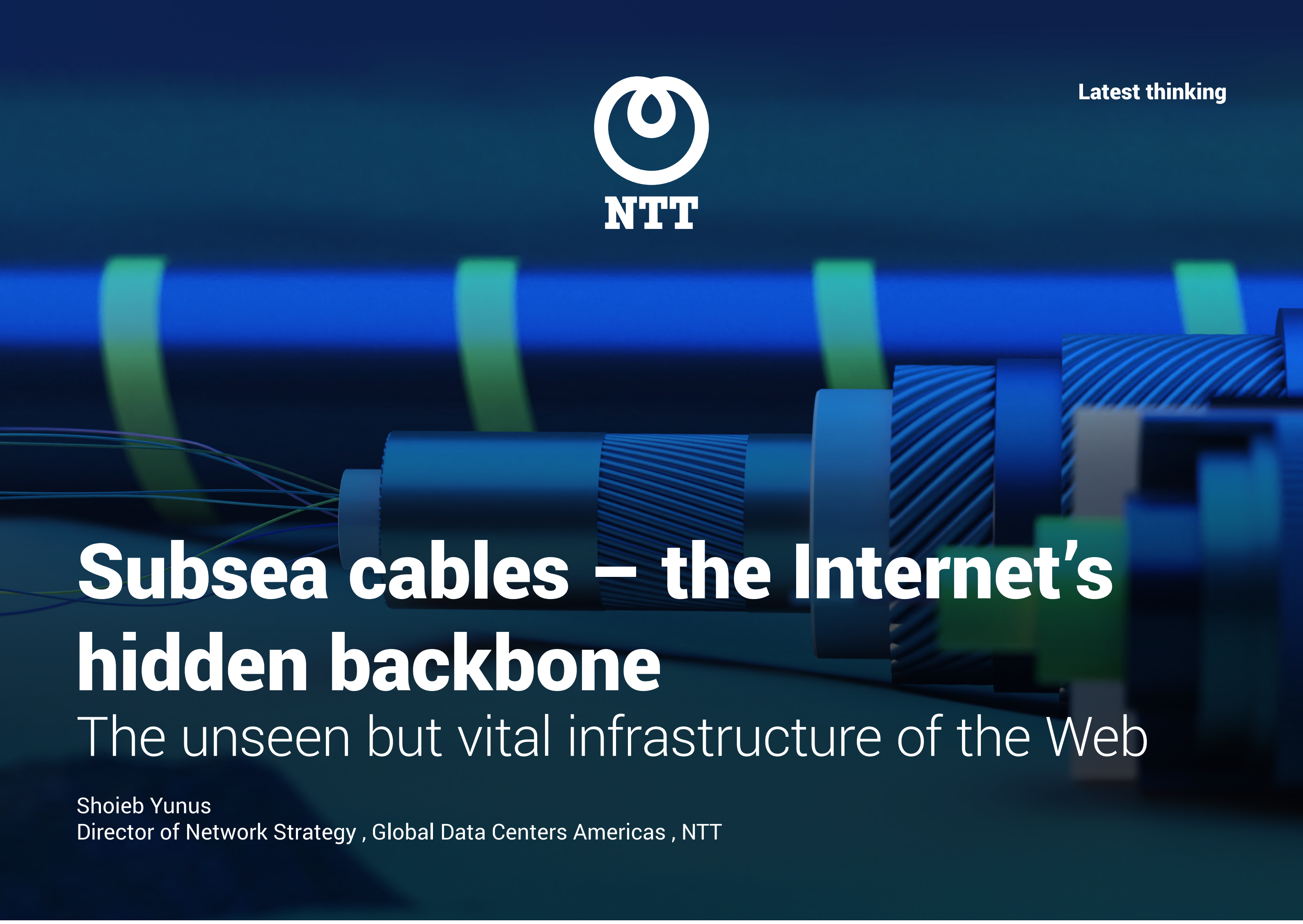

Latest thinking

Subsea cables – the Internet’s hidden backbone

The unseen but vital infrastructure of the Web

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We live in a highly connected era. But what does that really mean? The science and deployment of fiber optics, which plays a basic role in today’s connectivity, can be hard to comprehend. Light, for instance, travels at 670,616,629 miles per hour, meaning that it could circle the globe 7.5 times in one second. Put another way, light could theoretically go round-the-world in about 130 milliseconds.

But those oft-repeated numbers are still hard to fathom, and in practice, optical transport is more complicated, meaning it’s slower. The arrival of coherent optics about ten years ago reduced some traditional obstacles, like attenuation and dispersion. But there remain speed bumps, including the repeaters required to sustain a signal over long distances. Very few people can even see this network. Much of this unseen but vital infrastructure is underwater. These subsea cables are what makes the Web, truly worldwide.

