THE CLOUD IS UNDERSEA:

The Positive Local Impact of Global Subsea Cable Systems

Astound
Business Solutions

Executive Summary

When people think of cloud computing, there is often a misperception that this massive connectivity occurs up in the sky. We can thank misleading vocabulary like “upload,” “download,” or, for that matter, the term “cloud” itself for creating this false impression. But the notion of a floating cloud providing the backbone that connects the global Internet couldn’t be further from the truth. Instead, the vast majority of data being shared travels undersea, then underground, and occasionally across utility poles, to get to where it’s going and back again.

In actuality, there are endless miles of super-high-speed fiber optic cables crisscrossing the bottom of the oceans, connecting continents, countries, and the world’s local communities with the real-time information that connects us—or, at least, most of us. Here’s a more accurate picture that should come to mind: An unimaginably and ever-expanding network of data centers across the globe are connected by a web of subsea cables, each submerging underwater from the shore of its origination point. They then stretch across the seabed and reemerge thousands of miles away on the shore of their termination points. They then connect to an equally vast network of data centers on the other side.

Data traverses across these global locations literally at the speed of light—as well as through the countless terrestrial crisscrossing connections that lie in between. Carried by large and incomprehensibly long fiber optic cables, this data is able to zip across thousands of miles in mere milliseconds. How fast is that? To give context, one online purchase transaction, for example, could circle the globe six times within the span of a single second. More impressively, this miracle of connectivity occurs all around us every second of every hour of every day of every year. Caught up as we are in our day-to-day travails, the world rarely gives a thought to how all of this happens.

Because of this, it remains essential to bring continued public, private, and government attention to, and support for, this technology, because it is through it that the world actually connects and communicates. This network of subsea cables creates the digital main streets and town squares that make up our so-called “Global Village.” This vast connectivity is both how and where the world’s far-reaching resources and opportunities meet and inform how we live, work, and play. Subsea cables provide the physical nexus where the global impacts the local. And contrary to common belief, this is not happening in the sky, orbiting somewhere up and out of reach in space. It’s occurring right down here, where we can all build it, expand it, and share it with more and more of the communities who need it. Therefore, expanding the global cloud to increasingly connect to local underserved and unserved population centers—domestic or otherwise—is no pie-in-the-sky aspiration. The cloud is actually undersea, within reach, and it’s an imperative worth diving into and expanding.

