

Fiber Optics and Its Impact on Telecommunications

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### Fiber Optics and Its Impact on the Internet

Although fiber optics have been around for many years, the use of the technology for advancing internet speeds is a new development that seeks to change how the internet is accessed forever. Fiber optics is a very interesting development that has been latched onto by many companies seeking to gain from its advancements. Companies such as Verizon, AT&T, and Google have jumped on the bandwagon into the new era of internet, but there are many hurdles fiber optics will have to overcome in order to become a successful technological development. This paper will assess the significance of this development by asking:

1. What is fiber optics?
2. What are the benefits of fiber optics?
3. What are issues surrounding fiber optics?
4. What needs to be done in order to bring fiber optics to completion?

After researching the development of fiber optics these questions were answered in the following paragraphs.

#### **What Is Fiber Optics?**

##### **What Is Fiber Optics?**

According to Merriam-Webster's online dictionary (n.d.), fiber optics is "thin transparent fibers of glass or plastic that are enclosed by material of a lower refractive index and that transmit light throughout their length by internal reflections." Fiber optics can be used for many purposes, but are mainly used for telecommunication and medical use.

##### **How Does It Work?**

In telecommunication use, fiber optics is compacted into a cable with the use of layers of materials. This cable is then run from provider huts to the houses of their consumers without any

interruption in the cable. Provider huts are normally spaced every 50 miles to cut down on extremely lengthy cables. A laser is then pointed a very shallow angle, and is turned off and on to send each bit of information to the receiver. The light is perfectly reflected as it travels at the speed of light towards its destination. This beam of light is then translated into digital signals which are processed by the device the cable is plugged into. The newest fiber optic cables now have multiple lasers with different colors to send multiple signals at the same time in the same fiber (Freudenrich, n.d.). Fiber optic cables can be used for telephone systems, cable television, medical technology, engineering technology, and computer technology. All areas in which fiber optic cables can be used have many benefits from their use.

### **What Are the Benefits of Fiber Optics?**

There are many benefits to using fiber optics over other means of transferring data. In the past years, metal wire has been used to transfer data by varying the voltage levels. Fiber optic cables are much better than copper wires when it comes to telecommunications in many areas.

#### **Cost**

Fiber optic cables are less expensive than copper wiring due to the production of fiber optic cables being cheaper than production of copper wires. The power required to maintain signals in fiber optics is also less than in copper wires. This means that providers of services spend less money giving out the service which means the consumer spends less money.

#### **Size**

Fiber optic cables are smaller in diameter and weigh less than copper wire which means less space is occupied by cables and less work is required to move them. The smaller diameter

also means more optical fibers can be packed into the same space a copper wire once took up. This means more phone lines or internet lines can be run in the same amount of space as before.

### **Quality**

The strength of the signal in optical fiber is much better than copper wire due to the fact that fiber optic cables do not interfere with other fiber optic cables. The electrical signal sent through copper wire can interfere with other electrical signals sent in other copper wires. Fiber optics is also more beneficial because its signals are better suited for carrying digital information. This is useful because computer networks work with digital signals which means transferring the data would flow smoothly (Barbour, 2010). The main benefit people notice with fiber optics compared to copper wiring is that fiber optics runs faster than electric signals. Google Fiber advertises fiber optics saying that it can increase internet speeds 100 times faster than before. Fiber optic cables can download a movie in seven seconds compared to the 2 minutes it used to take (Edward, 2012). The pure speed fiber optics offers is enough to get people to pay attention. It is a great benefit people in this generation hold in high regards. In an era where time is precious, the less time taken waiting for a movie to load is better. All these benefits are great, but some issues can restrain the development of fiber optics.

### **What Are Issues Surrounding Fiber Optics?**

While fiber optics shows promise to enhance our future, there are issues surrounding its development. Legal, social, ethical, and security issues hold back the development and dampen its progress.

