
The Other Side of Communication: Guardians of Global Connectivity

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A few weeks ago, I called a colleague in London—Chelmsford, to be exact—to discuss a business opportunity. After dialing his phone number and ensuring the appropriate country codes were applied to not only call out of the United States but also call into the United Kingdom, his cheerful British voice was on the other end. He quickly bellowed out an infectious greeting and laugh that could make a person believe all was right in the world despite the ever-changing political scenery of the United Kingdom's recent vote to exit the European Union and the impending change in a U.S. presidential administration. But for that moment, we were friends trying to figure out how to earn a steady figure to keep the wheels of our own lives turning.

My attention during that phone call was not so much on what we discussed but rather *how* we were able to discuss it. Specifically, how my voice was being transmitted from my cell phone in my home office in Oregon, all the way across the country, across the Atlantic Ocean, and to my colleague's cell phone in Chelmsford. That is, after all, the geography of our world; we cross oceans to communicate internationally.

A call from a cell phone is only mobile until it can no longer be. In this instance, my call was being transmitted through a U.S. mobile network

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until it reached the east coast, probably somewhere in New York or New Jersey. From there, my voice reached a terminal station where equipment decoded the transmission and sent it through one of many submarine fiber optic cables lying on the seabed of the North Atlantic Ocean. These cables connect the United States and United Kingdom directly through an actual physical cable link the diameter of a garden hose, which—by design and when laid over long distances—is the shortest and fastest way to transmit voice communication and data. Once in England, my voice was again sent through terminal station equipment. It then took a terrestrial and airborne journey through another network directly to Chelmsford. The delay in this transmission is on the order of milliseconds.

The above form of communication is achieved because my voice was sent through glass fibers no wider than the tip of a ballpoint pen contained in a submarine cable. My voice was actually being decoded into binary zeroes and ones and stored and transmitted on wavelengths of light reflecting through glass fibers that stretched roughly 6,000 kilometers across the seabed of the Atlantic Ocean at water depths as great as 5,000 meters. When I explain this to adults all over the world, I find their reaction is much the same as when I explain it to a class of sixth graders in my home town.

Light travels through fiber at roughly 203,000 kilometers per second, which is about two-thirds the speed of light through a vacuum.¹ Contrary to popular belief, over ninety-eight percent of all international voice and data communication occurs through submarine cables, not satellites. The irony in speaking to my colleague in Chelmsford was that the business opportunity under discussion was about exactly this—a new international submarine cable.

The first, fully operational transoceanic international submarine cable was laid in 1858. It was a transatlantic telegraph cable between Ireland and Newfoundland. The cable was operational for about sixteen days before failing, but it nonetheless allowed Queen Victoria to communicate with U.S. President James Buchanan. Manufacturing of another Atlantic cable began in 1865 and was installed by the legendary vessel *Great Eastern*—at that time the largest ship afloat. This cable was operational from 1866 to 1872 and was held in such esteem that it is celebrated in the fresco by Constantino Brumidi titled *The Apotheosis of Washington*, which decorates the dome of the United States Capitol Building in Washington D.C. The fresco has a marine section depicting Neptune with a trident and Venus helping to deploy a submarine cable.² The celebration was warranted because these early cables laid the foundation for an international telecommunications network, a backbone of critical infrastructure that now

supports the way we operate in the world and the way we interact with each other. It commenced an intercontinental communications revolution through submarine cables of ever-increasing capacity that has been maintained to this very day.

Technology has progressed over time, from early telegraph cables to coaxial cables and now fiber optic cables. Before the 1950s, telegraph cables could carry only a few hundred words per minute, but, by the mid-1980s, submarine coaxial cables could carry up to 5,000 telephone channels. In 1988, the first transoceanic fiber optic cable, named TAT-8, had a capacity equivalent to 7,680 telephone channels. Then, in 1991, the world-wide web was introduced. Since that time, consumer demand for broadband through fixed and mobile devices has drastically changed, and continues to change, the world of communications.

Today there are over one million kilometers of cable crossing the world's oceans and seas, connecting nearly every single coastal country (all but about twenty-two) in a vast array of diversified communication networks.³ Collectively, this global network is the result of close cooperation among and entrepreneurial work of more than 124 companies in roughly sixty-two nations.⁴ The technology is such that, as of 2001, some transoceanic fiber optic cables have the ability to carry up to thirty million telephone channels. Capacity continues to improve. This is not only transmission of voice data we are talking about here, but also financial transactions that keep our global economy functioning.