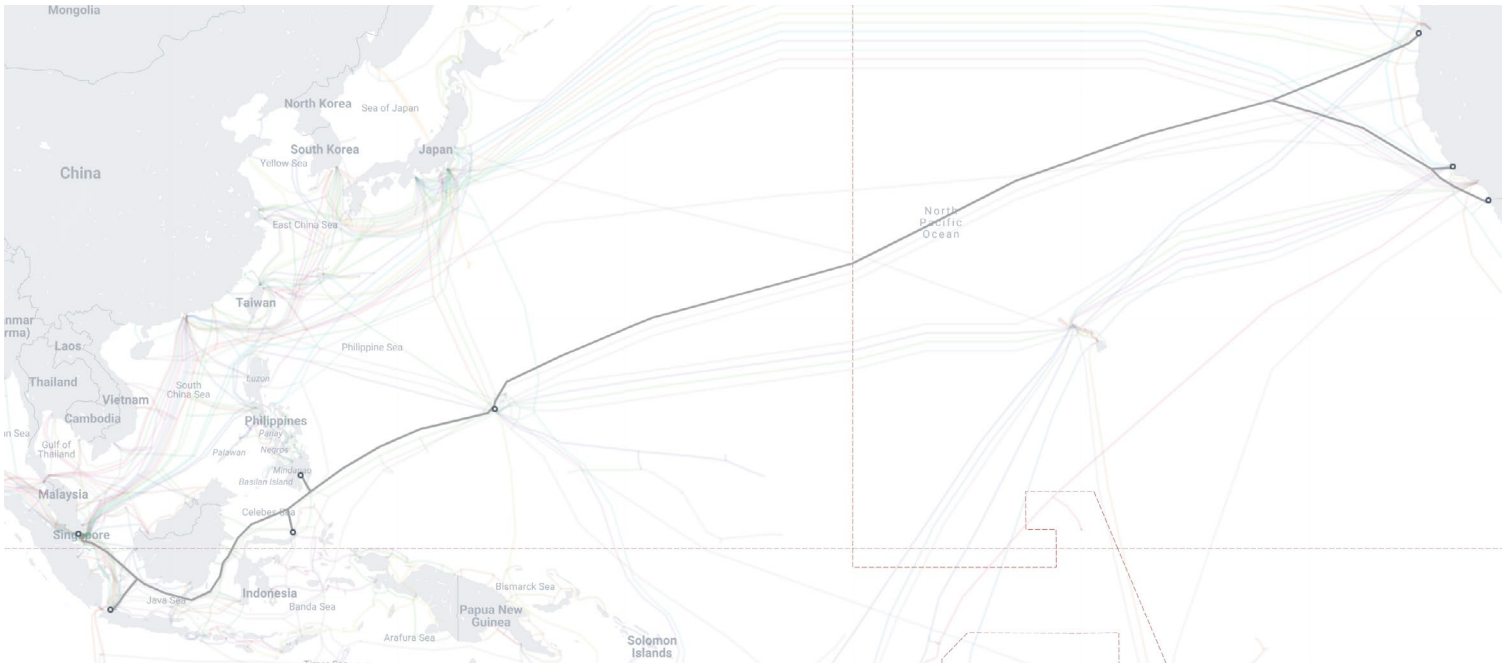
Providing Sea-to-City Backhaul Connectivity

In the spirit of full transparency, our perspective for this paper does not come from any firsthand experience in laying subsea cabling. To be clear, as team members of Astound Infrastructure Development, it is not in our purview to lay subsea cables across the floors of the world's oceans. However, in strategic partnerships with those who do, ours is the business of conceiving, configuring, and constructing the infrastructure that connects subsea cables to their destined U.S. terrestrial data centers. What does this mean exactly? It means that we do everything in between, linking the cables that hit the beach to these data centers.

Here is a brief illustration: Global subsea cables rise from the sea, onto the shore, where they connect to what is called a beach manhole—in essence, a primary land-based connector point. (We design, dig, and develop these beach manholes.) From there, the subsea cable connects from the beach to a cable landing station on dry ground (which we also design and construct). At these landing stations, the fiber optic cable, and the cable that powers it, are landed; what is called, terminated. The fiber connectivity then splits into spiraled strands of fiber optic cables, each running underground or on utility poles, stretching and branching out farther to reach their destinated rural and metro data centers. (We also lay this backhaul stranded fiber optic cable along with the subterranean and overhead infrastructure that carries it.) Finally, through the joint efforts of collaborating partners and carriers—Astound among them—we bring this high-speed fiber optic connectivity (a.k.a., backhaul cabling) to rural and metro cities, linking individuals, businesses, and communities alike across the United States.

Our expertise comes from designing and building everything needed to connect the initial subsea fiber optic cable to the rural or metro data center, and all distribution infrastructure in between. In this fashion, we are turnkey for our customers, from the point where the subsea cable hits the beach, all the way to those targeted data centers, repeating and distributing to all points necessary along the way.