### **Legal Issues**

One legal issue surrounding the development of fiber optics appears during the installation of the fiber optic cables. When workers dig to lay down new fiber optic cables, they

sometimes hit old wires and break them. This creates legal problems as to who's at fault, and what needs to be done. This can create legal battles within companies and halt installation of more fiber optic cables for a while (Burkhalter, 2012). Another legal issue when dealing with fiber optics is cable companies wanting to block cities from building their own fiber networks. Cable companies and cities have fought the past few years for the right to build fiber optic cables in certain cities. Cable companies want to build in the cities to get more money, while the city wants to build to gain more tax money. This results in lobbying by cable companies and complex legal battles to determine the result of who can install the cables (Fung, 2014).

### **Social Issues**

Social issues are also a problem when dealing with fiber optics. Fiber optics is a development that can greatly affect societies in both positive and negative ways. While increasing the internet speed with fiber optics can improve living standards with more access to information, this same access can widen the gap in inequality. In third world countries like Colombia, not many resources are put into new technology. In return, there is little information that can be access through the internet. When it is possible to have good internet, it comes at a high cost. This widens the gap in technological inequality when dealing with the access of information. If everyone could access the internet, it could result in more democratic societies, better public participation in making decisions, and increase in expertise that could lead to more development. If the development of fiber optics could be brought into more countries, social problems could be lessened (Soto, n.d.). This same gap in internet speed can cause social issues in the United States. People get upset when fiber optic internet speeds aren't available in their area. This causes social issues which companies have to handle. This could hurt the company's reputation, which would halt some of the progress they have made.

**Ethical Issues**

While there are social and legal issues that surround the development of fiber optics, there are not many ethical issues that involve the development of fiber optics. One could question the morality of the construction process when it comes to installing the fiber optic cables. The process of installing fiber optic cables can result in the disturbance of the environment. It could force animals to relocate and plants to die. This process of installing cables and damaging the environment is not only happening underground on land, but also in the sea. Whether or not faster internet is worth damaging the environment is an ethical question that could stall the development of fiber optics (Schofield, 2014).

**Security Issues**

Security issues are problems with any type of technology, and fiber optics is no exception. When the development of fiber optic cables first started, people boasted them as the most secure way of communication, but after a few years that has been proven wrong. It is now known that if a person has the knowledge of how to tap into a fiber optics network, they can easily do so. If the security attacker can access the physical fiber optic cable, they can retrieve the packets sent in the connection. The attackers can tamper with the information and have access to delicate information. One action being taken to decrease the amount of taped communications is providing strong physical security around the fiber optic cables. This will keep attackers off the cables and out of private communications. Although some solutions have been proposed, security is still an issue fiber optics is dealing with (Pascucci, n.d.).

**What needs to be done in order to bring fiber optics to completion?**

**Legal, Social, Ethical, and Security Issues**

The introduction of fiber optics to the internet began in 2005 with Verizon FiOS. Since then, multiple companies have developed their own fiber optic cables and have started installing them in some cities. Some steps have to be taken for fiber optics to become widely available though. All the issues listed in the previous paragraphs need to be dealt with or at least taken into account before more development occurs. Legal, social, ethical, and security issues are hurdles every development in technology must overcome.

### **Cost**

Another barrier that keeps fiber optics from being integrated is the fact that it is expensive to install. Fiber optic cables cannot just be added onto the old copper wires. They have to be installed just like the copper wires were, and there is a lot of money required to do that. This cost of installation has kept companies from furthering their installation process, and has instead made them crawl at a slow pace towards installing fiber optics to more cities. To deal with the cost, companies must either invest heavily into this development, or find another way to deploy fiber optic cables.

### **Conclusion**

Fiber optics is a great innovation in technology, and will benefit the internet greatly. This development will shape how information is gathered forever. This development will not only make people happier, but also further advancements in other fields of technology. Engineering and medical fields are already using fiber optics, and the continuing development to make fiber optics better in regards to the internet will also make fiber optics in those fields better. It is only a matter of time before fiber optics overcomes old copper wiring and becomes something that is accessible for all people.

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