuit breakers |  |
|  | Hazards are identified and reported. |  |
|  | Unexpected situations are dealt with safely |  |
|  | Student awareness of First aid kit. |  |
|  | Students awareness First aid officer:  9267 7555 |  |
|  | Students awareness Campus Security: 9267 7666 |  |
|  | Work site cleaned, tools and equipment put away appropriately |  |
| Anti Discrimination legislation, regulations, polices and workplace procedures followed | Students completed all tasks while following all anti-discrimination legislation, regulations, policies and workplace procedures including using correct language when speaking to other students and lecturer and adhering to SM TAFE equity and diversity policy. |  |
| Sustainability principles followed | Students completed the task with minimum wastage and recycled components where possible. |  |
| Working with live power 240V  Students are strictly advised that they are not allowed to test/ measure 240 V without direct Lecturer supervision. | Students are observed that they disconnected power while modifying their Circuit. |  |

**Assume you are working as a Network Technician for ABC\_LAN. You will configure a wireless network using an Access Point and enable basic security using the commands in CLI. You will decide on the differences between two security methods.**

**Client Criteria:**

This assessment will be carried out as an industry simulation and where possible will reproduce and replicate the industry.

You are given a design specification of a wireless network. You are required to complete all 11 specification task for a wireless network design at Thornlie Campus.

Answers must be provided for all sections that are highlighted by green.

**Specification Task 1**

**Site Map**

Draw a site map of Block 10 on a A3 paper.

Use the following assumptions:

All large classrooms are 6m X 9m.

Small rooms are 4m x 4m.

Classrooms will have 20 computers.

You must include both floors, Gazebo area and the main courtyard.

Assume you will have access to the ceiling area to place antennas.

*Requirement 1a:*

*Produce an A3 site map for Block 10, including upstairs and downstairs. This diagram will show:*

*Locations of all IDFs with an appropriate name.*

*Connection between IDFs with a dotted line.*

*RF signal mapping for the Courtyard and Gazebo area.*

*Produce an A4 map for one classroom. This diagram will show:*

*Locations of all computers and Patch connections*

*The main cabling duct for the Network Cables connecting Patch connections to the IDF*

*patch panel.*

Show locations of MDF and IDF in your design and media used to connect them. Show connection to the College MDF and type of media used.

Pre-existing Infrastructure. Your wireless network will be an extension to existing network.

Provide the location of the IDFs that you need to cover your designated area. You are allowed multiple IDFs. Assume the MDF is located 70m from Room 10F80. Remember you cannot exceed more than 100m for your LAN connections. An IDF can consist of a small wall mounted rack with networking equipment inside.

Requirements 1b:

*Produce an A4 map for one classroom. This diagram will show:*

*Locations of all computers and Patch connections*

*The main cabling duct for the Network Cables connecting Patch connections to the IDF*

*patch panel.*

**List of Elements**

* Air conditioning
* Heating
* Ventilation
* Power
* Space for conduits

*Requirement 1c:*

*Examine the above list and explain briefly what you consider applicable for your design (you must choose at least four of them). You are not limited to the list above. Do not forget to add this to your equipment list. You must*

Element 1:

Element 2:

Element 3:

Element 4:

**Specification Task 2: Installation Requirements (For WLAN)**

**Antenna Installation and safety**

Safety and other regulatory requirements to which the wireless network area shall comply are identified, obtained and understood.

Refer to the following site:

<https://www.acma.gov.au/our-rules-eme>

Requirement 2a:

Q1. Identify safety and regulatory requirements when installing and using an Antenna for transmitting and receiving data.

Brefly explain how you could apply this to your wireless network design.

Q2. What is the function of ARPANSA? Go to <https://www.arpansa.gov.au/regulation-and-licensing/regulatory-publications/radiation-protection-series/codes-and-standards/rps3>

and list two services they provide.

Q3. What steps must the suppliers of Wireless Devices must follow. How could you insure the wireless devices that you intend to use in your design meets the ACMA regulations:

**Antenna installations:**

*Requirement 2b:*

*Indicate clearly where your antennas are placed to cover area. You must consider interference. List them in the Table given.*

Power

Indicate where a GPO is needed to power your MDF and IDFS. Think about power needs of your equipment. In case of power outage, what facilities should be included to avoid network coverage losses? Give one detailed solution.

*Requirement 2c: Indicate if you require a GPO. List where:*

**Security**

Task: What security measures (physical and logical) would you implement:

1. For your APs

2. MDFs

3. IDFs

4. Routers

5. Switches.

*Requirement 2d: List two for each:*

Environment

Task: What environment factors can cause networking equipment to fail. How would you protect your network against them?

*Requirement 2e: Briefly explain:*

**Specification Task 3: Location of MDF and IDF**

List distances between your MDF to IDF and IDF to IDF. List the type of LAN connection you have decided, speed and bandwidth requirements. Connections to servers (backbone cabling) will require high bandwidth connections.

Investigating architectural and environmental constraints:

Use the following table to help you answer:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Cable type | Length (m) | Speed | architectural and environmental constraints: |
| eg MDF1-IDF1 | Cat 5 | 50 | GB | Thick wall with metal re-enforcing. |
|  |  |  |  |  |

Show cable route between MDF and IDF with a dotted line.