Each day the Society of Worldwide Interbank Financial Telecommunications (SWIFT) transmits fifteen million messages over submarine cables to over 8,300 banking organizations, securities institutions, and corporate customers in 208 countries. The Continuous Linked Settlement (CLS) Bank, located in the United Kingdom, is just one of the critical market infrastructures that rely on SWIFT as it provides global settlement of seventeen currencies with an average daily value of approximately USD 3.9 trillion. The U.S. Clearing House Interbank Payment System (CHIPS) is another structure that processes over USD 1 trillion a day to over twenty-two countries for investment companies, securities and commodities exchange organizations, banks, and other financial institutions.⁵ But this example, though impressive, rarely resonates with people at a personal level.

How do submarine cables impact us individually? Every time I open my personal email account through Google's Gmail, I am accessing my messages from one of Google's datacenters. It is possible that my Gmail is stored in a location such as Finland where companies like Google take

advantage of colder climates to control cooling of the vast amounts of servers stored in a centralized location. In this case, however, the transmission of data is very similar to my phone call to Chelmsford. My email is sent through a European terrestrial network until it reaches the Atlantic Ocean, whereby it travels via submarine cable to the United States and then hits another terrestrial network. I check my email no less than once every half hour (that is if it is not continuously open on my computer or cell phone). If, like me, you constantly use an email or messaging application, you are likely to be a heavy unwitting user of the submarine cable infrastructure that plays a key part in delivering most messages you send and receive. That is just one form of communication.

Facebook, Instagram, LinkedIn, Twitter, Netflix, YouTube, and every other medium of social media and entertainment make the same demands on the global network of submarine cables by billions of people around the world each day. These cables have revolutionized the world's ability to communicate. They have revolutionized education, business, commerce, healthcare, entertainment, and they have made possible the growth and accessibility of the Internet. They are the interconnected threads of the fabric of globalization. These cables have ushered developing nations into a modern era of regional and global commerce, and they make possible international financial transactions, video streaming, and payment services. It's not that this technology is forgotten, it's that the technology is unseen. But that is changing.

The CBS TV network ran a video news special on October 15, 2016 titled *Inside the installation of a new trans-Atlantic undersea cable*,⁶ which featured a cable system called MAREA that connects Bilbao, Spain with Virginia Beach. The investment is primarily backed by Facebook and Microsoft. Before that, on October 13, adweek.com featured a write-up in their "Social Times" section titled *Facebook, Google Team Up on Subsea Cable Across Pacific Ocean*. This cable, called Pacific Light Cable Network (PLCN) connects Hong Kong with Los Angeles and is now the third trans-pacific cable Google has backed. But submarine cables are not just relevant because names like Facebook and Google are associated with them. There are about forty actively used submarine cables going into the United States, all of which predate MAREA and PLCN. In fact, the actual relevance of submarine cables predates anything currently being used in the water today.

Since the dawn of submarine cable communications, nations have realized how international cooperation is necessary to protect this critical international infrastructure. They realized that without peacetime cooperation and collaboration, and the protection and rule of international law,

this vital human asset might become vulnerable to social and economic pressures, or become a pawn in peacetime international agreements.

On March 14, 1884, a convention among twenty-seven countries was held in Paris for the protection of submarine telegraph cables.⁸ The Convention established seventeen articles detailing how newly established international law would protect submarine cables and vessel-related operations for the laying and repair of cables outside of the territorial waters of coastal states. This convention is the predecessor to the 1958 Geneva Convention on the High Seas and Continental Shelf. Much of this was then incorporated into the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which is now the predominant international legal instrument governing submarine cables.

Under UNCLOS, submarine cables are recognized as a "common good that [is] the foundation of the increasing globalization and interconnectedness of the world."⁸ While Article 21 of UNCLOS grants a coastal State the freedom to adopt laws and regulations with respect to the protection of cables and other associated activities in its territorial sea, much of UNCLOS extends freedoms to submarine cables, as preceding legal instruments always have, for all areas outside a coastal State's territorial sea. For example, UNCLOS Article 58 extends the same freedom enjoyed by submarine cables on the high seas to the exclusive economic zone (EEZ), including the laying and maintenance of submarine cables. This provision also extends itself in Article 79 which says that all States (both coastal and landlocked) are entitled to lay submarine cables on the continental shelf. In the case of laying or repairing cables, all States should provide due regard to cables already in position and the possibilities of repairing existing cables shall not be prejudiced.

