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Letterkenny Institute of Technology

Assignment 1

Lecturer:	John O'Raw
Report Title:	Assignment 1
Submit to:	Blackboard with all files as specified in the assignment, submitted as a single ZIP folder.
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Programme of Study:	M.Sc. in Cloud Technology
Module:	Private Cloud Technology

Please refer to the Institute's Quality Assurance Handbook, Version 3.0, September 2018

1. Practical work, forming part of the CA of a module, will only be assessed if the student has attended the relevant practical classes.
2. CA work must be completed within the schedules and specifications (specified in the CA brief). Students who submit CA late may forfeit some or all the marks for that work.
    a. The total marks available for an assessment be reduced by 15% for work up to one week late; i.e. a grade of 50% would become (50*0.85) = 42.5%
    b. The total marks available be reduced by 30% for work up to two weeks late i.e. a grade of 60% would become (60*0.7) 42%
    c. Assessment work received more than two weeks late should receive a mark of zero.

    Work is deemed late when an unauthorized missing of a deadline has occurred.
3. CA must be the student's own work, refer to Plagiarism Policy, in section 5.7 of the QA manual.

Briefing

This is an electric-petrol station project for an SME site of 25 employees involving buildings as below:

- Forecourt (2 floors)
- Test and Service (2 floors)
- Battery Building (2)
- Car Wash
- Substation

Network planning and designing for the project has been completed. The scope of the project involves network equipment and racks installation. Cabinets/ Racks, switches are to be installed and cabling is to done in all the buildings. There will be 2 cabinets in Forecourt and Test/Service buildings, and rest of the buildings will have one cabinet. Details of the cabinets are as below, out of which 47U cabinets will have servers (Two Dell Power Edge 640 Servers, one in each cabinet) installed as well, which is a separate project.

Building	Floor	Description	Cabinets and Racks
1	A	Forecourt Ground	IP21 20U, 600d x 600w
1	B	Forecourt Upper	IP21 47U, 1000d x 800w
2	A	Service Area Ground	IP21 20U, 600d x 600w
3	B	Service Area Mezzanine	IP21 47U, 1000d x 800w
4	A	Car Wash Block	IP68 10U, 400d x 600w
5	A	Battery Building 1	IP67 20U, 600d x 600w
6	A	Battery Building 2	IP67 20U, 600d x 600w
7	A	Substation	IP67 20U, 600d x 600w

Stackable Layer 3 switches of the series Aruba CX 6300 will be used in each cabinet in ring topology, such that there will be two paths between any 2 switches. Three routers for HSRP have been recommended for redundancy but contractor is free to design it their way making sure redundancy is taken care of. Different VLANs for Hosts, Security Cameras, Infrastructure Servers, Clients, EPOS, Sales, Payroll etc. have been defined and will have an IP of series 10.15.x.0. Link to detailed VLAN diagram is VLANs.pdf. The VLAN sheet has details of IP addresses for DHCP, Fixed, Reserved IP range along with IPs to be assigned to different Virtual Machines (VMs) which will be installed on two Dell host servers. VMs for File/Print Server, Application Server, Database Server, AD/DHCP/DNS will be created and will belong to Infrastructure Servers VLAN. Link to Logical Diagram showing VMs connection to VLAN along with IP assignments is Logical Diagram.pdf . Dell Servers will be installed in Forecourt and Test/Service building, one at each location on first floor. There will be CAT6 cables going to these servers for management and network connection to their respective switch. Redundancy is required for these connections, hence total 8 connections of 10Gbits/s CAT6 Ethernet cable will be required. OM4 Multimode Fiber Cable (MMF) having 8 Cores of 10Gbits/s will be used to connect the 8 switches in ring topology. Link for Server diagram showing connectivity to switches is Server Diagram.pdf.

All the cabinets will have UPS, details as below:

- 47U Cabinets – Two 2U UPS each of 1500VA
- Rest of the cabinets will have 1 UPS of 500VA.

47U Cabinets will also have 2 PDUs each along with 1 KVM switch occupying 1U. Structured Cabling is to be installed in all the cabinets. Link for cabinet diagram showing the details is Cabinet Diagram.pdf.

Use the following details to decide about Aruba switches port requirement for various floors and buildings in this SME site of around 25 employees:

- Forecourt Building, first floor, has office area and every employee will be given a PC, an IP Phone and access to MFD (multi-function device) for printing and copying. Plan is to have maximum occupants who can sit comfortably. Ground floor has Deli Counter where EPOS will be required along with PC, MFD and Phone connections.
- Each office section in Test & Service building would need atleast one PC and IP Phone port along with access to common MFD on the floor. Other sections like Reception, Sales, Showroom, Supervisor etc. as well have requirements for connecting PC and phone. Monitoring devices will be connected in Control room and LCDs will be installed in Showroom. Video Conferencing setup will be installed in Meeting Room and Managers/Supervisors will be given laptop along with PC.
- Battery buildings will have controllers installed for monitoring ventilation system, power equipment and solar panel so ports will be required for this.
- Car Wash area will have controllers for power equipment and EPOS for making payment via Credit Card.

100mm ducting with 4 subducts will be installed as below.