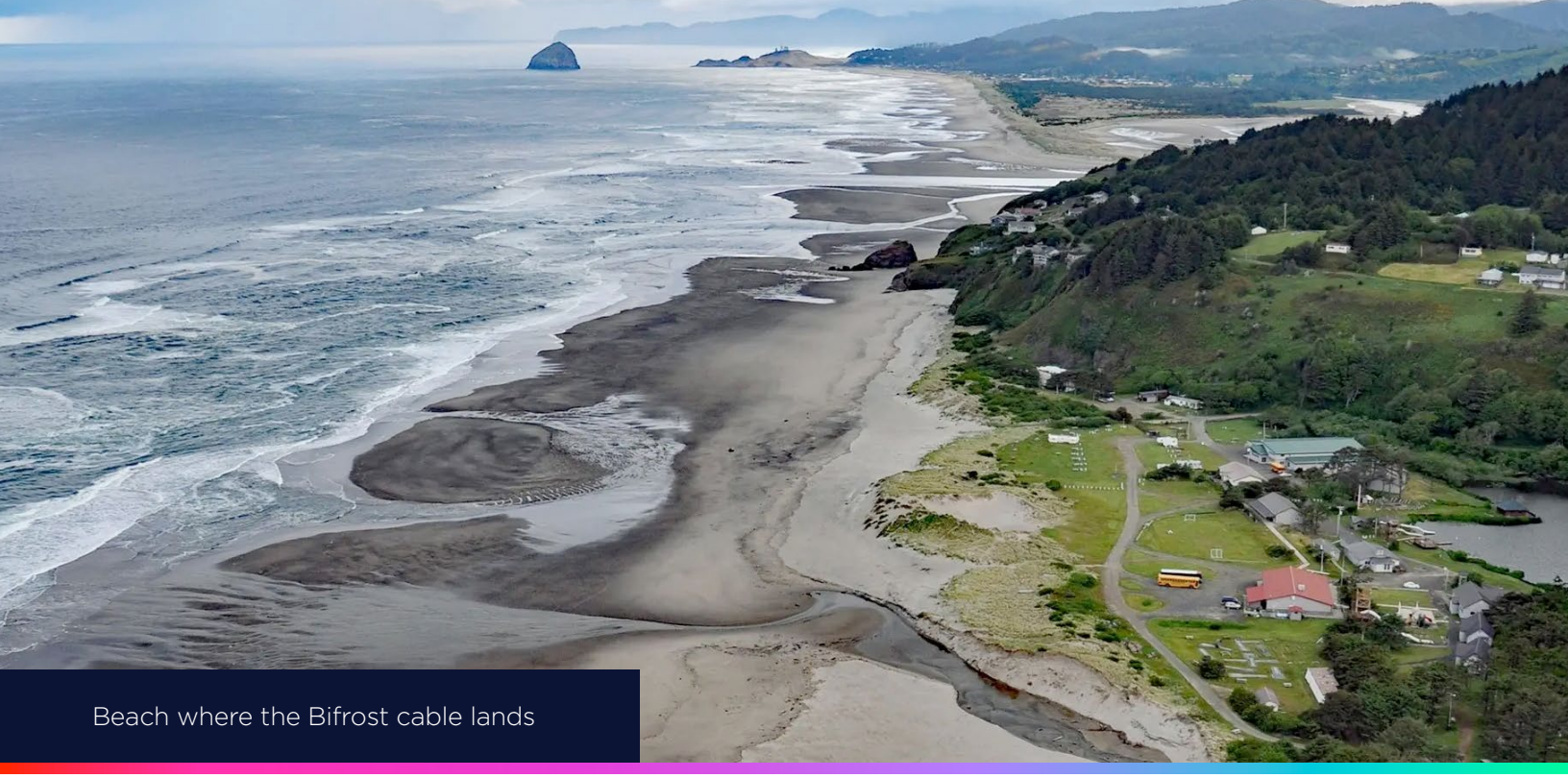
Bifrost cable connecting Singapore to the West coast of North America via Indonesia, the Philippines, and Guam



Spreading Opportunity at The Speed of Light

As the turnkey provider of these sea-to-city backhaul conduits and fiber, we are firsthand witnesses to the positive life- and work-changing impact created when these routes and destinations suddenly become “lit”. Growth of all types and scale occurs. Under the intense speed of that digital light, and the throughput it accelerates, communities and economies spring to life—taking root, budding, and thriving. This organic growth occurs not only in the newly lit communities themselves, but it also expands, web-like, to form and feed adjacent communities. From individuals to companies to neighborhoods and municipalities, new ecosystems are birthed through the spark and speed of that fiber optic light.

