Micro link TVET College

Information Technology Support Service

Level II

Learning Guide #14

Unit of Competence: **Administrator and Network Hardware Peripherals**

Module Title: **Administrating Network Hardware Peripherals**

LG Code: ICT ITS2 M03 LO2

TTLM Code: ICT ITS2 TTLM3 020

LO2   obtain required peripherals

LO- Two

Information Sheet – 2	Obtaining peripherals

Obtaining new components

Assessing the need for new equipment

Continuous interaction with clients is crucial to determine exactly what they require on their network to meet their organisational needs. The help desk data base can also often inform IT staff as to what might need to be purchased to overcome consistent problems or improve work flow. New components may of-course also be required because of breakdowns.

Once you have decided that new components are required, you need to contact vendors that stock the component, obtain information as to warranty and licensing as well as any technical specifications needed to check that the component is compatible with other hardware and software on the network. For fragile components, the delivery method and packaging of the component must be appropriate and agreed upon also.

After this, the recommendations would normally need to be documented and submitted to a supervisor or manager for approval.

Wired technologies

- _Twisted pair_ wire is the most widely used medium for telecommunication. Twisted-pair wires are ordinary telephone wires which consist of two insulated copper wires twisted into pairs and are used for both voice and data transmission. The use of two wires twisted together helps to reduce crosstalk and electromagnetic induction. The transmission speed ranges from 2 million bits per second to 100 million bits per second.

- *Coaxial cable* is widely used for cable television systems, office buildings, and other worksites for local area networks. The cables consist of copper or aluminum wire wrapped with insulating layer typically of a flexible material with a high dielectric constant, all of which are surrounded by a conductive layer. The layers of insulation help minimize interference and distortion. Transmission speed range from 200 million to more than 500 million bits per second.

- *Optical fiber* cable consists of one or more filaments of glass fiber wrapped in protective layers. It transmits light which can travel over extended distances without signal loss. Fiber-optic cables are not affected by electromagnetic radiation. Transmission speed may reach trillions of bits per second. The transmission speed of fiber optics is hundreds of times faster than for coaxial cables and thousands of times faster than for twisted-pair wire.

Wireless technologies

- *Terrestrial Microwave* – Terrestrial microwaves use Earth-based transmitter and receiver. The equipment look similar to satellite dishes. Terrestrial microwaves use low-gigahertz range, which limits all communications to line-of-sight. Path between relay stations spaced approx. 30 miles apart. Microwave antennas are usually placed on top of buildings, towers, hills, and mountain peaks.

- *Communications Satellites* – The satellites use microwave radio as their telecommunications medium which are not deflected by the Earth's atmosphere. The satellites are stationed in space, typically 22,000 miles (for geosynchronous satellites) above the equator. These Earth-orbiting systems are capable of receiving and relaying voice, data, and TV signals.

- *Cellular and PCS Systems* – Use several radio communications technologies. The systems are divided to different geographic area. Each area has low-power transmitter or radio relay antenna device to relay calls from one area to the next area.

- *Wireless LANs* – Wireless local area network use a high-frequency radio technology similar to digital cellular and a low-frequency radio technology. Wireless LANs use spread spectrum technology to enable communication between multiple devices in a limited area. An example of open-standards wireless radio-wave technology is IEEE 802.11b.

- *Bluetooth* – A short range wireless technology. Operate at approx. 1Mbps with range from 10 to 100 meters. Bluetooth is an open wireless protocol for data exchange over short distances.

Network topology

Computer networks may be classified according to the network topology upon which the network is based, such as bus network, star network, ring network, mesh network, star-bus network, tree or hierarchical topology network. Network topology is the coordination by which devices in the network are arranged in their logical relations to one another, independent of physical arrangement. Even if networked computers are physically placed in a linear arrangement and are connected to a hub, the network has a star topology, rather than a bus topology.

Types of networks

Common types of computer networks may be identified by their scale.

Personal area network

A personal area network (PAN) is a computer network used for communication among computer and different information technological devices close to one person. Some examples of devices that are used in a PAN are personal computers, printers, fax machines, telephones, PDAs, scanners, and even video game consoles. A PAN may include wired and wireless connections between

devices. The reach of a PAN typically extends to 10 meters.[2] A wired PAN is usually constructed with USB and Firewire connections while technologies such as Bluetooth and infrared communication typically form a wireless PAN

Local area network

A local area network (LAN) is a network that connects computers and devices in a limited geographical area such as home, school, computer laboratory, office building, or closely positioned group of buildings. Each computer or device on the network is a node. Current wired LANs are most likely to be based on Ethernet technology, although new standards like ITU-T G.hn also provide a way to create a wired LAN using existing home wires (coaxial cables, phone lines and power lines).

