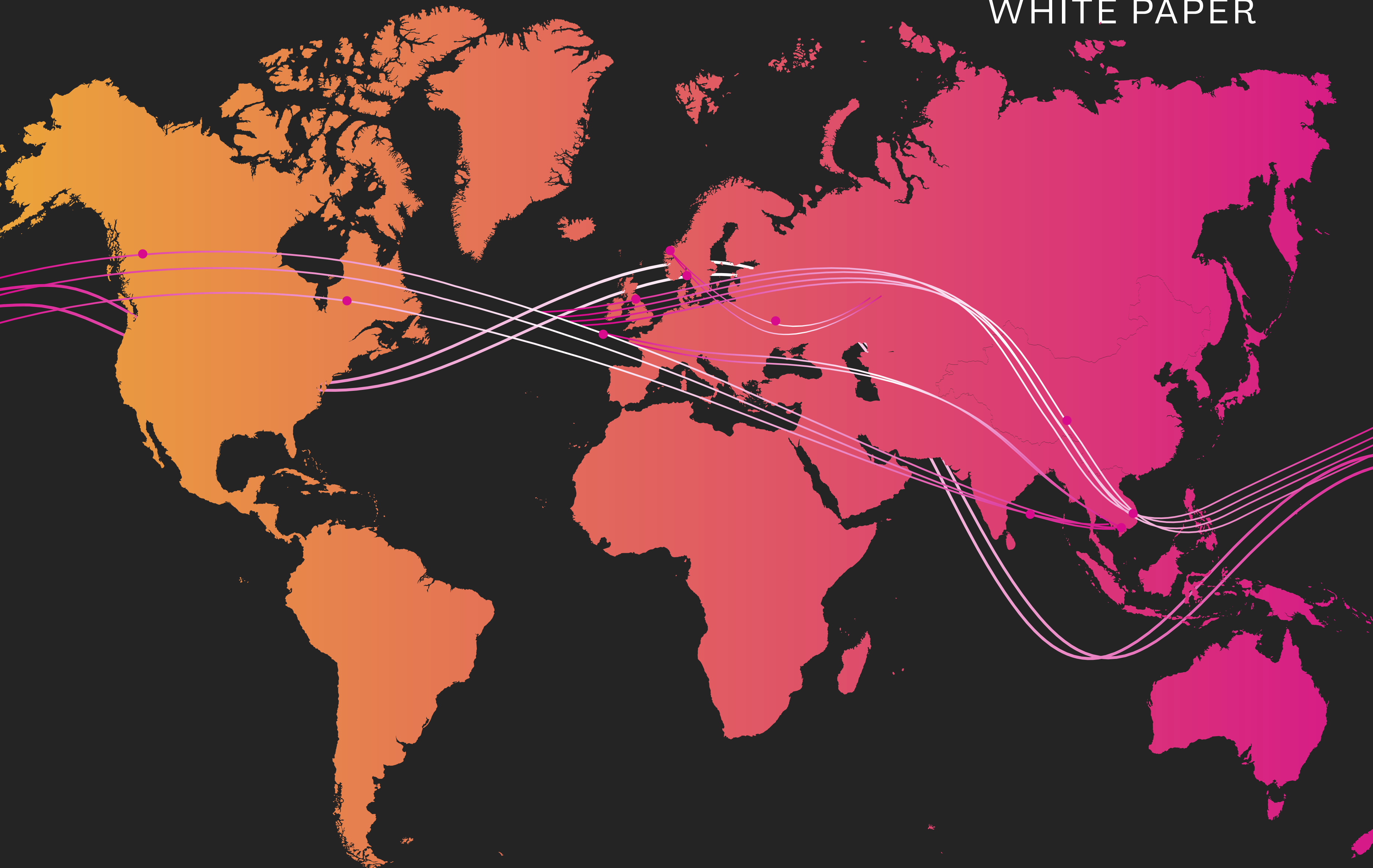


WHITE PAPER



# Building the networks of tomorrow

Engineering reliability for long-term success

**RETN**<sup>®</sup>

# Executive summary

In a world increasingly framed by geopolitical tensions, environmental challenges, and rapid technological change, global network infrastructure resilience has never been more critical. This white paper outlines the urgent need for building networks that connect people today while protecting against tomorrow.

Submarine cables and terrestrial networks are more vulnerable than ever to disruptions; to make matters worse, regulatory and supply chain challenges are rife. The path forward lies in prioritising investments into network resilience. This means investing in diversified routes, embracing collaboration and an ability to constantly adapt to an ever-changing operating environment. Network operators must shift focus from short-term gains to long-term stability, ensuring that infrastructure can support the continuity of essential services even in the most unpredictable of circumstances.

