

SUBMARINE CABLE CORRIDORS FOR ISLAND NATIONS: IMPLEMENTING BEST PRACTICES FOR CABLE PROTECTION

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Abstract: In an increasingly connected global economy, many island nations such as Bermuda are linked to the rest of the world by no more than a couple of submarine cables. The rise of new seabed economic activity may pose a risk to the cables. As best practice for critical infrastructure and given that over 70% of cable faults are the result of man-made activity, these island nations should implement a cable corridor for near shore protection. This paper explores the key elements of submarine cable corridors and what process is needed to implement cable corridors.

1. ISLAND NATIONS AND THEIR CABLES

The world today is connected by submarine cables through which over 95% of data is transmitted¹. Due to the higher cost of satellite and faster speeds of cables, submarine cables remain the primary infrastructure for the movement of information internationally. For islands and island nations, cables connect them to the rest of the world and play a vital role in their economies and national security.

By taking a quick look at TeleGeography's submarine cable map website, one will notice that many islands have no more than 3 cable systems connecting them to the rest of the world. The exceptions to this are the islands that serve as cable hubs such as Hawaii, Fiji, and Guam. With fewer cable systems connecting them to the rest of the world, islands inherently have less redundancy and are less resilient should cable faults occur. Although it's unlikely that three cables would be inoperable at the same time, it should always be considered a possibility due to natural disasters of catastrophic magnitude or from manmade seabed activities.

2. THREATS TO SUBMARINE CABLES

While many unfamiliar with cables may hold the misconception that most cable faults are due to natural causes, studies on the topic have found that human activities account for approximately 75% of faults. Of the human activities causing cable faults, over 75% occur at depths shallower than 300m, and approximately 20% occur at depths greater than 1000m. Additionally, the second largest cause of cable faults at less than 1000m depth is anchor fault. The cable faults were mainly located in busy harbors and in ship traffic areas with deep water faults being a rare occurrence².

Should cable faults occur, the cable operating companies typically cover the cost of cable repairs directly. This could cost between 1 and 2 million USD for repairs closer to shore with greater costs for those occurring in deep water³. Furthermore, there is a temporal factor with cable breaks, taking one day to repair a land break and up to seven (or longer) for a break in the ocean. This downtime results in disruptions for both the cable owners and their clients, affecting both business and government operations.

One recent example of disruptions due to a cable fault is being experienced on the island nation of Tonga. On January 20th, 2019, the nation's lone submarine fiber optic cable was cut. According to a director of Tonga Cable Limited, the company believed that the cable was cut in multiple places by an anchor dragged along the seabed. An oil tanker was in the area at the time, and the company and authorities are determining whether there was negligence involved.

As of February 1st, 2019, the cable isn't back in service, causing disruptions to Tonga's communications, businesses, and local economy. Credit card payments couldn't be processed, and local businesses aren't able to operate regularly with international customers and partners due to the brief rations of internet access. During this time, Tonga is relying on limited connectivity through satellite internet providers with speeds of dial-up⁴.

3. IMPLEMENTING LEGISLATED CABLE CORRIDORS

Each jurisdiction has unique legislative processes that can't be addressed individually in this paper. However, there are many common factors and issues that will be confronted during the implementation of a legislated cable corridor.

The first common issue is one that needs to be addressed with any type of legislation: political will⁵. Each government will have a different agenda based on the goals of the sitting congress or parliament. The big headlines tend to draw the bulk of attention by news cycles and the populace. These issues include topics such as social and economic issues as well as other issues of great local concern.

To address this issue, it would be wise for administrations to gather political will for implementing a cable corridor to another important issue. In the case of Bermuda, the

current administration has been focused on passing legislation around blockchain and technology. To build political will behind the implementation of a cable corridor, the need for a corridor had to be aligned with the initiatives of the current administration around technologies.