Typical library network, in a branching tree topology and controlled access to resources

All interconnected devices must understand the network layer (layer 3), because they are handling multiple subnets (the different colors). Those inside the library, which have only 10/100 Mbit/s Ethernet connections to the user device and a Gigabit Ethernet connection to the central router, could be called "layer 3 switches" because they only have Ethernet interfaces and must understand IP. It would be more correct to call them access routers, where the router at the top is a distribution router that connects to the Internet and academic networks' customer access routers.

The defining characteristics of LANs, in contrast to WANs (Wide Area Networks), include their higher data transfer rates, smaller geographic range, and no need for leased telecommunication lines. Current Ethernet or other IEEE 802.3 LAN technologies operate at speeds up to 10 Gbit/s. This is the data transfer rate. IEEE has projects investigating the standardization of 40 and 100 Gbit/s.

Home area network

A home area network is a residential LAN which is used for communication between digital devices typically deployed in the home, usually a small number of personal computers and accessories, such as printers and mobile computing devices. An important function is the sharing of Internet access, often a broadband service through a CATV or Digital Subscriber Line (DSL) provider.

Campus network

A campus network is a computer network made up of an interconnection of local area networks (LANs) within a limited geographical area. The networking equipments (switches, routers) and transmission media (optical fiber, copper plant, Cat5 cabling etc.) are almost entirely owned (by the campus tenant / owner: an enterprise, university, government etc.).

In the case of a university campus-based campus network, the network is likely to link a variety of campus buildings including; academic departments, the university library and student residence halls.

Wide area network

A wide area network (WAN) is a computer network that covers a large geographic area such as a city, country, or spans even intercontinental distances, using a communications channel that combines many types of media such as telephone lines, cables, and air waves. A WAN often uses transmission facilities provided by common carriers, such as telephone companies. WAN technologies generally function at the lower three layers of the OSI reference model: the physical layer, the data link layer, and the network layer.

Global area network

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A global area network (GAN) is a network used for supporting mobile communications across an arbitrary number of wireless LANs, satellite coverage areas, etc. The key challenge in mobile communications is handing off the user communications from one local coverage area to the next. In IEEE Project 802, this involves a succession of terrestrial WIRELESS local area networks (WLAN).

Enterprise Private Network

An **Enterprise Private Network** is a network build by an enterprise to interconnect the various company sites (production sites, head offices, remote offices, shops etc.) in order to share computer resources over the network. Sample EPN made of Frame relay WAN connections and dialup remote access.

Beginning with the digitalization of telecommunication networks started in the 70's in the USA (by AT&T) and propelled by the growth in computer systems availability and demands private networks have been built for decades without the need to append the term **private** to them. The networks were operated over telecommunication networks and as per voice communications a certain amount of security and secrecy was expected and assumed.

But with the Internet in the 90's came a new type of network built over this Public infrastructure, using encryption to protect the data traffic from eaves-dropping (VPN). So the enterprise networks are now commonly referred to Enterprise Private Network in order to clarify that these are private networks (in opposition to public networks).

Virtual private network

Sample VPN used to interconnect 3 office and Remote users

A virtual private network (VPN) is a computer network in which some of the links between nodes are carried by open connections or virtual circuits in some

larger network (e.g., the Internet) instead of by physical wires. The data link layer protocols of the virtual network are said to be tunneled through the larger network when this is the case. One common application is secure communications through the public Internet, but a VPN need not have explicit security features, such as authentication or content encryption. VPNs, for example, can be used to separate the traffic of different user communities over an underlying network with strong security features.

A VPN may have best-effort performance, or may have a defined service level agreement (SLA) between the VPN customer and the VPN service provider. Generally, a VPN has a topology more complex than point-to-point.

What are Straight and Crossover cable

Common Ethernet net

work cable is straight and crossover cable. This Ethernet network cable is made of 4 pair high performance cable that consists twisted pair conductors that used for data transmission. Both end of cable is called RJ45 connector.

 The cable can be categorized as **Cat 5, Cat 5e, Cat 6 UTP cable**. Cat 5 UTP cable can support 10/100 Mbps Ethernet network, whereas Cat 5e and Cat 6 UTP cable can support Ethernet network running at 10/100/1000 Mbps. You might heard about Cat 3 UTP cable, it's not popular anymore since it can only support 10 Mbps Ethernet network.