RETN's unique network-first approach is not just ethical, but inherently logical for all network operators wanting to achieve longer term commercial success.

This white paper is a call to action for the industry: to prioritise resilience, foster innovation, and ensure that the networks we build today support the demands of tomorrow.



SECTION 1

# Network vulnerability: The scale of geopolitical risks and wider threats

over **60%**

impacted data traffic between Europe and Asia

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Geopolitical volatility is straining connectivity infrastructure, as seen through the recent disruption caused by cable cuts in regions like the Red Sea and the Strait of Malacca. The disruptions in the Red Sea alone reportedly **impacted 25% of data traffic flows** between Europe and Asia, but this sounds like a severe underestimate. Based on what we saw at the time in our network and in feedback from our customers, many of the major consumer ISPs in South East Asia, a **more likely figure is 60-70% either through congestion or extended data transfer times.**

Beyond cable cuts, design flaws and a dearth of new cables contribute to this problem. Currently, for connectivity between Asia, Africa, and Europe, there's heavy reliance on two main submarine cable systems: Asia-Africa-Europe 1 (AAE-1) and the SEA-ME-WE 5 (SMW-5). Launched in 2017, both route through Egypt – a critical point where cables cross from the Red Sea to the Mediterranean through terrestrial paths. Unfortunately, this routing creates single points of failure; as a result, disruptions in Egypt can have staggering consequences on global connectivity.

Despite many promises during the latter years of COVID-19 of new cables under planning, the only new cable that fully spans Western Europe and South East Asia (SEA-ME-WE 6) - which was on the cards for next year - now seems unlikely to happen in 2025 due to ongoing issues in the Red Sea, exacerbating network vulnerability.



Our analysis shows that disruptions in the Red Sea impacted 60-70% of data traffic between Europe and Asia, far more than initially reported.

**Tony O'Sullivan**  
CHIEF EXECUTIVE OFFICER

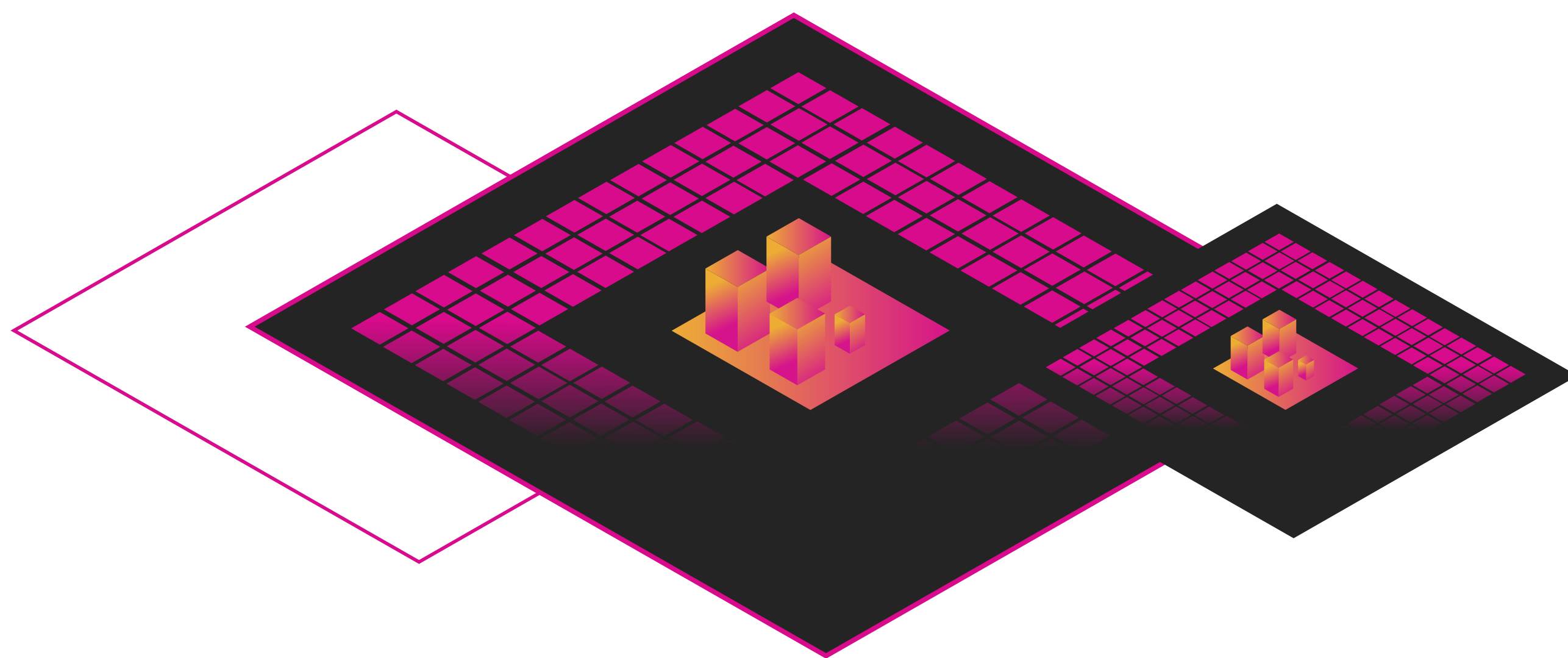
## The barriers to erasing single points of failure

# So, what's stalling new cables?

As geopolitical tensions persist, supply chain disruptions are impacting the availability and deployment of telecom equipment.

