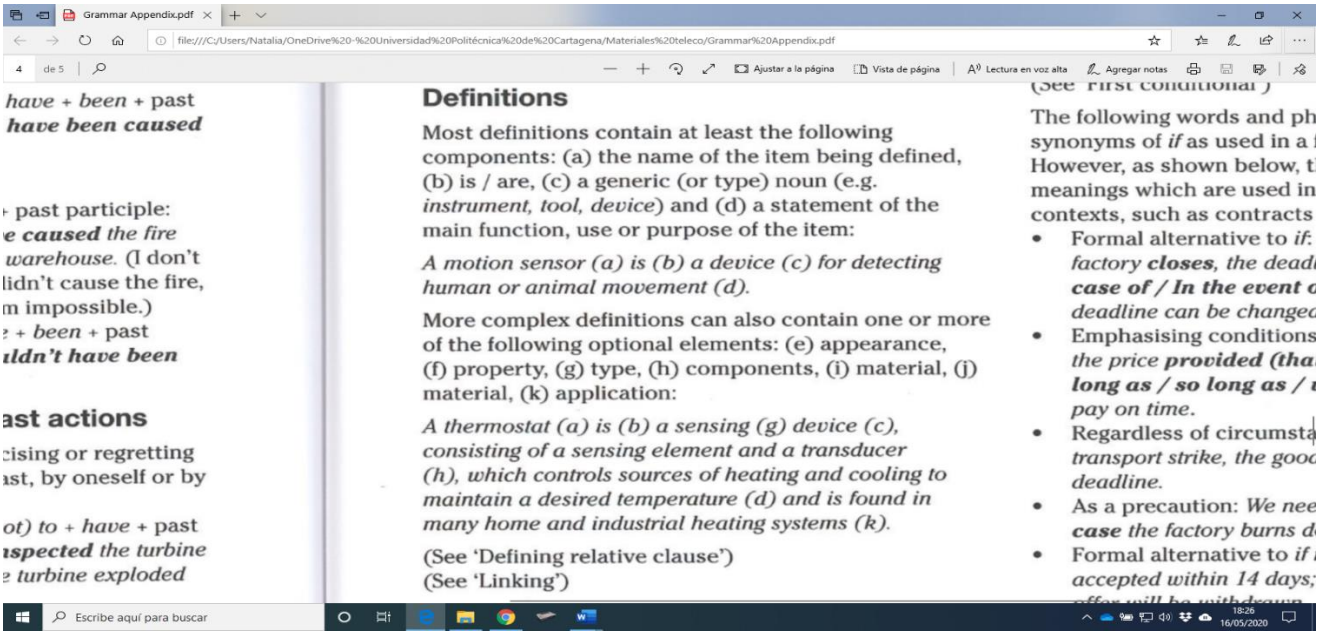
CLASS NOTES TO UNIT: FIBER (FIBRE) OPTICS / OPTICAL FIBER (FIBRE) (Video lesson + Class + Portfolio assignments)

In this unit we are going to:
-Determine how to write definitions of technical devices (1).
-Listen to a lecture with the basics of fiber optics and check the language functions used (2).
-Listen to part of a TED talk about fiber optic cable and check the use of prepositions and dimensions (3).
-Explain the physical side of a communications process (4).

Parts 1-3 will be dealt with in the video lesson and in class, including exercises a and b. Part 4 must be done after the class and included in the students' portfolio

1. Introduction: Let's read this basic definition of fiber optics: *Fiber optics are an essential part of telecommunications networks. Basically, they are long thin tubes of very pure glass, arranged in bundles called optical cables. The purpose of fiber optics is to transmit light signals over long distances.*

Let's now read how definitions are made, and try to adapt the one above to the rules:



have + been + past
have been caused

+ past participle:
***e caused** the fire*
warehouse. (I don't
lidn't cause the fire,
m impossible.)
+ been + past
ıldn't have been

ast actions
cising or regretting
ast, by oneself or by

ot) to + have + past
***ıspected** the turbine*
e turbine exploded

Definitions

Most definitions contain at least the following components: (a) the name of the item being defined, (b) is / are, (c) a generic (or type) noun (e.g. *instrument, tool, device*) and (d) a statement of the main function, use or purpose of the item:

A motion sensor (a) is (b) a device (c) for detecting human or animal movement (d).