To clarify the definition of terms, Article 3 of UNCLOS defines the territorial sea as a limit not exceeding 12 nautical miles (22 kilometers). The contiguous zone is defined in Article 33 as a limit that may not extend beyond 24 nautical miles (44 kilometers) from the baselines from which the breadth of the territorial sea is measured (coastline as defined in UNCLOS). Article 57 defines the EEZ to not exceed 200 nautical miles (370 kilometers). The continental shelf is defined by UNCLOS in Article

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76 as the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongations of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the coast. In all cases, however, regardless of whether a coastal state has a continental margin beyond the 200 nautical miles of the EEZ (and not many do), the high seas is defined by Article 86 as those parts of the sea that are not included in the EEZ, in the territorial sea or the internal waters of a State, or in the archipelagic waters of an archipelagic state.

Further expanding the explanation of the high seas, UNCLOS Articles 88 and 89 state that the high seas shall be reserved for peaceful purposes and that no State may validly purport to subject any part of the high seas to its sovereignty. The freedom to lay submarine cables in the high seas is reiterated again in Article 112 by articulating that all States are entitled to lay submarine cables on the bed of the high seas beyond the continental shelf. Further language is included in Article 113 to protect submarine cables by stating that every State shall adopt the laws and regulations necessary to provide that the willful breaking or injury of a submarine cable beneath the high seas by a ship or person subject to its jurisdiction is a punishable offense. While protecting submarine cables is an entirely different subject unto itself, these Articles express the importance and vitality of submarine cables, the criticality of the communications infrastructure they provide, and the legal instruments in place to ensure their freedoms in all areas outside a coastal State's territorial sea.

UNCLOS, however, gets more involved, particularly in the area of the high seas. In fact, Part XI of UNCLOS goes on to define what is called the "Area" as the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction (beyond a coastal State's EEZ or extended continental shelf). In general, it states that the Area and its resources are the common heritage of mankind, no state shall exercise sovereignty, all rights and resources of the Area are vested in mankind as a whole, and activities in the Area shall be carried out for the benefit of mankind and for peaceful purposes. It is fitting then that these submarine cables, whose purpose is to facilitate human communication, lay on a seabed explicitly outlined for activities that benefit mankind.

Bill Gates stated he was "a great believer that any tool that enhances communication has profound effects in terms of how people can learn from each other, and how they can achieve the kind of freedoms that they're interested in."⁹ Gates, who helped democratize the personal computer through hardware and software, gravitates towards an optimistic and peaceful pronouncement on how communication benefits mankind. Knowing that

the very highway to make global communication possible—that is, to enhance the development and connectivity of other communication tools—is lying on the seabed, including that of the high seas, should give everyone in the United Nations pause on how this kind of essentially benign infrastructure, unlike any other kind of seabed infrastructure, promotes the common heritage and benefit of mankind by connecting the entire world.

It is, however, becoming increasingly important for both industry and policy makers to exchange views, share differing perspectives, and collaborate in a constructive manner as both the private sector and regulatory bodies make advances in their own right. The International Cable Protection Committee (ICPC),¹⁰ for example,

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is the organization that fulfills the role of protecting and overseeing the submarine cable industry. The ICPC was established on May 22, 1958 in the United Kingdom, and its membership includes more than 150 member organizations from over sixty countries. This is the international community that built, operates, maintains, and owns what collectively comprises the backbone of global communications. Originally formed around the premise of protecting and repairing submarine cables, the ICPC now has the vision to be the international submarine cable authority providing leadership and guidance on issues related to submarine cable security and reliability. The ICPC and its members have become the guardians of global connectivity.

For a voluntary organization, representing members operating under the rule of international law, ICPC has operated with remarkable success and has done so without the need for further international regulation. Instead it has succeeded under cooperation, coordination, and coherence among stakeholders for almost five decades. But in a world that is more interconnected than ever—especially through increased ocean and seabed use—the ICPC has over the last several years started reaching out to other organizations that may be unaware of the significance of this seemingly hidden network under the ocean, including the United Nations.

An example of this involves United Nations Resolution 69/292, which was enacted on June 19, 2015, to establish a Preparatory Committee (PrepCom) to develop an international legally binding instrument under UNCLOS on the conservation and sustainable use of marine biological

diversity of areas beyond national jurisdiction (high seas). Termed “Biological Diversity Beyond Areas of National Jurisdiction” or “BBNJ,” the PrepCom seeks to address gaps in governance and to strengthen UNCLOS in this regard. Such governance would put in place legally binding regulation to conserve and sustainably use marine genetic resources, designate marine protected areas, and put in place requirements for environmental impact assessments in the high seas, an area defined historically with express freedoms. Such regulations, if poorly drafted, have the potential to encroach on the freedoms of the high seas given to submarine cables. As a result, the ICPC is starting to participate.

