**Undersea (Submarine) Cables-2021**

State of the Art in 2018: Planned Pacific Light Cable Network from Hong Kong to LA

to move 144,000 Gbps (or 144 Terabps) for 8,000 miles (13,000 km).

Main purpose is to connect Facebook/Google data centers in East Asia

with US. 2021: US FCC failed to license connection to US because of

security concerns arising from its connection to China.

State of the Art in 2021:

Facebook and Google placed bets on increasing fiber count in cables. Had

been limited to eight pairs because of need to for cable to supply power

to amplify optical signals repeatedly on their trip across the ocean.

Developers believed improving power transmission and optical amplifiers

would let a new generation of cables carry 16-25 fiber pairs.

* Google’s Durant cable which entered service in Jan. 2021 had 12 fiber pairs with a capacity of 250 terabits per second.

* The Amitie consortion cable as well as Google’s Grace Hopper cable now under construction in the Atlantic both have 16 pairs with full capacities of 350-370 terabits per second.
* Facebook’s new transatlantic cable will have 24 fiber pairs each with more than 20 Tbps for an overall record capacity of 500 Tbps (0.5 petabits per second). Equivalent to some 4000 Blue ray discs of data pers second. This is where capacity should be in two years when it is turned on says an expert. Built by NEC.

Future:

The next step is fibers that can guide different light signals at the same wavelength along separate paths through one fiber.

* One approach is fabricating fibers with multiple parallel light guiding cores running along their lengths.
* A second approach is fabricating cores larger than the usual 9 micrometers that are designed to guide several separate light signals through their length without scrambling them together.

NEC reported a successful field trial of a fiber containing four internal light guiding cores in a submarine cable. Expects multicore fibers to multiply the number of light guiding paths available through fibers without requiring major changes in cable size and structure. Might buy enough bandwidth to keep up with data center growth69+ for several years.

J. Hect, “Biggest Tech Companies Now Building the Biggest Data Pipes,” IEEE Spectrum website 18 Oct. 2021.