*Requirement 3:*

*Use the information from this to fill up the given Template.*

**Specification Task 4:**

**Equipment selection and location**

List equipment to configure and provide wireless connection. Select an appropriate AP for your wireless coverage. Does it meet the industrial standard for a college? Will it provide the appropriate Bandwidth? How do you ensure that it meets Australian safety requirements?

**Access Points and classroom switch**

Access Points selected are suitable for the environments in which they are to be installed, performance required, and regulatory requirements.

While surveying a facility and deciding where the APs should be located, look for ways to connect the APs to the network.

*Requirement 4a:*

* Briefly explain the following terms with reference to performance of Radio Signal and the effects of the environment:
* Attenuation
* Reflection
* Noise
* Dispersion
* Jitter
* What are some health and safety issues to consider with reference to working with Radio equipment?
* Search the internet to find the regulatory body covers the use of wireless devices in Australia? What is the role of this regulatory body?

*Using the above information:*

* *Select an industrial AP that is weatherproof, can run all day.*
* *Show the locations of your AP in the main diagram and label it with an appropriate name.*
* *Show the locations of two antenna to cover the two designated areas.*

*With a dotted line draw your cabling connections to these antenna from your AP.*

**LAN Media**

Draw a Rack to mount your Network equipment in your IDFs. Show location of your Networking equipment. Draw LAN cable connections between IDFS in your Drawing using red pen. Define the type of cable that you will use, for example, STP, UTP, Fiber Optics.

Cable routes are planned to ensure maximum lengths specified by standards, manufactured to meet environments they are placed, perform suitably are not exceeded and regulatory requirements.

*Requirement 4b:*

*List an approximate length, price and type of cable required in the Template given. Does it exceeds the max length requirements?*

**Cable Paths**   
Design cable paths between MDF, IDF and other devices as required.

**Aerial cabling and earthing (For WLAN)**

Download Australian Standard AS/ACIF S009:2006 Installation requirements for customer cabling (Wiring rules).

Answer the following based on the standard:

Requirement 4c:

1. According to Australian standard what is considered an aerial cabling?

2. According to the standard what is a communication earth system?

3. Briefly explain the reasons for EPR (Earth Potential Rise) and EPR hazard zone.

4. What is protective earth?

5. According to standard what are the requirements for earthing and bonding conductor?

6. Where a surge suppression device is installed, the total earthing conductor length between the surge suppression device and the main earthing bar, terminal or connection in the electrical switchboard should not exceed how many meters?

7. Indicate in your drawing the location of earthing bar. What is the preferred length of earthing cable for effective end user protection?

8. Earthing bar terminal should be capable of terminating conductors of what size?

**Specification Task 5:**

Network Map using a flowchart

*Requirement:*

*Draw a flowchart of all Networking equipment and show how they are interconnected.*

**Specification Task 6: Set up a wireless network with security**

1.0 List the commands to erase the configuration file stored in your AP:

2.0 List the commands to set up BVI interface with the appropriate address.

3.0 Set up basic security WEP and verify by connecting a host.

4.0 Replace WEP with WPA and verify.

5.0 What are the benefits of WPA over WEP security?

6.0 Provide an appropriate solution to an unplanned event such as major software/hardware failure of a Wireless Access Point configured above. How would you ensure that appropriate hardware/software are compatible and configurations restored to previous working state.

**Specification Task 7:**

Performance Requirements:

1. Operating systems and protocols

*Requirement 7a:*

*List the expected protocols and two applications that are expected to run over your designed network.*

2. Switches

Draw appropriate switches in your IDFS to connect between IDFS and to connect other equipment in the area. Conduct a search and find an appropriate switch suitable for your task. List the model, no of ports, speed and price of your switch. You may want to list all of your networking equipment and their specifications in a table. VLANS are used to create logical networks within a network. This enhances traffic flow and makes your network more secure. Do you wish to create vlans in your area? If yes, then define your vlans and list the ports in your switch for appropriate vlans.

*Requirement 7b:*

*List VLAN names:*

*MAP ports using your switch to VLANs:*

*VLAN Student: Ports mapped:*

*VLAN Ports Mapped:*

Routers

*Requirement 7c:*

Do you need routers in your part of the network. What are the main tasks of a router? List the model, no of ports, speed and price of your router. You may want to list all of your networking equipment and their specifications in a table.

**Specification Task 8:**

**In-building Survey**

Learning the location of major internetworking devices and network segments

Indicate what devices are needed in the MDF, their model and IOS.

Research cisco.com for relevant informations..

Documenting the names and addresses of major devices and segments.

*Requirement:*

*Look for any major impediment to RF propagation.*

*Examine the type of walls in each of the rooms. Does the rooms have constraint to RF signals.*

*Investigate one room (10F80) to form your decision. Briefly explain the effect of the main walls for the purpose of RF propagation.*

**Specification Task 9:**

Use 10.0.0.0 /24 address to address all Network devices in your design. You may use a table to list all Networking devices and their addresses.

*Requirement:*

*Use the above and the addressing method that was used in class, list an appropriate addressing for your network.*

**Specification Task 10:** Placing your Access Points:

*Requirement:*

*Decide on how many APs that you need and their locations. Label them appropriately. Do they need to be weatherproof?*

**Specification Task 11:** Draw a coverage map for your site.

AP Channel Selection: Select an appropriate channel for your AP. You can label your channel as follows:

*Requirement:*

*Show Channel selection and Power requirements for your APs:*

*AP 1:*

**End of Assessment**