Licence 1

Informatique, Développement d'Application

Cours : Anglais

Séquence 2 : Fiber optic Communication

Chapter_1: Fiber optic Communication

The Romans must have been particularly pleased with themselves the day they invented lead pipes around 2000 years ago. At last, they had an easy way to carry their water from one place to another. Imagine what they'd make of modern fiber-optic cables—"pipes" that can carry telephone calls and emails right around the world in a seventh of a second!

What is fiber optics?

We're used to the idea of information traveling in different ways. When we speak into a landline telephone, a wire cable carries the sounds from our voice into a socket in the wall, where another cable takes it to the local telephone exchange. Cell phones work a different way: they send and receive information using invisible radio waves —a technology called wireless because it uses no cables. Fiber optics work a third way. It sends information coded in a beam of light down a glass or plastic pipe. It was originally developed for endoscopes in the 1950s to help doctors see inside the human body without having to cut it open first. In the 1960s, engineers found a way of using the same technology to transmit telephone calls at the speed of light *(normally that's 186,000 miles or 300,000 km per second in a vacuum, but slows to about two thirds this speed in a fiber-optic cable).*

Optical technology

A fiber-optic cable is made up of incredibly thin strands of glass or plastic known as optical fibers; one cable can have as few as two strands or as many as several hundred. Each strand is less than a tenth as thick as a human hair and can carry something like 25,000 telephone calls, so an entire fiber-optic cable can easily carry several million calls.

Fiber-optic cables carry information between two places using entirely optical *(light-based)* technology. Suppose you wanted to send information from your computer to a friend's house down the street using fiber optics. You could hook your computer up to a laser, which would convert electrical information from the computer into a series of light pulses. Then you'd fire the laser down the fiber-optic cable. After traveling down the cable, the light beams would emerge at the other end. Your friend would need a photoelectric cell *(light-detecting component)* to turn the pulses of light back into electrical information his or her computer could understand. So the whole apparatus would be like a really neat hi-tech version of the kind of telephone you can make out of two baked-bean cans and a length of string!

How fiber-optics works

Light travels down a fiber-optic cable by bouncing repeatedly off the walls. Each tiny photon *(particle of light)* bounces down the pipe like a bobsleigh going down an ice run. Now you might expect a beam of light, traveling in a clear glass pipe, simply to leak out of the edges. But if light hits glass at a really shallow angle *(less than 42 degrees),* it reflects back in again—as though the glass were really a mirror. This phenomenon is called total internal reflection. It's one of the things that keeps light inside the pipe.

The other thing that keeps light in the pipe is the structure of the cable, which is made up of two separate parts. The main part of the cable—in the middle—is called the core and that's the bit the light travels through. Wrapped around the outside of the core is another layer of glass called the cladding. The cladding's job is to keep the light signals inside the core. It can do this because it is made of a different type of glass to the core. *(More technically, the cladding has a lower refractive index.)*

By **Chris Woodford.** *Last updated: June 25, 2017,* http://www.explainthatstuff.com/fiberoptics.html