These ecosystems then mature, connect, and intersect, generating equally thriving sibling ecosystems, teeming with possibilities. And the more connectivity that is made available, the more affordable it becomes for all. It’s a solid economic and civic investment, yielding immeasurable dividends for the future. In this way, it’s not only a simple, elegant economics equation, but a metaphor for the creation and evolution of life itself, which also rose from the sea.



Beach where the Bifrost cable lands

Where Best to Leverage Subsea Cable Systems

This exciting growth is one of the many reasons why we are driven to continue and expand support of subsea backhaul connectivity and the terrestrial and subterranean infrastructure that supports it: to enable greater access to affordable broadband connectivity to as many rural and metro communities as possible. Every year, billions of dollars are invested by top-tier telecom and Internet conglomerates to lay hundreds of thousands of miles of subsea fiber optic cabling across the ocean floor—connecting the world, country by country. Many of these Tier 1 companies, in fact, happen to be customers of Astound, and we proudly leverage the power of these relationships to help bring the broader benefit of greater connectivity and opportunity to everyone. One of the ways in which we support their investment is by helping them strategize and map out the potential landing points and terrestrial routes that will carry that blazing-fast light—and aiding them in realizing the greatest human impact at the lowest possible cost.

This is why, when we build out such backhaul infrastructure, we always engineer extra capacity, which then brings the connectivity benefits of subsea cable systems to more people along these strategic routes. In collaboration with these partners, we leverage these investments to bring near-unlimited bandwidth to places where originally low-to-no connectivity existed. This might be to an underpopulated rural town, for instance, that's off the beaten path, and whose municipal budget couldn't bankroll such a substantial commitment on its own. Or perhaps it's to an underserved or unserved metro community, whose local tax contribution couldn't hope to fund such a significant project.

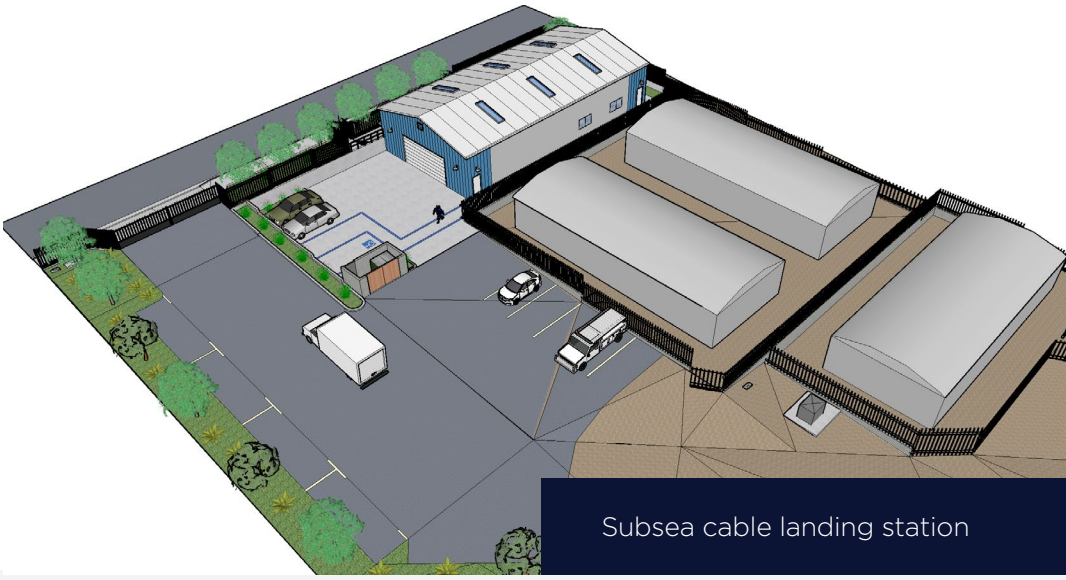
The more investment that is made in subsea cables, and in building out the backhaul infrastructure to connect coastal cable landing stations to data centers across the country, the more these connectivity-challenged communities find themselves growing and thriving. Suddenly, hubs and cell towers are being fed; communities are now connected and communicating. The network is working, for all.