Unlike most political initiatives, the subject of implementing cable corridors will most likely need a "top-down" approach as opposed to a more grassroots approach for social and economic issues. Submarine cables don't garner the same attention that issues such as taxes, immigration, and social welfare policies. This is despite the fact that submarine cables affect all citizens of most countries, even more so for those on islands as cables are how these populations stay connected to the rest of the world.

For island nations looking to build political will towards implementing a submarine cable corridor, an effective approach would be to tie the corridor to an economic initiative. While there will be restrictions of certain seabed activities in the protected cable corridor, these will need to be weighed against the benefits of implementation. Among the benefits are the due processes that can also be implemented around the laying or replacing submarine cables. These processes may include the local permits and licenses companies need before landing cables. For governments, this allows for having a centralized process by defining government committees, task forces, or departments with authority over decisions regarding cables. By also adding these processes, governments will establish a clear timeline events for themselves as well as for cable companies during new cable installations as well as repairs and replacements. This provides a certainty of process and is preferable over assembling impromptu committees, even if installation and replacement are infrequent events.

The second common issue to address is the location of the cable corridor. On islands, there is limited space both on land and in the surrounding waters. A submarine cable corridor will restrict certain seabed activities within the area. From an overhead view, the corridor will take the general shape of a cone with the tip being the location where the corridor originates, widening as it extends into the sea as shown in Figure 1. Ideally, the cables within the zone would be 3,000m apart by the time sea depth is 1,000m and 5,000m at 2,000m sea depth. This width between cables would depend on existing cable locations and space for future systems and repairs, as well as a buffer zone for prohibited activities⁶.

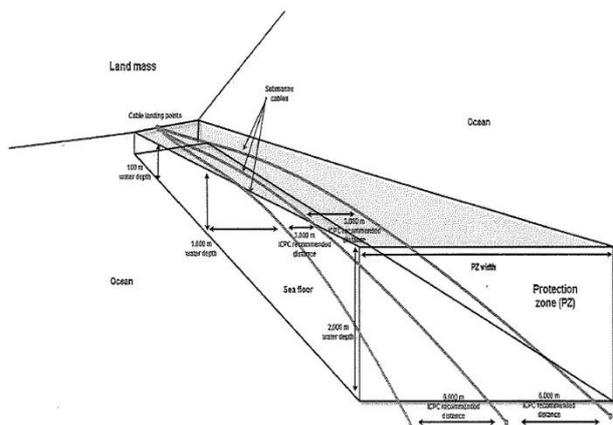


Figure 1: Visual depiction of a submarine cable corridor

Activities affecting the seabed will be restricted, including but not limited to dredging, mining, certain forms of commercial fishing, and anchoring. Not all of these may be applicable currently for many islands; however, they still need to be accounted for should technological developments lead to their emergence on island nations.

The simplest approach would to legislate the corridor around the landing site and location of existing cables. In practice, the problem of multiple landing sites at different locations will most likely arise. For instances like these, situations will need to be addressed

individually, and the corridor to be implemented should be tailored to fit the needs of the jurisdiction.

Using Bermuda as a case study, we will look at Bermuda's cable landing sites. As shown on TeleGeography's Submarine Cable Map, one will notice that Bermuda's four cables land at two different sites: three cables at one and one at the other⁷. In this situation, there is a possibility of implementing two corridors with the larger one around the landing site with three cables. However, Bermuda's natural topography minimizes some of the potential inconveniences of having two corridors. The southern side of the island has a rocky seabed and an abundance of coral reef, which have protections from prior legislation. Due to these circumstances, most of the islands commercial maritime operations take place on the northern side of the island^{8,9}. Consequently, implementing the cable corridors should have a minimal effect on Bermuda's commercial maritime activities, as all the cables land along the southern side of the island.

Each island will face a unique set of challenges such as Bermuda, and the cable corridors should also account for existing activities as well as the local island topography to maximize the corridor's value to the cables and island economy.

