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Global connectivity

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Why global connectivity matters?

- Business workflows heavily depend on global connectivity
  - Financial systems, transactions, etc.
- Science and research relies on the sharing and exchange of massive amount of data
- Currently the volume of global data traffic is estimated to be 33 exabytes per day
- **Global connectivity is one of the fundaments of trust, the importance of which can’t be overemphasized these days**

Global connectivity

- Primarily through a network of undersea cables
  - 700-800 undersea cable links globally
  - With considerable geographic concentration on certain choke points, and in certain areas following very similar routes, using / sharing landing points
  - Vulnerability to natural disasters
    - Taiwan Earthquake in Dec 2006 disrupted 8 major cables, cutting off a number of Asian countries, practically forcing the Internet traffic to be routed around the globe to circumvent the disruption (from India to US via Europe)
    - The recent Tonga volcanic eruption severed all connections to the outside world from Tonga
  - Accidental disruptions by fishing nets / trawlers, anchors
    - Houthi attack on ship in Red sea forced crew to drop anchor and abandon ship, resulting in dragging anchor and severing cables
  - Deliberate malicious acts
    - May be none of the recent communication cable disruptions can be attributed with absolute certainty to deliberate attack, but the blowing up of the Nord Stream gaspipe was clearly an deliberate attack
  - Considering the above, a further geographic diversification to improve the resilience of the global communication cable system is a welcome development

Arctic cable route

- Due to climate change and advancement of technology, connecting Japan to Europe via an arctic submarine cable became an option

- Would certainly help with geographic diversification and improve the resilience of the network

Comments on technology and vulnerability of undersee critical infrastructures, particularly optical cables

- The method of laying undersea communication cables is essentially the same, as it was 100 years ago
- A large section of the cable is loaded on special cable laying vessel, and deployed
- Process is time consuming and relatively slow
- The fleet of specialized vessels capable of laying cables is aging and relatively small
- Recently, there are more and more specialized, smaller vessels that can't install new cables on long routes, but can pick up damaged cables and repair them
- Still, in case of Tonga and with best effort and goodwill, the main international connection cable was repaired in a matter of weeks / couple of months, **but the fixing of a smaller, internal cable took a year.**
- One can conclude that the global connectivity infrastructure in general is vulnerable, because
  - Certain adversaries built out capabilities to disrupt
  - Can disrupt at relatively small cost and effort, in comparison to the scale of disruption and time needed to repair (available vessel needs to be found and dispatched, need to investigate cause and fix it). Basically, disruptions can be caused faster and at a lower cost, than repairs can be made and the cost of those repairs.
- Some players, including NATO started to look at
  - Becoming able to catch malicious actors at the act (basically to deter through the capability to clearly attribute a malicious act to players / countries)
  - Using satellite connectivity as a back-up for very critical communication (Note that the capacity of satellite communication links is two or three magnitudes smaller what an optical undersea cable offers.)