



Undersea Cables: What Should Be Keeping You Up at Night

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JCSP 49 DL

Exercise Solo Flight

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UNDERSEA CABLES: WHAT SHOULD BE KEEPING YOU UP AT NIGHT

THESIS

Proper functioning of undersea cables is an absolutely necessity in today's world – not only to businesses and individuals, but to the militaries that protect them. Therefore, it is necessary to keep the communications going both during peacetime and war. Unfortunately, at least in the United States, there is no one agency charged with ensuring protection and redundancy of communications within the homeland or on the territorial seas. Likewise, existing law, international and domestic, is inadequate to protect the cable infrastructure. This paper begins with a background on undersea cables and the international law protecting them. It then follows with a survey of current protection efforts in the United States and the challenges to their success. Finally, this paper proposes developing a North American strategy between Canada, the United States, and Mexico that creates a guidebook upon which agencies can focus their efforts, while working towards a larger combined strategy for western democracies, as well as, our partners in the Pacific region.

BACKGROUND

What are undersea cables, who owns them, and why do they need protecting?

The complex, high speed undersea cables of today owe their lineage to the first transatlantic telegraph cable laid 1854-1858 from Ireland to Newfoundland that carried the first official telegram across an ocean – a letter of congratulations from Queen Victoria to U.S. president James Buchanan.¹ Today, nearing two centuries later, commercially-owned undersea cables carry ninety-nine percent of transoceanic digital communications, including communications supporting the U.S. military and national security organizations.²

Modern undersea cables are composed of bundles of fiber optics protected from physical and electrical hazards by multiple layers of materials.³ Layers vary according to purpose and environment, but cables are commonly comprised of an outer tar-soaked yarn to provide some protection against anchor drag and shark bites, a galvanized armor layer for crush resistance, a polyethylene jacket to block static electricity and protect the inner layers from corrosion, a copper sheath for sealing against water and conducting electricity, ultra-high strength steel wires to protect and isolate the optical fibers, a plastic sleeve, some silicone gel, and of course, the fibers themselves.⁴

The overwhelming majority of undersea cables are privately owned.⁵ Some may have a single owner, though it is more common today for groups of investors to invest in a particular

¹ Queen Victoria to James Buchanan, November 17, 1858, Telegram, James Buchanan Papers, Manuscript Division, Library of Congress, Washington, D.C.

² United States. Congressional Research Service, *Protection of Undersea Telecommunications Cables: Issues for Congress*, Washington, D.C.: Congressional Research Service, 2023: 1. <https://crsreports.congress.gov/product/pdf/R/R476481>.

³ Joe Brock, "U.S. and China Wage War Beneath the Waves – Over Internet Cables," *Reuters*, 24 March 2023. <https://www.reuters.com/investigates/special-report/us-china-tech-cables/>.

⁴ *Ibid.*

⁵ Congressional Research Service, *Protection of Undersea Telecommunications Cables* . . . ,1.

cable venture in order to spread out both costs and risks.⁶ The United States and its partners are in competition with China and its companies over the ownership, laying, and landing of undersea cables, which has resulted in the United States exerting influence to enable U.S.-based cable companies to win contracts over Chinese interests.⁷ One example of this is the South East Asia-Middle East-Western Europe 6 (SeaMeWe-6), which will connect over a dozen countries across three seas and the Indian Ocean.⁸ With government assistance, the U.S. cable company, SubCom, LLC., prevailed over a Chinese cable company, despite that company's bid coming in over \$100 million less, ultimately resulting in two of the three Chinese investors exiting the deal.⁹

Damage to undersea cables may arise from both intentional and unintentional threats. For example, in 2022 vandals damaged a number of cables in France, causing considerable disruption.¹⁰ In another incident in France the same year, a cable was cut and resulted in communications degradation in many places across Europe.¹¹ In a different example from 2022, a cable was unintentionally cut by hapless fisherman.¹² Indeed, undersea cables even fall prey to natural events, such as underwater volcanoes (Tonga in 2022) and shifting ice (Alaska in 2023).¹³

The Law of Undersea Cables in Peacetime and War.