Straight and crossover cable can be Cat3, Cat 5, Cat 5e or Cat 6 UTP cable, the only difference is each type will have different wire arrangement in the cable for serving different purposes.
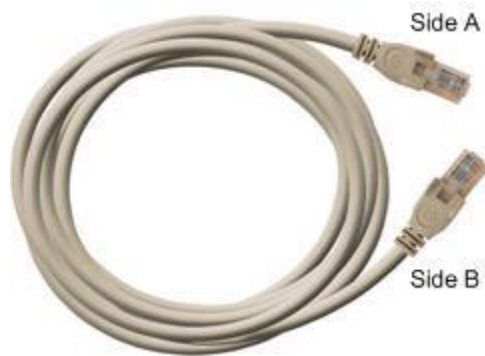
Straight Cable

You usually use straight cable to connect different type of devices. This type of cable will be used most of the time and can be used to:

1) Connect a computer to a switch/hub's normal port.

2) Connect a computer to a cable/DSL modem's LAN port.

3) Connect a router's WAN port to a cable/DSL modem's LAN port.

4) Connect a router's LAN port to a switch/hub's uplink port. (normally used for expanding network)

5) Connect 2 switches/hubs with one of the switch/hub using an uplink port and the other one using normal port.

If you need to check how straight cable looks like, it's easy. **Both side (side A and side B) of cable have wire arrangement with same color**. Check out different types of straight cable that are available in the market here.

Pin ID	Side A	Side B
1	Orange-white	Orange-white
2	Orange	Orange
3	Green-white	Green-white
4	Blue	Blue
5	Blue-white	Blue-white
6	Green	Green
7	Brown-white	Brown-white
8	Brown	Brown

12345678   12345678

Side A   Side B
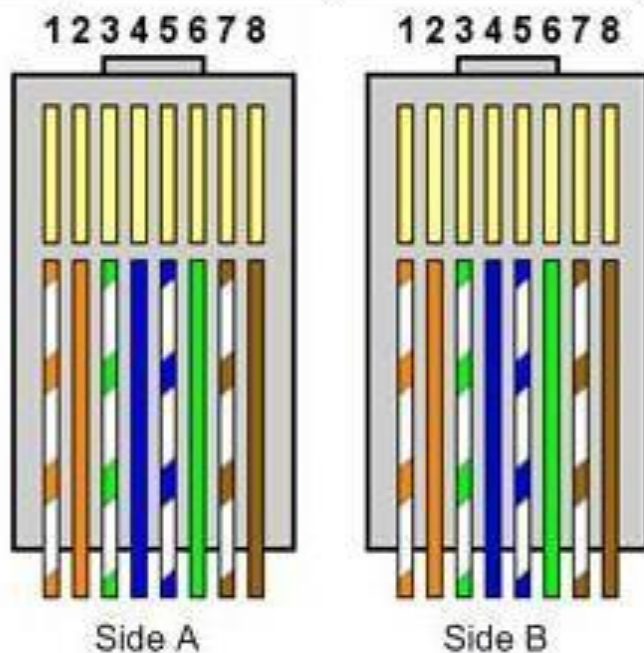
Crossover Cable

Sometimes you will use crossover cable, it's usually used to connect same type of devices. A crossover cable can be used to:

1) Connect 2 computers directly.
2) Connect a router's LAN port to a switch/hub's normal port. (normally used for expanding network)
3) Connect 2 switches/hubs by using normal port in both switches/hubs.

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In you need to check how crossover cable looks like, **both side (side A and side B) of cable have wire arrangement with following different color** . Have a look on these crossover cables if you plan to buy one. You can also find more network cable choices and information from Comtrad Cables.

Pin ID	side A	side B
1	Orange-white	green-white
2	Orange	green
3	green-white	orange-white
4	blue	brown-white
5	blue-white	Brown
6	green	orange
7	brown-white	Blue
8	brown	blue-white

Side A

Side B
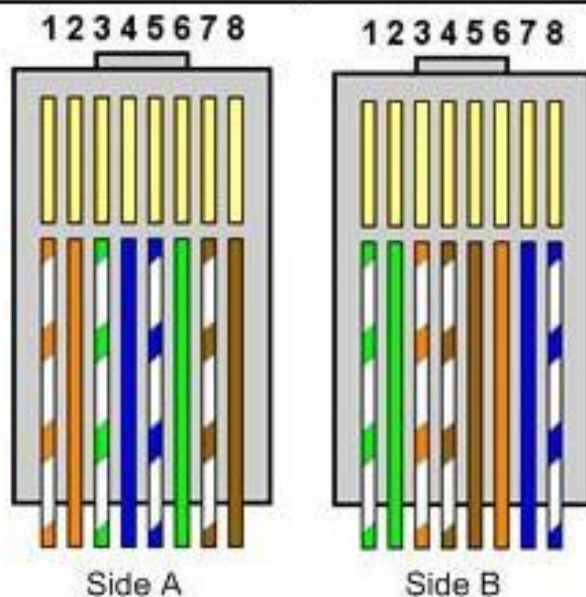
In case you need to make a crossover cable yourself! You can use this.