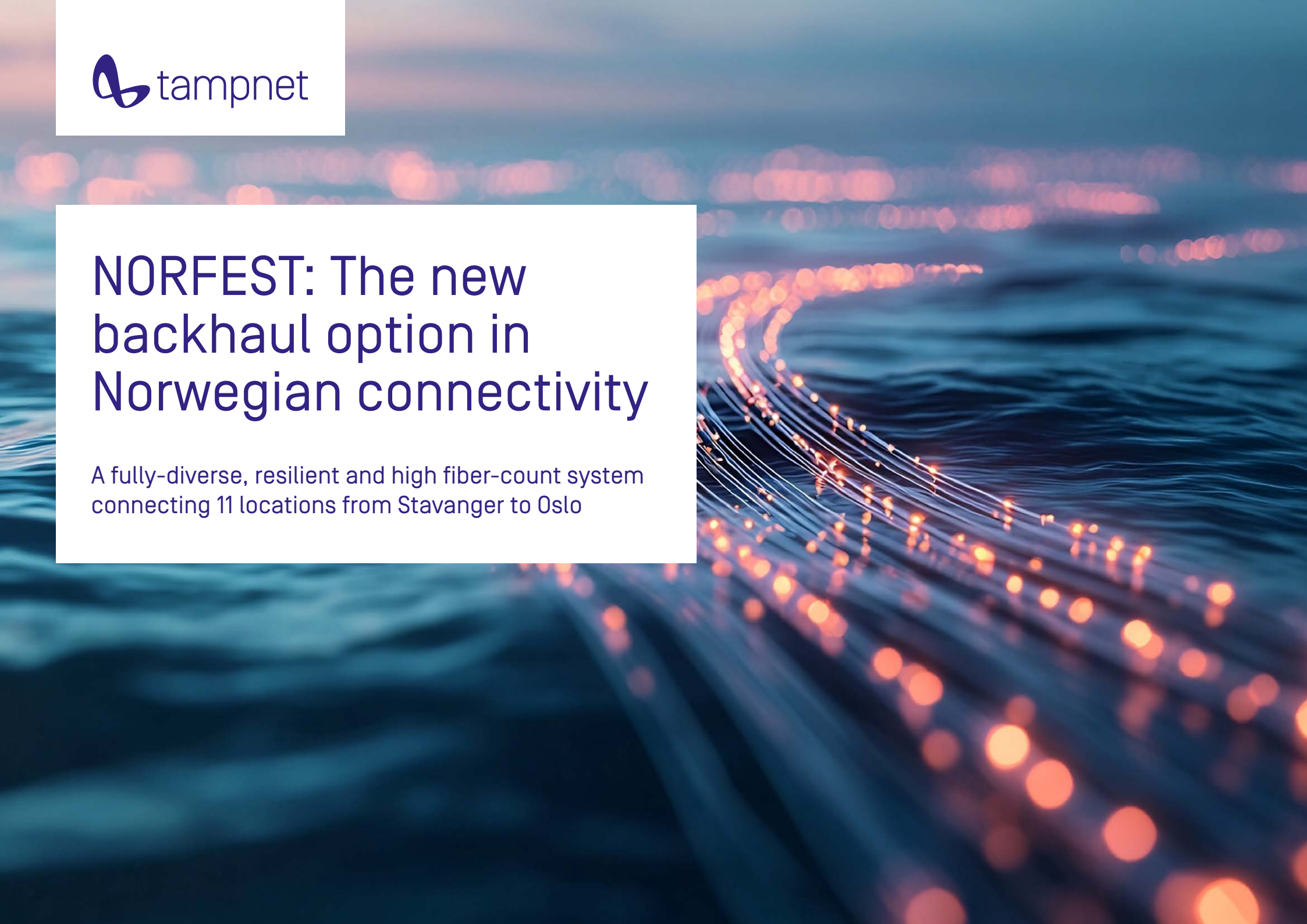


tampnet

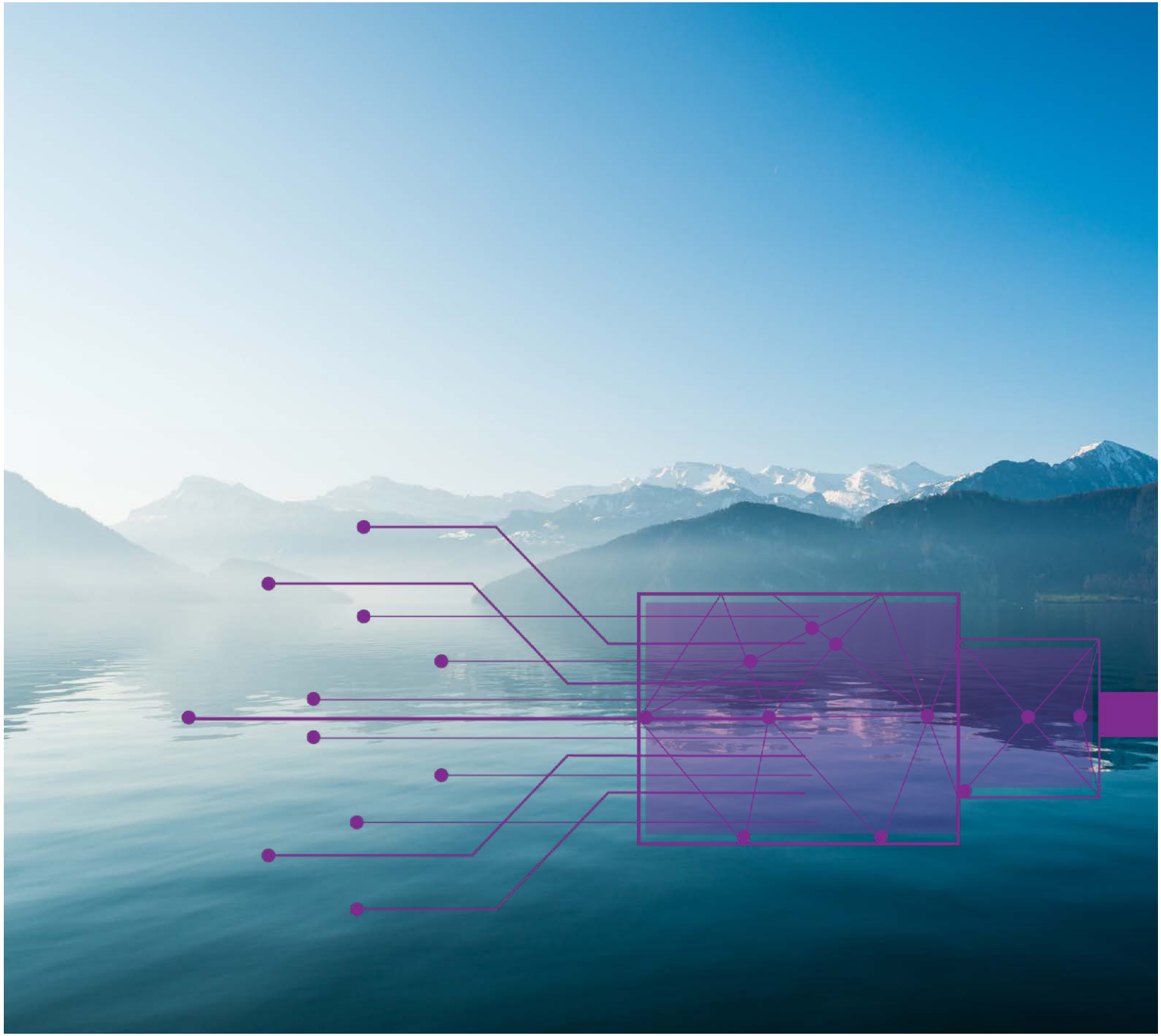
NORFEST: The new backhaul option in Norwegian connectivity

A fully-diverse, resilient and high fiber-count system connecting 11 locations from Stavanger to Oslo

Intensifying demand for Norwegian connectivity

Norway has become a sought-after location for data-intensive businesses, with its low-cost renewable energy sources attracting hyperscalers, content providers, data center operators, ISPs and more.

Dependable, high-capacity connectivity is a critical requirement, and one which Tampnet Carrier has been servicing since 2014 as part of our European network. Our combination of wholly-owned subsea infrastructure and the best third-party terrestrial routes has supported Norway's growth as a global data hub.