There are several sources of international law relating to the laying, operation, and protection of undersea cables. The oldest is the Convention on the Protection of Submarine Telegraph Cables dating from 1884.¹⁴ Numerous countries signed on to the convention including the United States, the United Kingdom, much of Europe, and Russia.¹⁵ The Convention makes it a crime to willfully or through culpable negligence cause damage to an undersea telegraph cable.¹⁶ It includes an exception for instances where the damage was necessary to save lives or a ship, though it requires that precautions be first taken to avoid the damage.¹⁷ The Convention also sets out liability for unintentional damage and creates time and distance offsets for fishing equipment and other vessels in the vicinity of cable-laying operations, while providing for reimbursement to fishing enterprises that abandon fishing nets and equipment in order to avoid damaging a cable.¹⁸ Notably, the Convention explicitly does not apply to belligerents in times of war.¹⁹

Next, the UN Convention on the Law of the Sea sets out coastal and non-coastal states'

⁶ Brock, "U.S. and China Wage War Beneath the Waves . . ."

⁷ *Ibid.*

⁸ *Ibid.*

⁹ *Ibid.*

¹⁰ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*,6.

¹¹ *Ibid.*

¹² *Ibid.*, 8.

¹³ *Ibid.*, 9.

¹⁴ Convention for the Protection of Submarine Telegraph Cables, concluded at Paris May 14, 1884, 13 Stat. 592, 170 L.N.T.S. 361. <https://www.iscpc.org/documents/?id=13>.

¹⁵ *Ibid.*

¹⁶ *Ibid.*, Article II.

¹⁷ *Ibid.*

¹⁸ *Ibid.*, Articles IV-VII.

¹⁹ *Ibid.*, Article XV.

rights and responsibilities, subject to certain requirements and restrictions, in laying undersea cables in the exclusive economic zone, the continental shelf, and the high seas.²⁰ Articles 113, 114, and 115 of the UNCLOS restate several of the provisions of the Convention on the Protection of Submarine Telegraph Cables, making them more broadly applicable to undersea cables, generally, including that intentional breaking be a punishable offense except in cases where necessary to prevent loss of life or a ship and that companies who break undersea cables while laying or repairing their own bear the cost of repair.²¹ However, the UNCLOS does not speak to the actions of belligerents during armed conflict.²²

ANALYSIS

What about in War?

There is little reason to expect belligerents will not seriously consider severing as many cables, or at least the most strategically important, as they can at the outset of armed conflict. The United States cut telegraph cables in the Spanish American War, the British cut cables in World War I, and cables were cut throughout World War II. Cables have fallen victim to armed conflict as recently as March of 2024.²³ Houthi aggression in the Red Sea is the likely culprit in three undersea cables being cut that carry 25 percent of the communications between Europe and Asia.²⁴ While some sources believe the Houthis directly cut the cables, others suggest that anchors from disabled ships set adrift by Houthi attacks might be to blame.²⁵

While there are many more cables now than existed in the early 1900s, or even the 1940s, providing some redundancy, the world is also much more reliant in everyday transactions and living on transoceanic communications.²⁶ Given the global economy, it is doubtful one party could sever a significant amount of their adversary's cables with also causing themselves some amount of adverse impact. Even so, a state may ultimately decide that the military necessity of disrupting their cobelligerents' communications outweighs any shorter-term negative impacts on the global economy.

Efforts to protect undersea cables in the U.S.

The Congressional Research Services report from 2023 identifies several efforts to improve undersea cable protection.²⁷ First, Congress enacted legislation requiring the U.S. Coast Guard to consider the location of undersea cables when establishing anchorage grounds.²⁸ According to industry reporting, approximately twenty-five percent of cable damage incidents

²⁰ United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

²¹ *Ibid.*, Articles 113-115.

²² James Kraska, "The Law of Maritime Neutrality and Submarine Cables." *Blog of the European Journal of International Law*, 29 July 2020. <https://www.ejiltalk.org/the-law-of-maritime-neutrality-and-submarine-cables/>.

²³ Jon Gambrell, "3 Red Sea Data Cables Cut as Houthis Launch More Attacks in the Vital Waterway," *Associated Press*, 4 March 2024, Last Modified 4 March 2024, <https://apnews.com/article/red-sea-undersea-cables-yemen-houthi-rebels-attacks-b53051f61a41bd6b357860bbf0b0860a>.

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 35.

²⁷ *Ibid.*, 21-22.

²⁸ *Ibid.*, 21.

arise from anchoring issues.²⁹ Therefore, this effort could significantly decrease overall cable damage in U.S. waters.

