TWO IMPORTANT TRANSATLANTIC TRANSMISSION CABLES

Fons Vanden Berghen

In this note I am making a brief comparison between the pioneering transatlantic telegraph cable from 1866 and the fairly recent impressive fibre optic cable from 2018.

The cable that turned the world into a global village

Photos: author's collection

For the first time, after several unsuccessful attempts in 1858 and 1865, a telegraph cable was laid down at the bottom of the Atlantic Ocean, making it possible to establish a permanent telecommunication (telegraph) connection between America and Europe.
At certain places it was up to 5 kilometres deep on the bottom of the ocean. This cable had only one conductor. It was composed of seven twisted-copper wires, each with an area of approximately 1 mm^2. The ocean water served as a return conductor for the telegraph current! The total length was 4,260 km and the total weight 42 thousand tons. In the photos above all the elements seen surrounding the central conductor served for insulation and protection. This transatlantic cable ran from the island of Valentia (Ireland) to Trinity Bay in Newfoundland, Canada. At each of these locations it was then connected to the existing land line network, both in Europe and in America.
This enterprise was a real pioneer work and was the first important step towards making the world into a village. Many books were written about this and there is also a lot more to be found on the Internet. Therefore, I will not go into further detail. For those interested in historical and also recent submarine cables, I can recommend the great website of my friend Bill Burns: http://atlantic-cable.com

Microsoft and Facebook have installed a submarine super cable

To meet the ever-growing volume of data traffic, these two tech giants have laid a transatlantic fibre optic cable [1], resting on the floor of the ocean, that will have the largest capacity ever. Note that the thickness of an optical fibre 'wire' is thinner than a human hair. This cable was given the name 'Marea', the Spanish word for 'tide'.

In a single second 160 terabytes of data can be pumped through this cable. To realise this, eight cable pairs were required. A fibre optic cable always consists of a pair in order to enable two-way traffic. Its weight is 4.65 million kilograms and it has a length of 6,600 kilometres. This cable connects Virginia Beach in the United States with Bilbao in Spain, with construction starting at the end of 2016. The choice of Virginia is obvious once you realise the region is one of the most important datacentre hubs in the world. At the Bilbao end, Marea connects to network hubs in Europe with further extensions to Africa and the Middle East.
Microsoft and Facebook wanted to capitalise on the explosive growth in data traffic. As is well known, many services have been operating 'in the cloud' for quite some time, enabling data to flow back and forth and no longer need to be stored locally. In order not to impede these traffic flows, a super cable of this capability was needed. The cable was laid by Telxius, part of the Spanish Telefonica group and put into operation in February 2018. Telxius now manages the cable and is allowed to sell the remaining capacity to third parties.

A comparison
We saw earlier that a submarine transatlantic cable is not a novelty, nor is the length. But the two tech giants can now claim to have the cable with the largest capacity ever, namely 160 times thousand billion bytes per second! Let me compare that with the first cable (telegraph cable) of 1866. This was of course used to transmit Morse signals. That was also a binary system: dots and dashes. To transmit a dot, a positive electrical impulse was sent and a negative impulse for a dash. It was stated that you could send 8 words per minute over this cable (I think it was often less). That is then about 1 character per second and now we would say 1 byte or 8 bits per second. So with Marea today we have a capacity that is **twenty thousand billion times larger**; mind boggling, isn't it ...?

Halle (B) , in June 2018

[1] *Glass 'fibre' (British English) or glass 'fiber' (American English), is made from a fine strand of glass. It has various uses but in the world of telecommunications it is made into optical fibre cables, in which light is directed through long fibres of optically very clear glass to convey signals reliably over large distances. Because the light within in the glass fibre grazes the outer wall of the fibre at a particularly small angle fibre, the absorption is very small and the light in the fibre propagates through internal reflection. Fibre optic cables are very suitable for very fast and high capacity data transfer.*