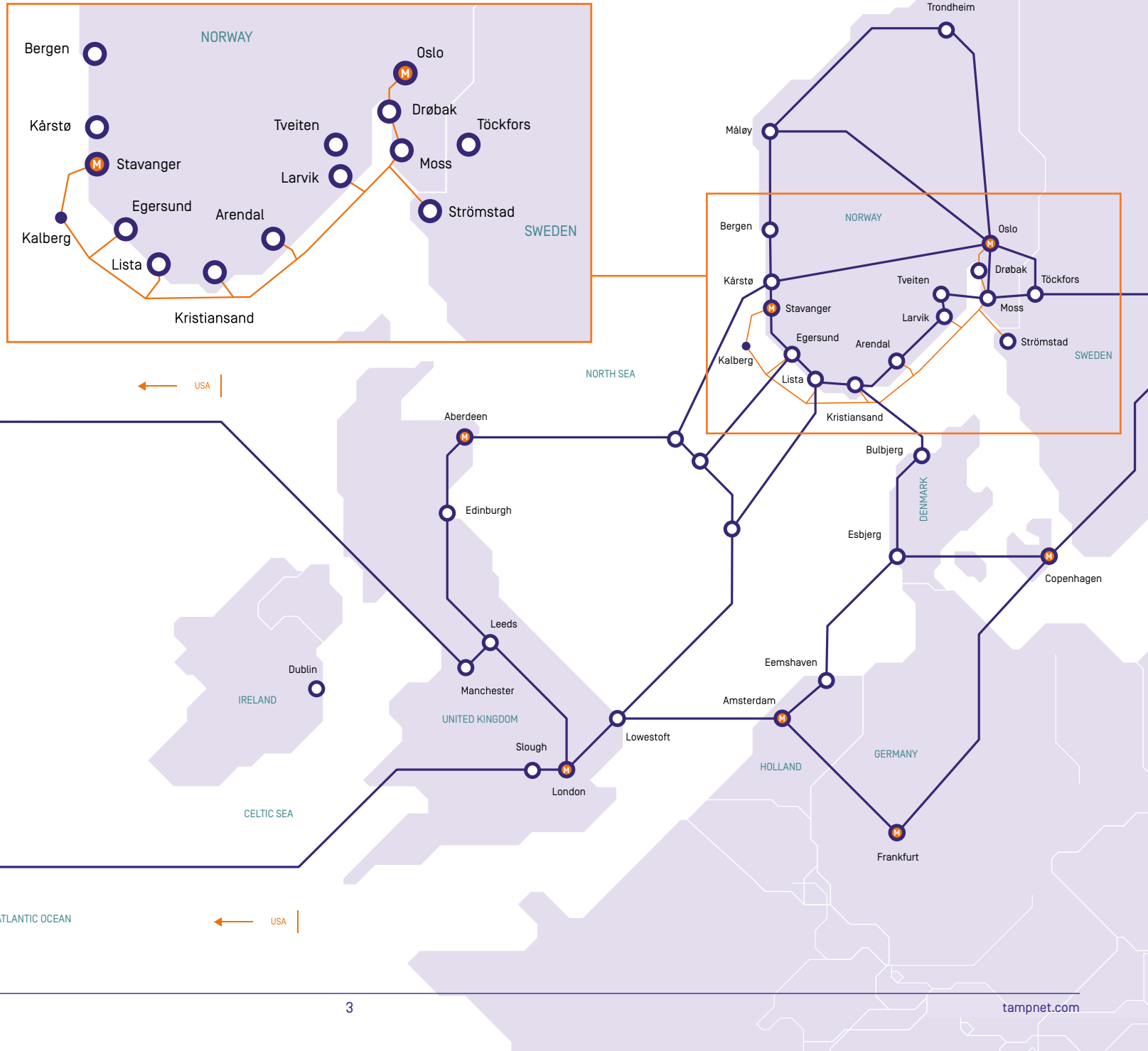


NORFEST:
A brand-new route offering complete diversity

More recently, however, soaring demand for capacity has led to increased congestion and latency on the most popular terrestrial routes, leaving us and our customers in need of new options.