During the UN General Assembly meetings held in late August 2016, the ICPC held a well-attended side event at the UN headquarters in New York City. The ICPC presented on the organization’s role within the ocean community and highlighted its newly published and informative white paper on the subject of submarine cables and BBNJ.¹¹ Among many of the compelling and informative topics presented at the side event, a conclusion and recommendation based on 150 years of industry knowledge and 132 years of regulatory framework was given. It stated that submarine cables should be exempt from any new legal regime that might be imposed in an implementing agreement for BBNJ. In addition, other than the criticality of their use, submarine cables are neutral to the marine environment, as recognized in The Oceans and the Law of the Sea Report of the Secretary General, the United Nations World Ocean Assessment for 2016, a joint study by the United Nations Environmental Program, the World Conservation Monitoring Center, and the ICPC. This report is only one among many other peer-reviewed scientific and technical publications, multidisciplinary workshops, and legal reports on the topic of submarine cables and the marine environment.¹²

As a result of the PrepCom side event and as an outcome of the ICPC’s annual Executive Committee meeting held in early October 2016 in Portsmouth, New Hampshire, the ICPC will be engaging organizations like the UN and others in order to develop and strengthen a consistent and present voice at the policy and regulatory level. This effort supports the UN PrepCom’s goal of seeking to strengthen cooperation and coordination in achieving equitable utilization of the high seas.¹³ It also strengthens the ICPC’s vision for outreach over common interests and is just one of many examples where the ICPC has demonstrated leadership through cooperation to promote the case for submarine cables.

The ICPC has developed a very strong affiliations and outreach strategy in order to develop relationships with other industry and governmental

organizations to promote collaborative and open cross-dialogue. Examples of this include outreach programs with the International Seabed Authority (ISA), the International Hydrographic Organization (IHO), OSPAR Commission, and General Bathymetric Chart of the Oceans (GEBCO), in addition to country-specific outreach.

In today’s world, the call for increased collaboration and dialogue seems to be ever-present. While competing views will surely exist, especially at the crossroads of industry and policy, the effect of one on the other exemplifies just how connected aspects of this world are. This connectivity could not be underscored more than by the submarine cables that physically link us all by communication and information transfer. As long as the world is connected, cooperation, collaboration, participation, and constant endeavor to protect human communication for the betterment of human kind is critical in furthering our common heritage. When and where emerging threats exist, both physical and regulatory, increasing partnerships of common interest will form between government, non-governmental organizations, international organizations, academia, and the private sector. Coincidentally, when they do, often-times it will involve a person writing an email or making a phone call between countries and continents who never once will think about how his words or voice are reaching the other side.^f

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ENDNOTES:

- 1 *Network Latency: A White Paper for Hibernia Networks*, Telegeography, 2015, <<http://www.hibernianetworks.com/news-and-insights/insights/>>.
- 2 International Cable Protection Committee, News Release, July 27, 2016, “ICPC reflects upon the start of the Global Cable Communications Revolution – 150 Years Ago today,” <<https://iscpc.org/documents/?id=2175>>.
- 3 *Submarine Cables and BBNJ*, International Cable Protection Committee, August 1, 2016, <<https://iscpc.org/documents/?id=2220>>.
- 4 Captain Douglas R. Burnett, *Cable Vision Proceedings, 2011* (U.S. Naval Institute, August 2011 Vol. 137/8/1), 67.
- 5 S. Malphrus, “Undersea Cables and International Telecommunications Resiliency,” 34th Annual Law of the Sea Conference, Center for Ocean Law and Policy, University of Virginia, May 20, 2010.
- 6 *Inside the installation of a new trans-atlantic undersea cable*, October 15, 2016, <<http://www.cbsnews.com/videos/inside-the-installation-of-new-trans-atlantic-undersea-cable>>.

- 7 *Convention for the Protection of Submarine Telegraph Cables, Paris, Australian Treaty Series 1901 No. 1 (electronic), Commonwealth of Australia 1999, March 14, 1884*, <http://www.gc.noaa.gov/documents/seabed-icpc_1884.pdf>.
- 8 Tara Davenport, "Submarine Communications Cables and Law of the Sea: Problems in Law and Practice," *Ocean Development & International Law* (2012): 201.
- 9 Gates, Bill. "Keynote Address to the Creating Digital Dividends Conference" Speech Text. (18 October 2000), <<http://voicesofdemocracy.umd.edu/gates-keynote-address-speech-text/>>.
- 10 *International Cable Protection Committee*, <www.iscpc.org>.
- 11 Ibid.
- 12 *Preparatory Committee established by General Assembly resolution 69/292, United Nations*, "Chair's overview of the first session of the Preparatory Committee," <http://www.un.org/depts/los/biodiversity/prepcom_files/PrepCom_1_Chair's_Overview.pdf>.
- 13 Ibid.