More complex definitions can also contain one or more of the following optional elements: (e) appearance, (f) property, (g) type, (h) components, (i) material, (j) material, (k) application:

A thermostat (a) is (b) a sensing (g) device (c), consisting of a sensing element and a transducer (h), which controls sources of heating and cooling to maintain a desired temperature (d) and is found in many home and industrial heating systems (k).

(See 'Defining relative clause')
(See 'Linking')

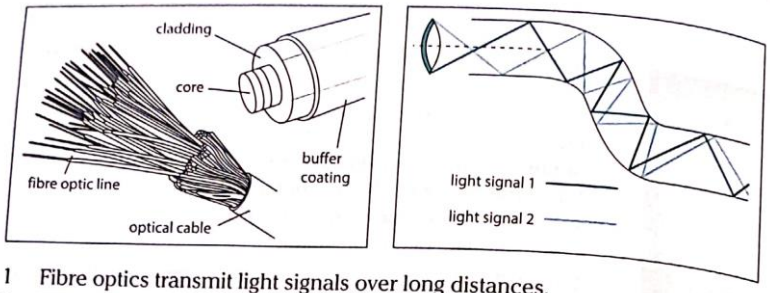
(See 'First conditional')

The following words and ph
synonyms of *if* as used in a
However, as shown below, t
meanings which are used in
contexts, such as contracts

- Formal alternative to *if*:
  *factory **closes**, the dead*
  case of / In the event
  deadline can be changed
- Emphasising conditions
  *the price **provided (tha***
  long as / so long as /
  pay on time.
- Regardless of circumsta
  transport strike, the good
  deadline.
- As a precaution: *We nee*
  ***case** the factory burns d*
- Formal alternative to *if*
  accepted within 14 days;

2. Listening I. Exercise a: In the video lesson, you will listen to a lecture on fiber optics. Complete the exercises below (they will be corrected in class):

1 18 Listen to an introductory talk about fibre optics. Are these statements *true* (T) or *false* (F)? Correct the false ones.



1 Fibre optics transmit light signals over long distances.
2 Fibre optics can transmit infrared light.
3 LEDs are more powerful but more variable light sources than lasers.
4 The cladding around a fibre optic line helps reflect the light inside the core.
5 Copper wires need fewer relay systems than fibre optics.

2 18 Listen again and complete the speaker's words with the words and phrases in the box.

another way of putting it is or that is that is that is to say to put that another way to put this in everyday language

1 Now, I've got a slide here of a fibre optic line, *or* 'fibre', as it's sometimes called. In the centre you have the core, _____ the hollow glass tube …
2 Fibres are very narrow; they can be from 9 microns to 62 microns in diameter. _____, they have the same diameter as a human hair.
3 … but they vary more with ambient changes, or _____, they are more variable in their performance …
4 … the light wave can travel great distances. _____ that this system allows signals to go round bends and travel a long way.
5 In due course, the light signal degrades, _____, it becomes weaker and less pure.
6 In addition, signals through copper wires suffered greater degradation, _____ there was often a loss of signal …

3 Match the words and phrases 1–9 in the text below with their less formal equivalents.

— restored
1 greatly
— impossible to decode
— be greater than
— long-distance
— less pure
— light flashes
— get rid of
— shown

Scientists have demonstrated a system that could (1) *substantially* improve the data capacity of fibre optic networks. They say the growth in applications such as YouTube will eventually (2) *exceed* the limits of long-distance optical fibre links. The improved system would (3) *eliminate* most of the interference caused by other signals and amplifiers. Data is sent down an optical fibre as a sequence of (4) *bits coded into a light beam*, but it can become distorted over long distances. That can occur because of 'cross-talk' – signals sent down a fibre that influence one another. The result is that the digital signal becomes (5) *degraded* and (6) *unintelligible*. While this can be overcome with existing electronics, the result has the effect of reducing data capacity. Now, a team has (7) *demonstrated* a device that can clean up a signal and re-transmit it with fuller capacity. The signal for re-transmission is (8) *reconditioned* at the precise digital level required. This is of particular interest for (9) *long-haul* links, where data cables stretch across continents or oceans.

Let's check together useful connectors from the lecture, and the grammar behind them (also the pronunciation of the technical words):

-Because the cladding doesn't absorb any light from the core, the light wave can travel great distances.
Let's rewrite: Because of…

-Unlike copper wires, fiber optics do not suffer from interference from other fibers in the same cable.
Let's rewrite: In contrast,…

3. Listening II. From the following TED talk: *Discovering The Physical Side of the Internet*, https://www.ted.com/talks/andrew_blum_discover_the_physical_side_of_the_internet, let's watch minutes 5:00 to 7:00, using the subtitles in English.