Second, the Fiscal Year 2020 National Defense Authorization Act created a Cable Security Program, which includes subsidies to incentivize private ownership of two U.S.-flagged cable repair ships.³⁰ Perhaps even more importantly, it gives the U.S. government access to the ships in times of national emergency, adding significant cable repair capability to complement the Navy's one cable laying and repair ship.³¹

Third, pursuant to its treaty obligations under the Convention on the Protection of Submarine Telegraph Cables, the United States has criminalized both willful and negligent cable damage.³² However, with penalties for both, adopted in 1888, falling within the relatively minor misdemeanor category³³, it is questionable as to whether the criminal sanctions have a sufficient deterrent effect and whether the punishments fit the magnitude of the crime given the worldwide dependence on such cables today, as well as, their strategic advantage in competition and war.

Lastly, the CRS notes that since the fall of 2021, the United States Federal Communications Commission has required telecommunication cable providers to report any unscheduled service outage.³⁴

Another entity that works for the protection of undersea cables is the interagency Committee for the Assessment of Foreign Participation in the United States Telecommunications Services Sector, known more succinctly as Team Telecom.³⁵ Team Telecom is memorialized in Executive Order 13913, which recognizes that “the security, integrity, and availability of United States telecommunications networks are vital to United States national security and law enforcement interests.”³⁶ Made up of numerous federal agencies and Secretaries, including Defense, Homeland Security, and the Attorney General, Team Telecom reviews a number of different telecommunications licensing applications, including licenses to land an undersea cable in a U.S. territory and transfers of existing undersea cable licenses to other entities.³⁷ With a focus on preventing China from controlling any cable that lands in the United States, Team Telecom has been a driving force behind cancellation of at least four cables meant to connect the United States and Hong Kong.³⁸

Challenges to protection efforts.

²⁹ *Ibid.*

³⁰ *Ibid.*, 22.

³¹ *Ibid.*

³² Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 22.

³³ *Ibid.*

³⁴ *Ibid.*

³⁵ The Committee for the Assessment of Foreign Participation in the United States Telecommunications Services Sector - Frequently Asked Questions, Last Accessed 19 May 2024, <https://www.justice.gov/nsd/committee-assessment-foreign-participation-united-states-telecommunications-services-sector#1>.

³⁶ Executive Order 13913, *Establishing the Committee for the Assessment of Foreign Participation in the United States Telecommunications Services*, 85 Fed. Reg. 19255 (4 April 2020).

³⁷ *Ibid.*

³⁸ Brock, “U.S. and China Wage War Beneath the Waves . . .”.

One challenge to the protection of undersea cables involves the diverse groups of investors involved in individual cables.³⁹ These investors are often based in several different countries and have a variety of different interests that may affect such things as data security, responsiveness to repair, and vulnerability to exploitation by malicious actors.⁴⁰

Another protection challenge concerns the power of U.S. states and territories to regulate leases for undersea cables in their territorial waters.⁴¹ Since different jurisdictions have different laws regulating the industry, thereby creating compliance complexity, applying a one size fits all protection regime at the federal level is difficult.⁴² For example, a federal rule requiring welded manhole covers or other landing site protections might conflict with or significantly deviate from the applicable state law.⁴³ Likewise, various federal, state, and local agencies involved in the undersea cable permitting process, but with mandates other than protection and security, create a risk that various requirements could increase overall vulnerability.⁴⁴ As one example, the U.S. Army Corps of Engineers regulates the placement of undersea cables from the perspective of its own jurisdictional scope, that of impacts to navigation, rather than the security of such cables.⁴⁵ Similarly, agencies with mandates to secure public access to beaches, reduce pollution to air, water, and land, and granting of easements each review undersea cable placement through the lens of their own programs.⁴⁶

Yet another challenge to undersea cable protection involves the numerous emerging risks posed by other, competing uses of territorial waters, such as “deployment of offshore wind facilities, deep-sea mining, and oil and gas exploration.”⁴⁷ All of these competing uses create complexity in deconfliction and pose questions about how much offset should be maintained between the cables and other activities. Moreover, high demand for such uses could have the effect of relegating numerous undersea cables to single landing points, thereby effectively defeating the advantages of cable redundancy and automatic rerouting of traffic.

While many agencies are working various, sometimes overlapping, aspects the undersea cable protection space, there is no single agency tasked with orchestrating and organizing the protection effort.⁴⁸ The Department of Homeland Security’s Cybersecurity and Infrastructure Security Agency (CISA) has the lead in the United States for critical infrastructure protection, which arguably includes undersea cables, or at a minimum, the landing stations thereof.⁴⁹ CISA has the Communications Sector Coordinating Council (CSCC) and the Communications Sector Government Coordinating Council, both of which develop plans to protect critical infrastructure.⁵⁰ The CRS report notes that, as of 2022, neither had developed a plan for

³⁹ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 11.