How Investing in Backhaul Fiber Yields Positive Economic Impact

As a turnkey provider of this interstitial land-based backhaul connectivity—because, again, we design it, build it, and maintain it—we know firsthand about the power and possibility that subsea fiber optic cable systems bring to the world's communities. In fact, few others are as well-positioned as we are in this category or vantage point, because we operate on the front lines, day-to-day, and have a panoramic, end-to-end view of it all, from origin to termination. When strategically planned and mapped out, even a single cable-landing-station-to-data center long-haul fiber optic route can yield far-reaching economic impacts to a variety of beneficiaries along the way.

We've witnessed how this investment in connectivity drives a vast array of business opportunity engines, including, but not limited to, the following:

- **Regional Impact**
- **Municipal Impact**
- **Business Impact**
- **Community Impact**



Subsea cable landing station

REGIONAL IMPACT

- Bringing brand new lines of connectivity from cable landing stations to data centers
- Allowing sea-to-city connectivity points to become catalysts that spur additional and extended communications and commercial growth
- Lighting up geographic dead spots by leveraging subsea backhaul infrastructure
- Setting the foundation for new economic growth and/or civic revitalization
- Attracting commercial and residential development and buildout
- Enabling international connectivity to generate and breed increased regional connectivity—as entities, at both ends of the line, connect to the subsea cable system

MUNICIPAL IMPACT

- Expanding communications infrastructure without depleting strained or insufficient town or city budgets
- Updating outdated government IT/telecom systems and applications to better support the communities they serve
- Spurring local economic development at the borough, village, and township level through private-sector-subsidized growth
- Fueling strategic public/private partnerships, to enhance services and improve the lives of diverse and often “at need” municipal constituencies
- Improving public safety communications by enabling increased cellular coverage/throughput and radio-based connectivity access points

BUSINESS IMPACT

- Promoting the creation of new beneficiaries—home office setups, small-to-medium sized businesses, and enterprise-level organizations
- Driving digital transformation for high-data-consuming industrial and manufacturing operations
- Empowering medical centers, research institutions, and other strategic verticals with higher levels of speed and bandwidth
- Advancing ever-expanding cloud, automation, and AI proliferation
- Supporting wholesale communications by enabling smaller regional/local broadband providers to cost-effectively expand operations and bring access to more customers
- Providing network infrastructure for extending cellular connectivity

COMMUNITY IMPACT

- Expanding general residential cellular, telecom, and ISP services
- Connecting underserved and unserved communities by expanding access to broadband communications infrastructure and services at low-to-no cost
- Empowering K-12 schools and centers of higher education by enabling the enhancement of teaching tools, applications, and online resources
- Helping to provide all students with equal access to bandwidth, increasing digital and online remote learning
- Accelerating progress at public, private, and government-funded research centers and think tanks to support emerging sciences and other advanced technologies
- Expanding community-based social, cultural, and entertainment events and venues, enabling more digitally immersive experiences that help unite and bond communities

Why Astound to Provide This Perspective

At Astound Infrastructure Development, we are proud to play a key role in the proliferation of sea-to-city fiber optic backhaul infrastructure. To this day, the positive impact we see unfolding in the communities we've helped light up—especially on the West Coast, where Astound leads in fiber backhaul installations—continues to inform and inspire our work. It instills in us a great sense of satisfaction, and it underscores the importance of this empowering technology and its ongoing impact on the residents and businesses we serve. Here are just a few summary proof-points regarding how that perspective has been earned and continues to broaden:

Deep Experience

Many consider Astound Infrastructure Development to be the leading terrestrial backhaul fiber provider for the West Coast, connecting 10-plus subsea cables at over 50% of the region's cable landing stations. We've created a vast West Coast network of collaborative partners, contractors, and customers throughout our 13 years of service to this industry, establishing and deepening relationships with all major companies laying subsea cables today. They come to Astound as their local expert and provider of turnkey, end-to-end, backhaul solutions, from beaches to data centers. We say this not to boast, but to reinforce our understanding of the full dynamics at play and what is possible with increased support.

Diversity and Versatility

There are providers who build beach manholes and cable landing stations. Many others build destination data centers. Others design and lay the dark fiber and conduit lines that link them. But few have direct experience designing, developing, and connecting all three, let alone strategically aligning and uniting them with the providers of the originating subsea cables. This is what we do at Astound. And by providing these pivotal linkage points along the way, we become an essential partner and resource to these interdependent players. We not only help satisfy the demands of our Tier 1 carrier-grade Internet Service Providers, Telecom Partners, and Hyperscalers, as well as the subsea cable providers themselves, but also all the connected municipalities throughout the backhaul line. Add the end-customer experience of our Astound Business Solutions division, as well as our company's residential services, and our corporate vista at Astound Broadband is widened even further by this unique and panoramic ecosystem-wide perspective.

Construction and Compliance IQ

From undersea routes to landing points to their ultimate terrestrial destinations, there are stringent construction codes, permits, and right-of-way permissions that must be charted, navigated, and adhered to at every mile along the path. With over a decade of experience in bringing subsea cable systems onto land, Astound has elevated firsthand its construction and compliance IQ, helping our customers anticipate and avoid costly dead-ends, speed bumps, and offramps at every turn. This puts in place yet another key tile of the mosaic that is our extensive subsea cable skillset.

Extending Connectivity for Expanding Opportunity

What is the end game to all of this? To increasingly extend the connectivity that subsea fiber optic cables bring to rural and metro areas and to help spread the positive impact and diverse opportunities this infrastructure inevitably brings: opportunity for connecting more of the country to 21st century communications; opportunity for students, patients, and customers alike, across all sectors of public, professional, and private life, to benefit from increased access to broadband; and, in short, opportunity for boosting local economies with the power of global fiber optic connectivity.

At Astound, we encourage private residents, business professionals, legislators, and policymakers at all levels of government to look for more ways to clear the pathways to enable greater sea-to-city fiber optic expansion. It's good for business. It's good for municipalities. And it's good for the communities and customers who comprise them.

How good? The math confirms the message. According to a recent study conducted by Future Market Insights, in 2024, the global submarine communication cables market is projected to reach an estimated $3.9 billion USD, with expectations to ascend to $7 billion USD by 2034.* This increase reflects a compound annual growth rate of 6.2% over the forecast period. Clearly, the interest and drive to spread broadband is a robust one, driven by momentum that continues to build. However, the connectivity advances that this growth enables will only come as we increasingly understand the true nature and impact of this high-speed communications infrastructure. Subsea cable systems provide that essential communications nexus, the point where the global meets the local. The cloud may physically lay undersea, but its ability to rocket human potential continues to soar skyward.

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Central Coast, CA cable landing station

Oregon coast cable landing station

Astound offers deep expertise in Subsea builds from land procurement, to architecture, to front haul conduit builds, out to manhole and landing stations. With existing dark fiber capacity and turnkey solutions, we'll partner to get your operations to market faster.

Visit astoundbusiness.com/subsea to learn more.

Sources & Acknowledgements

[1] https://www.accesswire.com/949559/submarine-communication-cables-are-taking-communication-under-water-check-out-the-scalability-of-the-industry-with-fmis-exclusive-insights

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