4. STAKEHOLDERS OF THE CORRIDOR

There will be two groups of stakeholders: the decision makers and the industries and individuals affected. The decision makers include the government and the government agencies, the cable owners, and telecom companies. The individuals and industries include the island's residents, ship owners, commercial and recreational fishers, and the other business communities on the island including hospitality.

The concerns of decision makers will vary according to their usage of the marine space or their role in enforcing and regulating a cable corridor. The government and its agencies will be responsible for establishing and enforcing the rules of the corridor. Additionally, port authorities will likely receive inquiries from the shipping and tourism industries regarding the submarine cable corridor and play an important role with aiding in education and outreach regarding the corridor. Legislatures and regulators would likely be responsible for enforcing licenses, protection and monitoring within the corridor, and legislating the zone including the boundaries. The commercial decision makers such as cable owners and telecom companies will be concerned with any permits and licensing fees required to operate on the island, which may be addressed in previous legislation or as part of the cable corridor.

While decision makers are more focused on the regulation and facilitation of the corridor, individuals and industries will be more concerned on how their activities will be affected within the corridor. Certain activities that pose a threat to submarine cables would be restricted in the zone. As mentioned earlier, these activities include anchoring, dredging, mining, and certain types of fishing. This isn't to say that all these activities are restricted. Dragging anchors of large ships and longline fishing would be the activities posing the greatest risk to the health of submarine cables. Mining and dredging also involve heavy seafloor activity and potential harm to cables. For consumers of telecom services such as residents and the business community on the island, the implementation of a cable corridor should have minimal effects on the day-to-day activities and operations.

5. ADDRESSING STAKEHOLDER CONCERNS

Each stakeholder involved will have concerns around the process of implementing the cable corridor, the effects of it on their activities (both recreational and commercial), and the effects on the island economy. The government and existing government agencies will need to leverage existing legislation and find out what additions are needed in order to effectively roll out a submarine cable corridor. Some concerns regarding enforcement in a proposed cable corridor may have already been addressed in previous legislation, meaning new legislation would only need to cover the remaining aspects needed for implementing a corridor. One of the most significant issues that may arise is that of political will mentioned earlier.

Cable owners appreciate the certainty of process and the mitigated risk that comes with having a process when planning new cables or replacing cables and for repairs should faults occur^{10,11}.

The issues of the individuals and industries are concerned less on legislation and regulation and more on the effects of such actions. Island residents won't be affected from the services they are provided nor will most of their recreational maritime activities. Container shippers and cruise lines may be concerned about where they can drop anchor around the island, especially during storms or while waiting to be unloaded or loaded.

The presence of a submarine cable corridor provides a great deal of assurance for island nations. The nature of hospitality and international business activities on island nations require constant connectivity with the rest of the world for operations. For governments, constant connectivity is vital for daily activities and national security as submarine cables are often the primary

medium of staying connected with the rest of the world.

6. PREPARING FOR LEGISLATIVE PROCESSES

In order to prepare for the legislative side of implementing a cable corridor, it would be wise to examine prior cases of implementation. The first two countries to implement a zone were New Zealand and Australia.

However, both countries took different approaches in restrictions within the corridor. New Zealand took a general blanket approach and restricted a variety of maritime activities within the zone. Meanwhile, Australia took a less restrictive approach but spent more time addressing nuances in certain activities, such as the maximum weight for anchors in the area. Discerning which approach will be most appropriate will be a critical step for each island implementing a submarine cable corridor.

One final concern regarding legislation is that of territorial seas. As defined by the United Nations Convention on the Law of the Sea, the territorial sea of a nation extends up to 12 nautical miles. This effectively limits the range of the cable corridor for all ships to this distance, which may not encompass all of an island's continental shelf. However, the island nations can still extend the corridor to the end of the continental shelf for domestically flagged vessels.

Every island nation should be able to implement a cable corridor to protect its vital telecom assets. Although the general implementation of cable corridors will be similar, each island's own corridor will present unique problems and opportunities given the various stakeholders, different approaches to corridor implementation, and the considerations surrounding topography and economic environments.

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