⁴⁰ *Ibid.*

⁴¹ *Ibid.*

⁴² *Ibid.*, 12

⁴³ *Ibid.*

⁴⁴ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 15.

⁴⁵ *Ibid.*

⁴⁶ *Ibid.*, 19.

⁴⁷ *Ibid.*, 13.

⁴⁸ *Ibid.*, 14.

⁴⁹ *Ibid.*, 13.

⁵⁰ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 13-14.

protecting undersea cables.⁵¹ It goes on to note that the 2022 SCC annual report made no mention of undersea cables.⁵² A quick check of the 2024 annual report yielded the same result.⁵³ Likewise, a keyword search on the CSCC website for the terms “undersea”, “submarine”, and “subsea” retrieved zero results.⁵⁴

The Blessing and Fallacy of Redundancy.

One thing that warrants repetition throughout this analysis is the difficult balance between the protection afforded by grouping large numbers of cables together at a single hardened landing site and the resulting singular target on which an enemy can mass firepower. While in the United States, for example, there are large numbers of cables coming onshore, which automatically reroute traffic in the event of a cable fault, they often make landing at the same physical location – thereby allowing onshore protection efforts to concentrate on a particular location while also making that location a prime, singular, high-value target for adversaries.

The Way Forward.

Undersea cable ventures are much like other critical infrastructure providers, such as hospitals and energy companies, in that, as previously mentioned, they are most often privately owned. This makes enforcing protection measures like robust cybersecurity difficult to effectively pursue. Some cables, however, should be considered so critical to the nation’s ability to prosecute national defense that they be designated as a special category of national security infrastructure. This designation would serve to treat those particular cables as no-fail and requiring enhanced protection measures with a greater governmental presence within the actual business. While this paper recognizes that it is possible that certain cables, those most essential to national security, may have some such designation, there does not appear to be any public information of its existence. This paper is limited to readily available information on the internet accessible through commercial search engines. Likewise, if such a designation was known at the public level, it seems likely it would be reflected in the Congressional Research Service undersea cable protection study mentioned throughout this document.⁵⁵

Examples of cables necessitating such a designation are the ones providing communications between the continental United States and its Pacific bases and operations in Korea, Guam, Kwajalein, and Hawaii. Kwajalein, for example, supports the U.S. Space and Missile Defense Command’s Ronald Reagan Ballistic Missile Defense Test Site.⁵⁶ According to the website, Submarine Cable Map, Kwajalein is serviced by a single undersea cable, the

⁵¹ *Ibid.*, 14.

⁵² *Ibid.*, 14.

⁵³ Communications Sector Coordinating Council, *Annual Report, 2024*, Last Modified 1 March 2024, <https://www.comms-scc.org/2024/03/01/2024-cscc-annual-report/>.

⁵⁴ This author used the site’s search engine at <https://www.comms-scc.org/?s> to search for the terms undersea, submarine, and subsea.

⁵⁵ The CRS report does mention “some cables landing in the United States are scrutinized for physical and other security risks, but not all applications are referred or reviewed in such detail—only those that pose a risk to U.S. national security.” Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 29. However, it does not suggest the level of governmental involvement the author contemplates in his recommendation.

⁵⁶ U.S. Army Garrison Kwajalein Home Page, Last Accessed 19 May 2024, <https://home.army.mil/kwajalein/>.

HANTRU1 Cable System.⁵⁷ Seemingly, this one cable would be critical to continued operations at Kwajalein; thereby, earning it a designation as part of the suggested national security infrastructure. However, further complicating U.S. government intervention is that the HANTRU1 Cable System is owned by a consortium consisting of the Federated States of Micronesia Telecommunications Cable Corporation, the Marshall Islands Telecommunications Authority, and Hannon Armstrong.⁵⁸ Only one of those, Hannon Armstrong, is an American company.⁵⁹

According to the same cable website, Hawaii connects to the continental U.S. through eight cables.⁶⁰ Of those, all but one make landing on the leeward side of the island of Oahu.⁶¹ For a robust state actor, sabotaging seven cables, or landing sites, on one side of an island does not seem that lofty a goal. Notably, Oahu is home of a vast array of U.S. military bases, headquarters, and capabilities, such as Indo-Pacific Command, U.S. Army Pacific, United States Pacific Fleet, Marine Corps Base Hawaii, Hickam Air Force Base and Pearl Harbor (now Joint Base Pearl Harbor – Hickam), and the Army's 25th Infantry Division.⁶²

