## Copper cables and fiber optics in network construction essay

**Business**, Industries



Copper Cables and Fiber Optics in Network Construction There is no arguing the fact that the Information Age is upon this present generation. The sheer number of computers in the nation, in many homes there are more than one computer and access to the Internet is something no longer considered as a luxury but a necessity.

Due to the recent technological breakthroughs there consumers are demanding for more innovative products and services. With regards to the Internet and the high demand for multimedia services there is a need for an infrastructure that would be able to deliver high volume data at a much faster rate. In this regard it is not only computer hardware and software that must be pushed to the next level but also the the components that go into network construction. And one of the important parts of a networking system are the cables were data can be sent back and forth, between servers and computers alike. In the 21st century there are two major types of cables that has become the standard for reliable networking and these are: 1) copper cables; and 2) fiber optics.

Copper cables have been around for quite some time now and have proven to be a very reliable component in any network. On the other hand the use of fiber optics is relatively new but already many are convinced that this is the future of networking as it pertains to IT infrastructure. This paper will take a more in-depth look at these two types of cables as it is being used in network construction. The following factors can be used to provide an intelligent comparison between the two materials: raw materials used to create Copper Cables and Fiber Optics; capabilities as well as limitations; andrequirements for the construction or installation of the same. A Network A basic definition of a network is two or more computers that are linked together so that information can be exchanged between them. The following are the basic components of a network: I A sending devicel A communication link! A receiving device A sending device ca be a computer or server and the receiving device can be another computer, server or equipment such as printers etc. The communication link is where communication signals are transmitted.

And the common types of link include copper wire and fiber optics. Copper Cables Copper became the preferred material for the manufacture of metallic cables because it is a better conductor of electricity and is relatively economical (see BICSI). There are four major groups of copper cables and these are: MulticoreTwisted pairsQuadsCoaxAccording to Habraken, " Although a number of different cable type can be used for LANs, copperbased twisted-pair wire has really become the standard ... It is fairly inexpensive and easy to work with because it is flexible, it bends around corners" (2004, p. 31).

A twisted pair copper cabling is ideal for the following connections: I Telephone sets to PBX common equipmentl Telephone sets to key systems common equipmentl PCs to the wiring closet of a LANI Homes to the nearest telephone company equipment (Dodd, 2002, p. 83). Limitations According to A. Dodd, " The Electrical properties of copper cabling create resistance and interference. Signals weaken the farther they are transmitted on copper wires. The electrical property of copper cabling is the key factor that limits its transmission speeds" (2002, p. 83). This is an example of seeing a downside and an upside in a particular feature of the device. In this case, the property that made copper cables a popular component in many network is the same property that made it undesirable. As a result, "...copper cables are limited to 100 meters for almost all applications above 100 Mbps" (Trulove, 2000, p. 142). Furthermore, with regards to the metallic aspect of copper cables, it cannot be placed just about anywhere.

It cannot be placed near elevator shafts or power lines. Also, there must also be "...adequate consideration of grounding and bonding" (Trulove, 2000, p.

34). These limitations is really problematic in the 21st century where there is a need for greater interconnectivity and the 100 meter limit is a serious problem when talking about creating a network in other places aside from the city. Fiber Optics In the 19th century an Englishman named John Tyndall was able to demonstrate that light can be bended. Before this, conventional wisdom dictates that light travels through a straight line and there is no way to interfere with that phenomenon and by doing so will block the light, not alter its path. But Tyndall demonstrated that, "…light could be bent around a corner as it traveled in a jet of pouring water.

Water flowed through a horizontal spout near the bottom of a container ... When Tyndall aimed a beam of light through the spout along the water, his audience saw the light follow a zigzag path inside the curved path of the

Page 5

water" (Sterling, 2004, p. 4). Thus, Tyndall was credited with the discovery of a principle that would lead to the manufacture of modern day fiber optics.