With Norway's famously rugged physical geography presenting significant challenges for terrestrial cable builds, we designed and rolled out a radically new solution: a state-of-the-art, near-shore subsea system that connects eleven key locations and data hubs between Stavanger and Oslo.

The NORFEST system was installed and commissioned in 2023 and now provides a fully-diverse, high fiber-count route for global organizations looking to connect from, to or through Norway. This paper introduces NORFEST and shows how we designed the system for maximum resilience and scalability.



Identifying a route: geographical challenges and opportunities

Anyone familiar with Norway knows the challenges in planning, building and maintaining new cross-country fiber routes. The country's mountains and fjords present significant physical obstacles, and often-harsh weather conditions make thousands of kilometers of cable tough to maintain.

For these reasons, many terrestrial cable systems in Norway rely on existing power lines and railways. This makes installation easier, but reliance on third-party infrastructure can also make access a challenge for maintenance, upgrades and repair. The restricted choice of routes also limits the scope for route diversity.

These limitations prompted us to think differently when designing a new route to provide much-needed diversity for us and our customers.

Tampnet owns and operates the world's largest and most diverse offshore high-capacity communications network, delivering always-on connectivity to oil and gas platforms and vessels in the North Sea and the Gulf of Mexico/America. The level of physical interference on our subsea assets was compellingly low compared to terrestrial routes. Could a subsea system be the best way to meet our and our customers' Norwegian connectivity needs?

Benefits of a near-shore subsea route

Once we started to look at subsea as an option, a unique opportunity presented itself. Just off the coast of southern Norway lies a relatively deep trench offering a high degree of protection from fishing activity, anchors and malicious interference. The trench also lies within the 12nm of national waters monitored by the Norwegian Coast Guard, providing an added layer of protection.

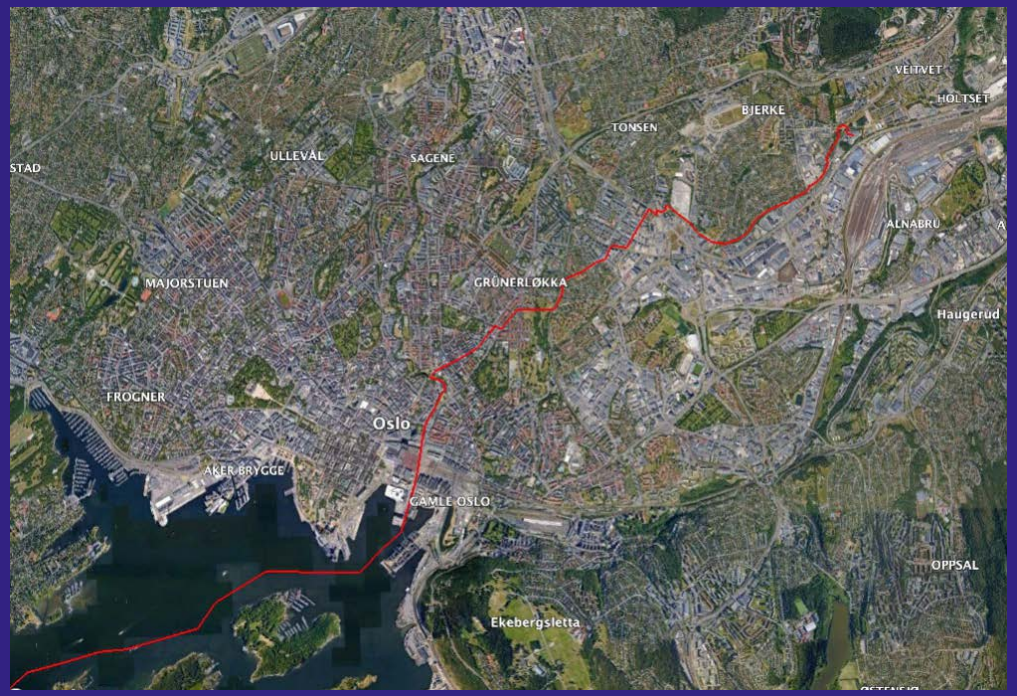
The position of the trench just offshore meant we could combine key benefits of subsea, such as low risk of disturbance and high protection from the weather, with key benefits of terrestrial, such as short distances between points of presence (PoPs). Those short distances would allow amplifiers and other electronics to be hosted on land, leaving the cable itself as low-maintenance passive fiber.

