|  |  |
| --- | --- |
| **Operating Systems & Networking Fundamentals**  Diploma in CSF/IT  Year 1 (2021/22) Semester 2 | Week **14** |
| Activities |
| **Network Cabling** | |

**OBJECTIVES**

* To understand the advantages and disadvantages of different types of cable used in LAN.
* To understand the characteristics of the common types of network cables.
* To be able to select the appropriate type of network cable.

1. Watch the video on Network Cabling (up to 7.22 minutes) and with some research online, complete the following table to compare the characteristics of Optical Fibre and Twisted Pair cables with the given factors.

<https://www.youtube.com/watch?v=RWCiqUm34Bc>

|  |  |  |
| --- | --- | --- |
|  | Optical Fibre | Twisted Pair |
| Signal Source | **Light waves** | **Radio Frequency** |
| Max Length in metres | **Up to 100 km without processing** | **Up to 100m** |
| Characteristics | **Transmission by light.**  **No RF signal, very difficult to monitor /tap.**  **Signal slow to degrade – transmission over long distances**  **Immune to radio or electrical interference as there is no RF** | **Uses balanced pair operation. Two wires with equal and opposite signals. Uses twist to keep wire constantly moving away from the interference. Opposite signals compared on the other end. Pairs in the cables have different twist rates. Can be shielded (STP) or unshielded (UTP)** |

1. An emerging IT company with about 500 employees has moved to a new premise (a large and tall building). It is taking the opportunity to revamp its networks and connectivity to all departments.

Answer all the following questions in the context of the above company. Recommend the appropriate network cable(s) for each of the scenario, stating the reasons and justifications.

1. The computer centre with all the main servers will be located on the ground floor. It has a network backbone connected to all operational departments in various part of the building also located on the ground floor. Besides expecting to handle extremely high traffic, it is also expected to carry substantial of confidential information. Fire safety is also very important.

Recommend the network cabling for the backbone.

Optical fibre.

Optical fibre can extend to a very long distance meaning that the whole building will be able to get good connection. It is also immune to electrical and radio interference preventing any fires and has no RF signal making it very difficult to monitor the data or tap the data.

1. The Chairman and Strategic Planning Department with about 20 employees are located on the 50th floor. Recommend the network cable to connect this department to the network centre on the ground floor.

**Optical fibre should be used. The chairman and strategic planning department will have information that must be kept confidential added with the fact that they are on the 50th floor which is a few hundred meters from the ground floor where the main servers are makes optical fibre the most suited. It is the most secure and has high data rate over long distances. It is also has a high data rate and does not need to be maintained regularly which would be a hassle considering it would be 50 stories long.**

1. For each of the departments, all wireless access points (APs) are connected to a centralized switch in that department. Recommend the network cable for connecting the APs to the switch.

Use a Unshielded twisted pair (UTP) as it is cheap and flexible making it easy to install unlike fibre optic, and will be most effective for LAN. Since it has to be installed on every floor cost and ease of installation are the factors to be most considered. Lastly, use a RJ45 cable to connect the devices to the switch

1. There is a Multimedia Development Department which expects network supporting up to 10 Gbps. There are 15 high-end desktops with one shared server. Recommend the network cable for connecting each of the desktops and the server to a switch with 10Gbps ports within that department.

As network must support up to 10Gbps, the 3 Ethernet PHY standards that come to mind are the 10G Base-T, 10G Base-SR and 10G Base-LR. These 3 all support data rates of 10 Gbps. As there are only 15 high end desktops with one shared server, I assume that the physical space is not large and it within a 100m. Thus, I would use the UTP – Cat 6a as 55m might be too short a radius but 100m should be enough for all 15 desktops to be in range and have a good connection.

1. All users in other departments either use desktops or laptops (like the ones you have). Recommend network cable, if any, to connect to all these devices.

I would use the UTP – Cat 6 cable. The maximum distance is 100 m which is reasonable, and the speed is 1 Gbps which should be enough to do most work. Also, UTP is cheaper and with every user using 1 the cost saved would be large.

- End -