> You don’t need to be a subsea fiber optic engineer to appreciate **the vital role these links play in our highly connected world.**

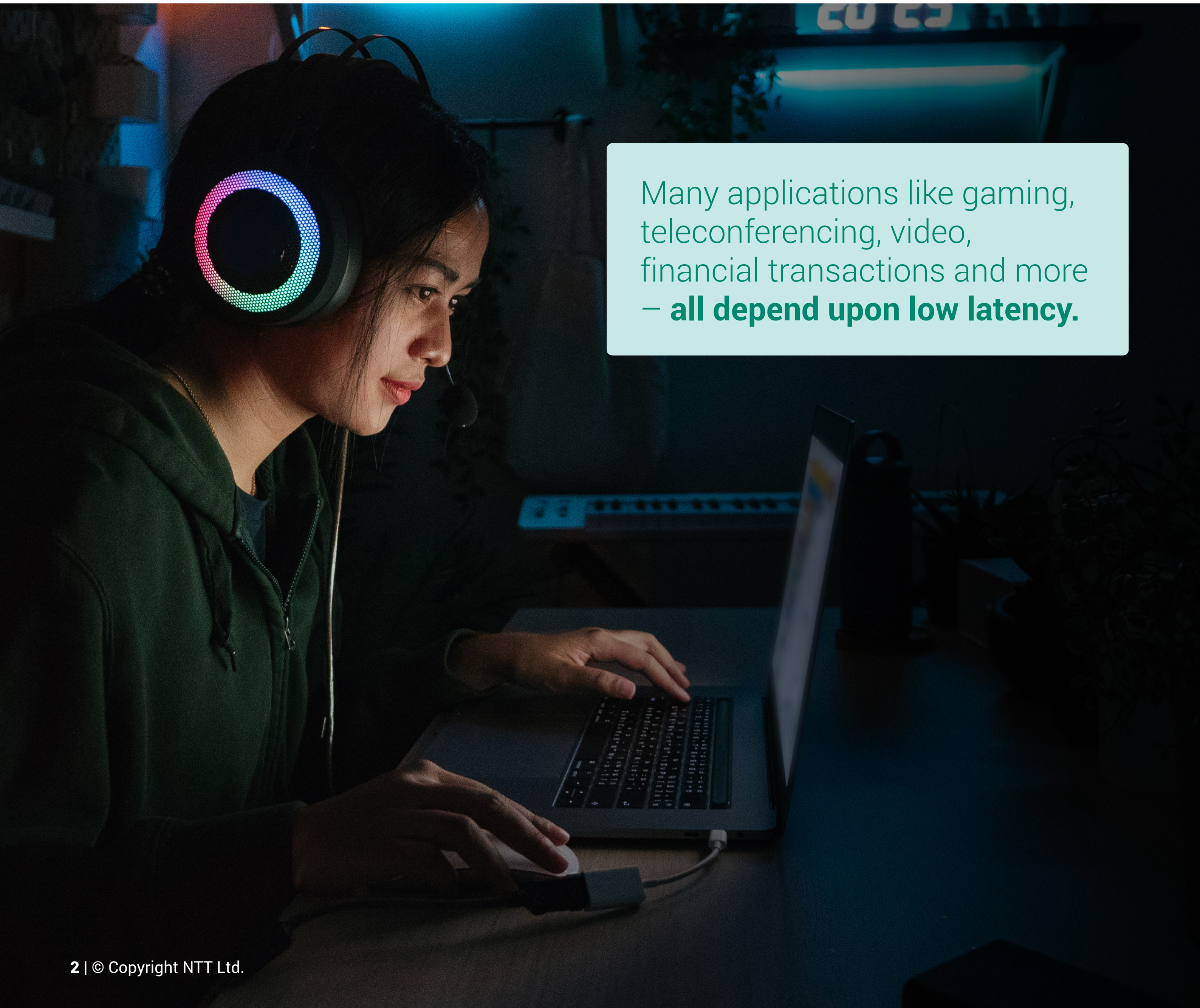
There are about 475 such cables around the world, and the number is growing. Most of them connect points A to B, but some have more extensive landing points or form a system of pairs. Each physical cable itself contains a bundle of fibers. Each one, depending upon the transmission and multiplexing technology used, can carry massive increments of data.

One of those links is called the Pacific Crossing (PC)-1. It is actually a system with four landing points. At Harbour Pointe cable landing station (CLS), about 25 miles north of Seattle, the PC-1 cable enters the Pugent Sound and snakes along into the Pacific, and then some 4700 miles west to the CLS at Ajigaura, a beach town 100 miles northeast of Tokyo. It then becomes fully integrated with the extensive domestic network and facilities of PC-1’s parent company, NTT Ltd. The paired roundtrip begins at Shima, 300 miles southwest of Tokyo. From Shima, the cable returns to the U.S., landing at Grover Beach, CA.

Each landing site is connected to points of presence (PoPs) and data centers. Harbour Pointe, for instance, has a direct link with an NTT data center campus in Hillsboro, OR, recently opened and strategically located amidst abundant hydro electrical power in the greater Portland metropolis. A primary benefit of such direct connects is low latency, or the time delay for a packet traveling through a network. Factors impacting delay include the processing of bits, optical-to-electrical conversion (and vice versa) and the fiber itself – as noted above. Well-designed systems optimize both 'wet' (subsea) and 'dry' portions of the network. On PC-1, the Hillsboro-to-Tokyo latency is 85.31 milliseconds.

Low latency is a big deal. Many applications that enjoy widespread use – gaming, teleconferencing, video, financial transactions and more – all depend upon minimum time delay. Not surprisingly, web-scale companies, including Facebook and Google, make up an increasingly large share of subsea cable deployments, projects that can easily run at USD 300 million. But for most other companies, without the means to design, build and own these systems, patching together and managing agreements with subsea cable operators, PoPs and data centers is also a burdensome option.

That's why turning up a subsea connection with a few cross-connect cables in facilities like those on the NTT Hillsboro campus is an attractive alternative. You don't need to be a subsea fiber optic engineer to appreciate the vital role these links play in our highly connected world, but it's a good idea to partner with some, or find some way to leverage their expertise and the high-performing systems they've built.



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