A fully diverse route with state-of-the-art-electronics

Crucially, using this natural deep-water trench meant we could offer customers a fully diverse, future-proofed route with no reliance on third-party host infrastructure. Additionally, we identified a unique north-south route into central Oslo, avoiding the east-west routes used by existing fiber infrastructure serving the Oslo metro area.

As a brand-new route, NORFEST could also leverage the latest-generation electronics to maximize wavelength capacity and throughput, as well as recent Tampnet innovations in physical threat detection and alerting.

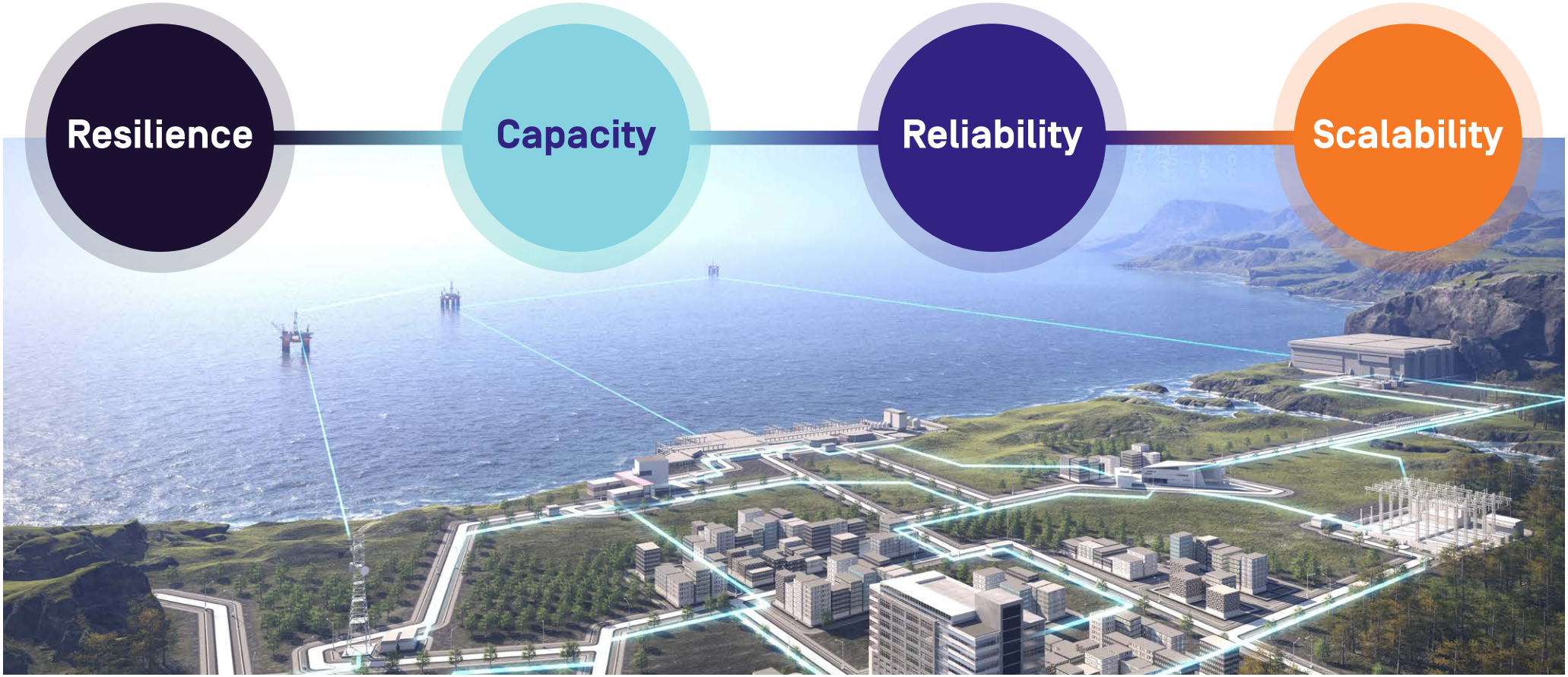
The business case for NORFEST was accepted by Tampnet investors in 2022. Work immediately began on the system design and build, enabling the route to be put into service in 2023.



