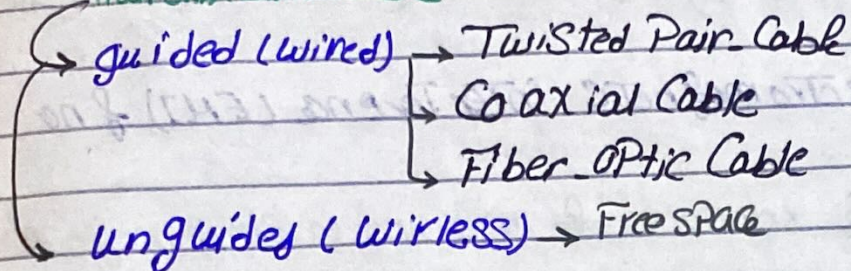


Communication Channel types

Transmission medium



What is Optical Fibers?

Transmission medium made of glass (Silica) with Cladding material of a little lower refractive index. The refractive index of the Core is increased by doping the Silica with GeO₂. A plastic Cover is used to protect the Fiber from moisture and Absorbtion? الامتصاص. It carry information from one point to another in the form of light في شكل الضوء.

→ It is a Communication medium between Transmitter مُرسل & Receiver مستقبل.

Advantage of Optical Fiber

1. low transmission loss & long distance signal transmission
 * low loss of Optical Fibers (0.2 dB/KM)
 * Copper loss is higher than (0.2 dB/KM)
 → This means that Optical Fiber can reach a very long distance up to 200 KM without need of Repeater مكرر.

2. light weight & small size

OF → lighter in weight and have small size

Copper → bulky & heavy weight

3. large bandwidth

→ Can transmit more information than copper based cables

→ Capacity is higher than copper.

4. Signal Security

→ it is more secure & can not be tapped than copper

انها اقل عرضة للاختراق مقارنة بالنحاس

5. Immunity to electromagnetic interference (EMI) & no crosstalk

* it is immune to noise & immune to electromagnetic interference

غير عرضة للضوضاء وكمناخه مقاومة للتداخلات الكهرومغناطيسية

* No Flash risks are available since they are made of dielectric

* They are more erosion safe than copper cables

6. It is made of abundant & cheap raw material (Glass, Sand)

7. more resistant to environmental extremes

(Can operate over long Temp variations)

تعمل في الظروف الجوية والدرجات العالية للحرارة

Disadvantage of Optical Fiber

1. need care when handling or maintained

أن يكون حذر واتباع التعليمات

2. need expensive equipment for interfacing & special tools for maintenance & repairing

يتكون من معدات باهظة وادوات متخصصة للصيانة والإصلاح بالإضافة إلى ارتفاع تكاليفها

اسٹارٹ

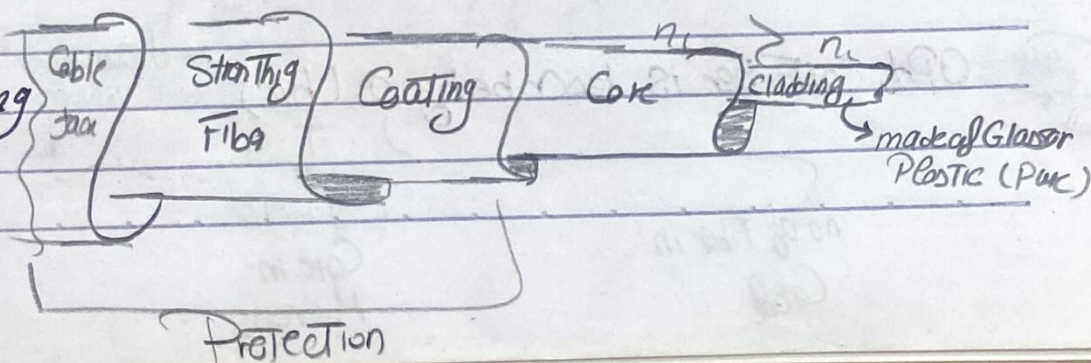
Compare Between Optical Fiber & Copper as transmission media

	OF	Copper
Transmission loss	Lower (0.2 dB/km)	Higher (0.2 dB/m)
economic	More economic	less economic
Size	Smaller Size	Bulky
Weight	light weight	Heavy weight
Band width	Huge (large)	less (narrow)
Data Rate	Higher	lower
Capacity	Higher	lower
Feasibility to be stolen	Not Feasible to be stolen	Feasible to steal
Security	More secure	Noise Cure

* What is Optical Fiber Structure

1. Core

2. Cladding



PAGE _____
DATE _____

* **Core** : Transmit light signal from Transmitter to receiver

• made of glass whose width is in microns

→ bigger core The more light The cable can convey

That inc. The Transfer Rate
كلما زاد قطر الكابل زاد معدل نقل البيانات

→ 4 to 8 μm

* **Cladding** : (4 to 125 μm)

• expelled over the core & fill in as the limit that contain light wave

• Empowering info to go to through length of fiber

→ يدخل المعلومات في الكابل لكي تنتقل عبره عبر (Fiber)

* **Coating**

Plastic Cover over the cladding to strengthen the fiber core.

• help retain stress

للمساعدة في تحمل التوترات

• Protect extreme cable curves

* **Jacket** : Outer layer or Sheathing of cable

Protect (Shields) the cable from natural perils

• 4 to 400 μm

~~Strength members~~

~~Strength members~~

* Ensure the core against Pounding Power & over Top strain during establishment

* Lower Cross talk between Optical Fiber

Optical Fiber is described by a (b/c) → diameter Cladding in microns

↓
no of Fiber in Cable

↓
diameter Core in Microns

absall

core: cylindrical dielectric material, light propagate along the core
Fiber. Surrounded by another cylindrical cladding
claddings made of same dielectric material, (usually glass)

refractive index of cladding (n_2) is
smaller than refractive index of core (n_1)

$$n_1 > n_2$$

الملوثات

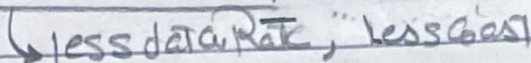
1. Protect Fiber From Absorbing Surface Contaminants
2. Add mechanical Strength
3. Reduce Scattering loss at Surface of Core
4. Reduce loss of light From Core into Surrounding air

Buffer: (250 μm)

- made of Plastic & elastic in nature Prevent abrasions
- Protect OF From Physical damage
- Prevent The OF From Scattering losses Caused by microbends

Jacket: Provides environmental & mechanical Protection
→ Contain → high abrasion resistance, stable Performance over
Temp

DATE _____



NOTE
The CLOS The OPTICAL Fiber is Connected to subscriber resident
→ The Better Connection because degree of Proximity decides
The data Speed Rate

★ FTTH (high Bandwidth, high data Rate) → More expensive

* There is Trade off between Cost & Performance

امتحان

→ SEA ME WE Series

South → Asia → Middle → East → West Europe

East → الشرق + آسيا + الشرق + أوروبا

(SEA MEWE 1, 2, 3, 4, 5, 6 & 7)

First member made of Copper, while other members made of optical fibers

SEA ME WE Series

↳ Cable Transfer large volume of data & information on a global scale

(Various broadband multi-media (Internet Telephone) services etc.)
app

Some Notes on it's

1. The Cable length in KM

2. Cable Capacity in Mbps, Gbps & Tbps

3. Path & The Countries it serves & The no of landing Points