Exercise b: After watching the video, try to fill in the gaps with the corresponding prepositions and/or terms related to dimensions from the box (in the video lesson we will clarify the difficult vocabulary, and in class we will check the answers):

out	across	in	underneath	from	length	away	thickness

If the Internet is a global phenomenon, if we live in a global village, it's because there are cables …… the ocean, cables like this. And in this dimension, they are incredibly small. You can you hold them in your hand. They're like a garden hose. But in the other dimension they are incredibly expansive, as expansive as you can imagine. They stretch …….. the ocean. They're three or five or eight thousand miles in ……..., and if the material science and the computational technology is incredibly complicated, the basic physical process is shockingly simple.

Light goes ……. on one end of the ocean and comes …….. on the other, and it usually comes …… a building called a landing station that's often tucked …… inconspicuously in a little seaside neighborhood, and there are amplifiers that sit on the ocean, and every 50 miles they amplify the signal.

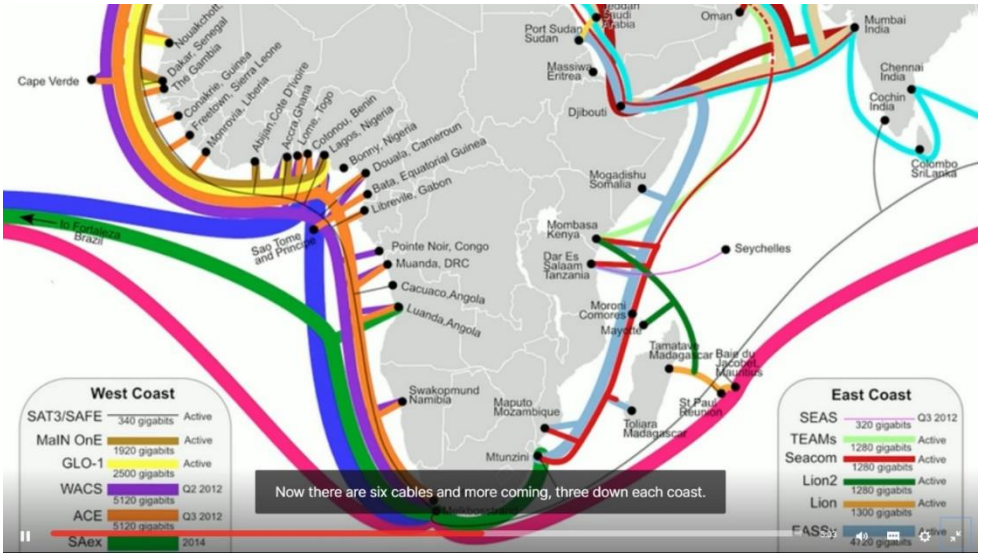
And since the rate of transmission is incredibly fast, the basic unit is a 10-gigabit-per-second wavelength of light, maybe a thousand times your own connection, then you'll have maybe eight fibers in a cable, four going in each direction. And they're tiny. They're the …….. of a hair.

Let's check together:
-Which two dimensions does the speaker refer to?
-Which of the following prepositions in the text (out, in, from, away, across) indicate movement/position?
-What is the difference between *under* and *underneath*?
-Which word category (noun, adjective) do *length* and *thickness* belong to? Let's complete the table with more terms describing dimensions and their uses:

	Noun (and how it's used)	Adj. (and how it's used)
Altura		
Anchura		
Grosor		
Profundidad		

Now, let's look together at the following text and corresponding image from the same TED talk:

Three years ago, when I started thinking about this, there was one cable down the Western coast of Africa, represented in this map as that thin black line. Now there are six cables and more coming, three down each coast. Because once a country gets plugged in by one cable, they realize that it's not enough. If they're going to build an industry around it, they need to know that their connection isn't tenuous but permanent, because if a cable breaks, you have to send a ship out into the water, throw a grappling hook over the side, pick it up, find the other end, and then fuse the two ends back together and then dump it over. It's an intensely, intensely physical process.



Let's find all the prepositions in the text and identify the movements involved (with gestures!)

4. Written assignment for your portfolio: Watch the full TED talk and write a paragraph (between 100-120 words) about another *intensely physical* communication process of which ordinary people are not aware of. Write from the point of view of the expert, that is, the engineer that explains, with the precise words and elements (connectors, prepositions) the technicalities of the process chosen.