Computer Network Task Assignment

Student’s Name

Institutional Affiliation

Computer Network Task Assignment

**Task 1**

**Part A. The section assess the importance of the company installing network**

The use of network by Doodle Games will be beneficial to this company in different ways. One of the key benefits that the company will enjoy in its operations is cost effective resource sharing of information. With the installation of computer network in the organization’s offices, it will reduce the amount of money spent on hardware, through creation of computer network and sharing hardware resources that the company already have. Another key benefit that this company will enjoy is improved storage efficiency and volume. In this case, upon implementation of computer networks, the nature of data storage will change in the organization. The third benefit that Doodle Games will realize access flexibility to information using any device e.g., tablets, smart phones, laptops etc. Other benefits include utilization of centralized database in retrieving and accessing data by employees and rights and privileges administration, security of valuable information, among other benefits. The suggested network topology for this organization is start topology, because of its great potential in easing the probabilities of network failures by connecting all the systems to a central node. Additionally, the failure of one node does not affect the operational state of the other nodes.

 Regarding the type of network that Doodle Games will need, the organization since it has its main office and the new office that it is intending to open, the company will require to be connected locally using LAN in the new office. The new office will occupy one building, hence implementation of LAN will be paramount. Additionally, to connect between main office and new office, the company will need Metropolitan Area Network (MAN) and Wide Area Network (WAN) for global connection

**Part B. The part covers internetworking devices as it is in the case of this company.**

Internetworking devices comprises of hardware within computer networks that links different network resources. The internetworking devices that can be used by Doodle Games can use in their new office include (1) **routers-**This is the most intelligent devices that exists on the network. Understandably, routers have an internetworking operating system (IOS) that is useful in allowing the router to have set of features for allowing the configurations needed for the network (Srinivasan & Jayaraman, 2014). The second internetworking device is **switches,** is an internetworking device that is used in managing the bandwidth on big network. Switches have become one of the commonly used internetworking devices used in controlling networks. The third internetworking device that can be used is **bridge**, which operates at layer 2 of OSI reference model, and can be applied by the company to link between the old office and the new office. Additionally, switches are used in creating multiple collision domains as well as broadcast domains. Another key internetworking device is **network cabling,** which provides connection links between different devices to provide a communication medium. Network cabling create a communication link between devices.

All the internetworking devices discussed above will be used, that is switches, routers, bridges, and network cabling. To start with the rationale behind using routers is because they are useful in forwarding data packets between computer networks. Additionally, they must be used as they are paramount in performing traffic directing functions over the internet. The justification on the use of switches in internetworking is typically to connect LAN segments as well as filtering out traffic destined for devices within the same LAN segment. Bridges will also be used due to its capacity to connects multiple LANS, for example with Doodle Games opening new offices, bridge will be helpful in multiplying. Lastly, network cabling is a must to be used because they connect one network device with another or connecting more computers to provide a platform for sharing resources.

**Part C. The part provides a comparison of switch, hub, and router**

Based on a comparison between switch, hub, and router, a switch is a computer networking device that connects various device, whereas a hub is a networking device that connects multiple computers into a single network. On the other hand, routers are used in forwarding data packets between computer networks. Additionally, a switch is an active device, while hub is a passive device, in contrast, router is known in routing packets based on their addresses to other network devices. In terms of the topology type applicable in this case, it is star topology as mentioned earlier. In all devices (computers) are connected to a centrally located device known as hub. All the devices in the start topology are connected using hub via a communication link. Comparison of the three devices can further be classified as shown in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Hub** | **Switch** | **Router** |
| Topology Type | Star | Star | Star |
| Traffic isolation | No | Yes | Yes |
| Efficient Routing | No | No | Yes |
| Cut through | Yes | Yes | No |
| Plug and Play | Yes | Yes | No |
| Uses | Connect multiple devices in a network | Connect multiple computers together | Perform traffic directing functions |

**Task 2**

1. The following terms can be clarified and explained to the management as follows: The concepts measure the speed of transferring data over the network.
2. Kbps (Kilobits Per Second)-This is a measurement of speed data transfer of the network/ internet. 1 Kbps is equivalent to 1000 bits per second.
3. Mbps (Megabits per second.)-This is a measure of internet bandwidth. 1Mbps is equal to 1000Kbs, Gbps (Gigabits per second)-This stands for 1 billion bytes per second. Additionally, Gbps provides a measurement of how many Gigabits of data that a can run through a system or network per second.
4. **How performance of network is impacted by different levels of bandwidth.**

Bandwidth is one of the critical factors that can impact the network performance greatly. The higher the bandwidth the faster the data can be transferred over the network medium (DeCusatis, 2013). Additionally, the transmission medium determines the level of bandwidths used; for example, fiber optic cables has a higher bandwidth that twisted copper wire etc.

1. **Comparison between bandwidth and throughput.**

Bandwidth refers to the capacity that a channel can hold. Additionally, this is the amount od data that can be transferred over s certain period of time., while throughput is the measurement of data transferred in a specific period of time. Bandwidth refers to amount of data that can be transferred via the medium, whereas throughput is how much that actually travel over a channel successfully.