Designing NORFEST: a state-of-the-art fiber system

We designed NORFEST from the ground up to incorporate features and capabilities that deliver a high-resilience, high-capacity, high-reliability and highly scalable route for Tampnet and for our customers.

Key elements of NORFEST design include:



Resilience

Deep-water trench

Water depth in the Norwegian trench varies between 300-600m, helping to protect the cable from trawling, anchors and malicious interference.

Burial depth

The NORFEST cable is buried to a depth of up to 1.5 meters, offering further protection against accidental or malicious disruption.

Micro-routing

Precision installation equipment allowed the cable to be laid along a micro-planned route that avoids potential high-risk zones (such as known bottom-trawling areas), further reducing the risk of disturbances.

Physical threat detection

Tampnet technologies for state of polarization (SOP) detection and distributed acoustic sensing (DAS) provide early warning of potential and actual fiber incursions, reducing downtime risk and mean time to repair (MTTR).

Coast Guard monitoring

The NORFEST system lies entirely within Norwegian territorial waters monitored by the Norwegian Coast Guard.

Sustainable build techniques

The use of horizontal directional drilling (HDD) to bring the NORFEST cable ashore has preserved the natural environment at landfall sites.

Capacity

High fiber count

NORFEST has 48 fiber pairs for scalable, future-proof capacity.

Unrepeatered subsea fiber

A key feature of NORFEST is that amplifiers and other electronics are located onshore, with the subsea cable itself comprising passive, unrepeatered fiber. This enables easy access to the electronics for maintenance, upgrade or repair, significantly boosting uptime and reliability while significantly reducing maintenance costs.

Own choice of electronics

As all NORFEST electronics are hosted on land, dark fiber customers can install, manage and upgrade technologies from their vendor(s) of choice. Tampnet itself has deployed Ciena WaveLogic 6 transponders on the route, delivering a throughput of 27 Tbps while optimizing energy consumption and cost per bit transported.

11+ local points of presence

NORFEST comes ashore at nine intermediate locations between Stavanger and Oslo, creating local points of presence at some of Norway's leading data hubs. The route offers the potential for additional landings by adding branching units to the existing unrepeatered cable.

Global interconnect

NORFEST is part of Tampnet Carrier's redundant, super-fast subsea and terrestrial network infrastructure. Our open-access approach means the system is designed to interconnect with other operators in key locations along the route.

Reliability

Secure colo-huts

Built to a secure design, our colo-huts house essential electronics with uninterruptible power supplies, creating a stable and monitored environment that strengthens security and uptime.

Rapid repair times

NORFEST offers a highly competitive mean time to repair (MTTR), since all electronics are housed onshore in Tampnet-owned colo-huts, enabling ready access for maintenance and repair. Underwater cable break repair times are minimized through continuous SOP and DAS monitoring, which promptly detects and localizes disruptions.

SLA

NORFEST is backed by an SLA with availability and uptime guarantees.

Scalability

Life of system access

With all electronics housed on land, customers of NORFEST can install, manage, maintain and upgrade their choice of network equipment at any time during the entire life of the system.