In the computer world the only language that can be understood by computers and servers is one that involves 1 and 0. Fiber optics technology is designed having this idea in mind. Steven Karris described how fiber optics works inside a typical network and he wrote, "Fiber optic cable transmits light pulses. A laser at one device sends pulses of light through this cable to the other device. The presence of light pulse is translated into a logical 1 and its absence into a logical 0 at the receiver end" (2004, p. 6.

2) This explains why fiber optics are so efficient and can able to handle the transmission of large volumes of data at a faster rate compared to copper cables. Upside There is simply more that a fiber optic can do compared to the old copper cables. The following list shows what is in store for those who may want to shift from using copper cable to fiber optics: Secure – does not emit electromagnetic signals; therefore the only way to tap into it is by physically breaking the cable and listening devices spliced into the break.

This method is easily detected. Small size – ideal for constructing a network underneath the city where underground conduit is at capacity (Dodd, 2002, p. 85). High bandwidth – fiber is ready to handle upgrades in IT such as high speed transmissions and the use of terabit routers.

Low attenuation – since fiber optics does not have metallic components it also means there is less interference. For TV this mean a strong signal and quality feed. For computers and LAN this means a much faster movement of data from one point to the next. Furthermore, there is less fading or weakening of signals even over long distances. Downside Even with the above-mentioned benefits from the use of fiber optics there is a number of downside that must be considered before deciding to use this new technology or simply stick to the old formula. The first major setback is the cost of installing fiber optics. According to Dodd, " Specialized equipment is required to terminate fiber cables within buildings, test and splice fiber and to convert electrical signals to light pulses and vice versa" (2002, p. 85).

Moreover, fiber optics is not as flexible as copper cables. This has something to do with the material used to manufacture fiber optics. For optical fiber communications the material required to create this medium is fused silica.

Downing asserts that although other fiber materials are adequate, only highquality glassy melt of silica-dioxide has the purity needed to make excellent fiber optics that can guarantee almost zero loss in terms of signal strength (2005, p. 101). This explains why fiber optics can be limited in the area of flexibility when comparing to the sturdier metallic cable such as copper. Conclusion In the Information Age, there is an ever increasing need for expedient access to Cyberspace or to a particular network where the user can send or receive data. As a result there is also a clamor for more powerful computers and IT infrastructure that can deliver more than is expected. A major aspect of IT Network construction is the cables that are used as pathways to send and receive data. There are two major types of cable used to transmit voluminous data over the internet and these are: Copper cablesFiber OpticsCopper cable technology came out first and it is still considered as a reliable medium to transmit signals from one point to the next. The main reasons for the success of copper cables are strength, flexibility, and cost-efficiency. But due to the improvements in technology and the changing consumer needs there is now a clamor for more the transmission of more data at a faster

rate. The design of fiber optics- the use of silica and laser to send a signal – made it an ideal material for long distance communication. The ingenious way of sending 1 and 0 through the speed of light allowed for voluminous data to be sent from one point to the next. Still fiber optics is not perfect. There is a need to improve its flexibility and to lower its cost.

If manufacturers can find a solution to these two limitations then the whole world will benefit from high-speed communication with a clarity and quality of signal never before seen in telecom history. Works CitedBuilding Industry Consulting Service International. Residential Network Cabling. New York: McGraw-Hill, 2002. Dodd, Annabel.

The Essential Guide to Telecommunications. 3rd ed. New Jersey: Prenctice Hall, 2002. Downing, James. Fiber-Optic Communications.

New York: Thomson Delmar Learning, 2005. Elliott, Barry. Cable Engineering for Local Area Networks. UK: Woodhead Publishing, Ltd, 2000. Habraken, Joseph. Absolute Beginner's Guide to Networking. Indianapolis, Indiana: QuePublishing, 2004. Karris, Steven. Networks Design and Management. CA: Orchard Publications, 2004. Sterling, Donald. Technician's Guide to Fiber Optics.

New York: Thomson Delmar Learning, 2004. Trulove, James. LAN Wiring: An Illustrated Network Cabling Guide. New York: McGraw-HIII, 2000.