As per bandwidth calculation, the following formula can be applied” **Bandwidth=Number of Concurrent Users x Application Throughput.**

Using 1Gbs as application throughput, and assuming that the number of concurrent users is 20, then Bandwidth will be given by 1 x20=20Gbs. So, this is the answer (**20Gbs**)

1. **Evaluation of WIFI, Bluetooth, and Zigbee**

**WIFI** remains to be an amazing successful technology, its success can be attributed to the fact that despite tremendous advancement, this network technology has remained backward compatible. Doodle Games can benefit greatly in future if the company implement WIFI. Some of the benefits include greater network efficiency, enhanced security, increased bandwidth range, and better performance in remote environment. For **Bluetooth** technology, this is a wireless technology applicable in exchanging data between fixed mobile devices over a short distance. Bluetooth use UHF radio waves for information exchange. The company can adopt this technology to facilitate exchange of information by employees in their respective offices. About **Zigbee** technology, this is a wireless technology established as a global standard, which is used in addressing unique needs of wires IoT networks in organizations. This standard mostly operates on IEEE802.15. Doodle Games can use this technology since it is supported by variety of network topologies (White, 2015). Based on the evaluation of the three wires technology, they have big potential for the company under consideration, especially WIFI and Zigbee technology.

**Task 2**

 Based on the kind of network cable to be recommended for Doodle Games, is Fiber Optic Cable, which has become important for the companies that have reached their bandwidth limits. Ideally, fiber optic connects network segments. The rationale for choosing this kind of cabling is because it is extremely first, support higher bandwidth, and can run anywhere as it uses light rather than electricity to transmit signals. Additionally, Fiber Optic cabling can run signals over a long distance without any resistance. However, the cost of implementing fiber optic cabling is very high as compared to other types of network cabling. This type of cabling is important as it can support the future needs of the company such as increasing devices, speed within when accessing resources from the cloud and remotely.

As per the construction of **coaxial** **cable**, the cable comprises of inner and outer conductor which are separated with insulator. Coaxial cable comprises of inner metallic conductor that is surrounded by an insulation layer. Regarding **UTP,** it stands for Unshielded Twisted Pair cable. It is made up of 100-ohm copper cable comprising of untwisted pairs that is surrounded by a jacket. The cable has no metallic shield. Construction of UTP require materials which include RJ45, UTP cable network tester, cable cutter and cripping tools. Lastly, **STP** considers UTP concepts. However, shielding in STP is done using metallic substance and then 4 pairs are wrapped in a metallic protector. The idea od using metallic protector is based on its capacity to prevent interference through use of three main techniques, namely shielding, cancellation, and twisting.

Concerning where to use **Crossover, Rollover,** and **Straight through cables,** for **crossover** cable is used to connect computing devices directly together. Therefore, the tool would be used in connecting the devices of the same type e.g., computers or two switches to each other. About **rollover** able. It would be used in connecting a computer terminal to router console port. Lastly, **straight through cable** would be used in LAN by connecting a computer to a router.

In order to create crossover cable, you will need Ethernet cabling using CAT5. Additionally, crimping tool will be used to strip and cutting the shielding off the cable. 2 RJ 45 connectors will also be applicable, and lastly 2 optional plug shields. For the crossover, when preparing the cable, it is a requirement that one side of the cable should follow 568 A standard, while the other side should follow B standard (Korsum. 2017). Implementation of this form of cabling can be described using the diagram below.

Figure 1: Crossover Cable: Source: (Korszum, 2017) for crossover cable as explained

**Task 4**

In responding to the junior member of the team on how communication occur across a local ethernet network, it is important to understand that the communication starts with a message, which must be sent from one individual to another. The communication elements, which include message, source, and sender. Message source are the devices or people wanting to other individuals or devices via the network. The second element of communication is receiver. The receiver receives the message and then interprets the message. The third element is known channel which comprises of the media that provides the pathway for transmission of the message. The channel can be in form of cable or other forms

Regarding, internet and how communication occurs, it is important to note that internet is a vast network connecting computers globally. Internet communication revolves around sharing of information or ideas over the world wide web. (WWW). Internet communication occurs when data is exchanged over the web and comprises of string of connected networks that involve exchange of data via packet switching approach. Internet communication is geared towards achieving several things, which include versatility, growing community, among others. Lastly, internet communication occurs when communication is initiated from the source by the sender to the sender. For internet communication to occur, application of communication protocols is important to facilitate the whole process efficiently.

1. Routers: This device is useful in transmitting packets from the source to their destinations via the interconnected networking devices. Routers are the most intelligent devices, and they store information about the network connections. Such a device can be used to divide networks into two or more subnetworks. Routers normally operate at the network layer of OSI model.
2. Switches: A switch is a multi-port device that is critical in improving network efficiency. Ideally, one of the key roles of the switch is to maintain is to maintain routing information relating to the nodes (Melnick, 2019). A switch ca work either at the Data Link layer or Network layer of the OSI reference model. The information maintained by switch is limited.
3. Bridge: The main role of a bridge is to connect two or more network segments or hosts. Ideally, bridges are also used are also used in to store and forward frames between different network segments connected by the bridge. Bridge mostly rely on MAC address to transfer frames between different network segments.

References

DeCusatis, C. (Ed.). (2013). *Handbook of fiber optic data communication: a practical guide to optical networking*. Academic Press.

Korsum, J. (2017 October, 12)How to Create Your Ethernet Cross Over Cable. Retrieved from https://www.electronicproducts.com/how-to-create-your-own-ethernet-cross-over-cable/

Srinivasan, S. S., & Jayaraman, R. (2014). *U.S. Patent No. 8,856,292*. Washington, DC: U.S. Patent and Trademark Office.

White, C. (2015). *Data communications and computer networks: A business user's approach*. Cengage Learning.