25-year minimum cable guarantee

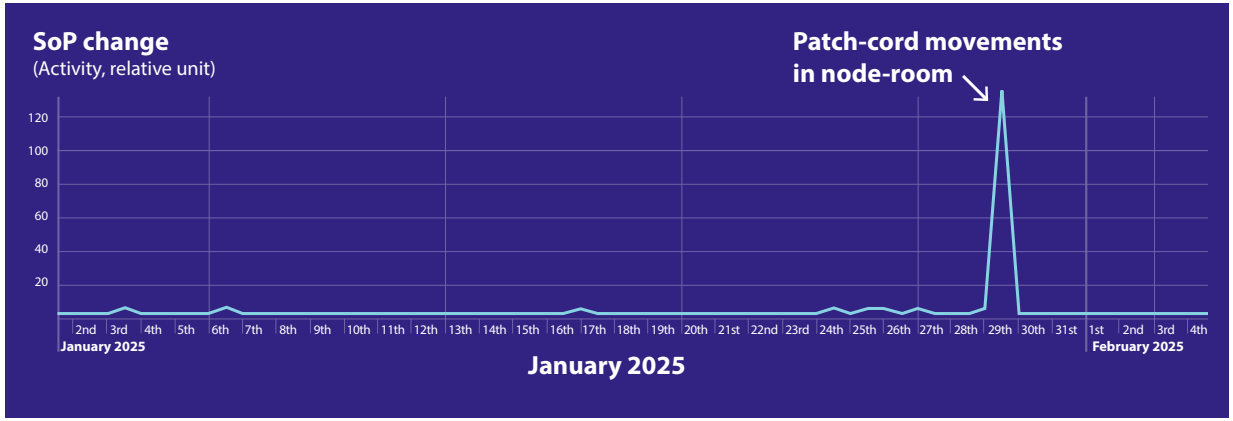
Manufactured by Nexans to withstand subsea pressures, corrosion and environmental conditions, the NORFEST cable is guaranteed to deliver peak performance over a lifespan well exceeding 25 years.[1]

1. For details of NORFEST cable design and sustainability, see Rolf Bøe, Jagoda Zajic, et al, 'Sustainability of subsea optic fiber cables in the North Sea,' conference poster delivered at SubOptic 2023, 15 March 2023, Bangkok.

Polarization fiber-sensing

Using state of polarization fiber-sensing, any vibrations or physical impact along the fiberpath is spotted.

Mostly, the fiber is quiet without any mechanical disturbances, and a quiet fiber can be assumed to be a safe fiber. As illustrated in the figure, when installation personnel are present in a node room—such as in this planned scenario—working near or handling patch cables, their activity appears in the polarization sensing activity plot and triggers alarms for NOC personnel, even when not impacting the service performance. This ensures that any unplanned or unauthorized work is promptly detected.



Why choose NORFEST for Norwegian connectivity

As a global carrier providing business-critical connectivity to offshore and onshore customers across Europe and the US, Tampnet was the primary customer for our own NORFEST cable.

Our requirement for a fully-diverse route between our Norwegian locations drove the business case for NORFEST and for the cable's unique architecture and design. At every stage, we have prioritized resilience, reliability and future scalability as well as capacity and throughput.

The result is a route that combines the resilience benefits of subsea fiber with the flexibility, scalability and accessibility of terrestrial network electronics.

Choosing NORFEST for Norwegian backhaul delivers significant benefits now and into the future, including:

100% route diversity, including Oslo metro area: NORFEST is independent of any other infrastructure, providing full diversity in a geographically-challenging territory where diversity can be tough to achieve. This includes 100% diversity in the congested Oslo metro area.

Unrivalled uptime: With all electronics securely hosted on land and only passive fiber below the waves, NORFEST can offer a faster mean time to repair than long-haul subsea routes or third party-hosted terrestrial cable.

Congestion avoidance: With traffic on the Frankfurt, London, Amsterdam, Paris (FLAP) ring experiencing growing congestion, NORFEST offers a way to bypass these European routes.

Life-of-system control: With no subsea electronics and no third-party infrastructure to access, NORFEST customers have full control over equipment installation, maintenance and upgrades over the full life of the system.

Future-proof scalability: The high fiber count of the NORFEST cable means it is engineered to cope with rapidly rising global demand for bandwidth.

Potential for additional landings: Unlike networks using active repeaters, NORFEST easily allows for further landings by adding branching units to the unrepeatered subsea cable. Our HDD drilling technique can be used to protect the natural environment at landfall points.

A like-minded partner: As the prime customer for our own cable, Tampnet is as invested in the performance of NORFEST as our customers. We partner with our customers to ensure we're delivering the uptime, reliability and responsiveness required by today's most demanding data businesses—from hyperscalers and content delivery networks to broadcasters, ISPs and communications service providers.

Find out more

If you have questions about NORFEST, or if you'd like to know more about Tampnet Carrier's global connectivity services, please get in touch with us at:

carrier_sales@tampnet.com

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