To enhance overall cable protection efforts, the CRS study recommends several measures to reduce the possibility of cable damage, several which will be briefly discussed.⁶³ First, the report recommends that a single federal agency be designated as the lead for coordination of all cable protection efforts.⁶⁴ The report notes that the Federal Communications Commission (FCC), as the communications coordinator for the U.S., is already well positioned to head this effort.⁶⁵ The report suggests that the FCC fulfill this mission in consultation with the Department of Homeland Security (DHS), as that agency has primacy for homeland protection efforts.⁶⁶ Another author proposes that the U.S. Coast be the lead agency.⁶⁷ As support, the author points to the Coast Guard's integration with both the DoD and DHS, its investigative and law enforcement capabilities, and its access to intelligence.⁶⁸ While the Coast Guard seems an indispensable part of a whole of government approach to cable protection, it seems unlikely that the Coast Guard could achieve in the near term the same level of integration and understanding of the communications environment that is already present in the FCC. Regardless of which is chosen, the lead agency could coordinate and deconflict all federal agencies and permitting

⁵⁷ Submarine Cable Map, Last Accessed 19 May 2024, <https://www.submarinecablemap.com/submarine-cable/hantru1-cable-system>.

⁵⁸ *Ibid.*

⁵⁹ Hannon Armstrong, Company Overview, Last Accessed 19 May 2024, <https://www.hasi.com/company-overview>.

⁶⁰ Submarine Cable Map, Last Accessed 19 May 2024, <https://www.submarinecablemap.com/submarine-cable/hantru1-cable-system>.

⁶¹ *Ibid.*

⁶² This information is based upon the author's personal knowledge having been stationed on Oahu in the military service.

⁶³ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 26.

⁶⁴ *Ibid.*

⁶⁵ *Ibid.*

⁶⁶ *Ibid.*

⁶⁷ Andrew Niedbala and Ryan Berry, The Coast Guard Should Lead to Protect Undersea Cables, *Proceedings* 149, no. 8 (August 2023), <https://www.usni.org/magazines/proceedings/2023/august/coast-guard-should-lead-protect-undersea-cables>.

⁶⁸ *Ibid.*

requirements, while coordinating with industry and establishing protection standards.⁶⁹

Second, the lead agency should develop a comprehensive cable protection strategy to set roles for other agencies, guide cable protection policies, assess risk, and further develop public-private coordination.⁷⁰ Third, the study recommends that Congress set policies to protect cables from damage.⁷¹ This includes hardening cable landing sites against attacks and natural disasters, increasing intrusion detection capabilities, cable protection zones, and route redundancy.⁷²

More than a U.S. Effort

Recognizing the difficulty in protecting cables and their landing sites in U.S. states, territories, and long-term leases briefly discussed herein, it is entirely another matter to consider their protection in waters and landing sites under the control of another country. Therefore, this paper goes further than the CRS report and suggests that the U.S. and Canada, along with their western allies, develop a strategic plan for maintaining communications capabilities both in peacetime and during armed conflict. Likewise, strategies and plans must be developed with as many of our Pacific partners as possible.

Each country would designate its own lead agency to coordinate protection efforts. Together, they could develop a multipronged strategy that includes protection of existing infrastructure at home, with our partners, and in areas of strategic interest, redundancy, and some sort of intrusion detection and response capability on the high seas.

CONCLUSION

While it is currently impossible to simultaneously protect all cables in territorial waters, the Exclusive Economic Zone, and on the high seas, it cannot follow that countries simply write off protection as being too hard to accomplish. To do so, would invalidate all the efforts at protection taken within territorial waters and at onshore landing stations. Undersea cables will be high value targets in both conventional warfare and gray zone conflict. Simply having a United States strategy for cable protection is not enough. Our cables land on many foreign soils. Therefore, it is critical that, at a minimum, western democracies develop a coherent strategy for the protection of cables that land on their soils in order to continue communications at the national security and economic levels. Similar efforts must be pursued with our Pacific partners, such as Japan. Canada and the United States, as the closest of friends, should begin by setting the standard for our allies. With the inclusion of our southern neighbors in Mexico, we can harden our cable landing sites, protect our cables from inadvertent and willful damage from anchors and other devices, and demand cyber hygiene from private cable owners.

⁶⁹ Congressional Research Service, *Protection of Undersea Telecommunications Cables . . .*, 26.

⁷⁰ *Ibid.*

⁷¹ *Ibid.*

⁷² *Ibid.*

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