1 First, only a handful of companies globally have the capabilities to produce the high-voltage direct current (HVDC) cables and converters needed, leading to limited manufacturing capacity and order backlogs. Specialist vessels required for cable installation are also in high demand, making them expensive and difficult to secure on short notice. And, of course, the same ships used to install new subsea cables are also needed to repair existing cables; the increased number of cable failures pushes back further the installation of desperately needed new infrastructure.

2 Second, during the pandemic, abandoned orders and economic uncertainty **severely impacted semiconductor production**. Otherwise known as chips, these essential components are involved in processing the data transmitted over subsea cables. The technology used to create and maintain subsea cables, including signal processing and data transmission, also relies on semiconductors.



In the aftermath of COVID-19, we're still experiencing the fallout from this global chip shortage with increasingly severe geopolitical consequences. For example, Chinese officials have ordered the country's leading telecom operators to **phase out foreign semiconductors** from their networks by 2027. As a result of these supply chain challenges, new cable projects have been delayed.

Climate change is another critical issue, with rising sea levels eroding coastal infrastructure. Staggeringly, in South America, beach erosion has become so severe that previously submerged subsea cables **have become exposed**, which sharply increases the likelihood of an outage. Mostly, however, climate risks here are longer-term. What needs to be a bigger conversation right now is how to ensure people stay connected digitally during physical disruptions.





## 24m displacements

Triggered by disasters every year



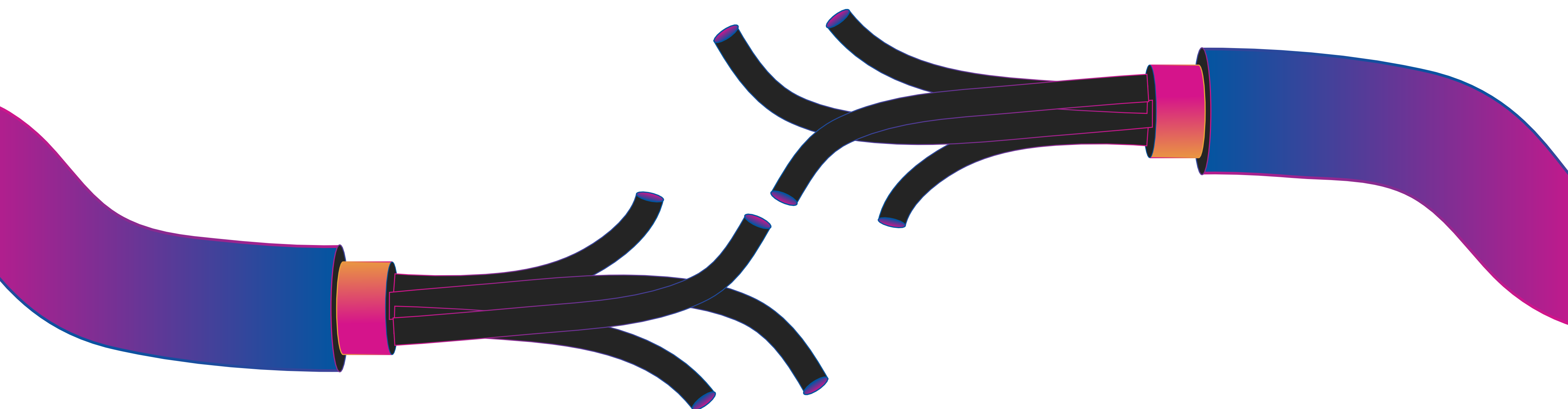
## 92% caused by weather

and by weather-related catastrophes, half of which involved floods

For the past decade, on average, disasters have triggered **24 million displacements every year**; 92% were caused by weather-related catastrophes, half of which involved floods. In East Africa alone, since March 2024, hazardous El Niño-rains have **displaced 234,000 people**, including refugees hailing from 11 countries, while the **February 2023 Turkish and Syrian earthquakes** caused huge disruptions to connectivity. It would also be remiss not to mention the millions of displaced citizens as a result of the Russian invasion of Ukraine, which had a **significant impact** on internet infrastructure in the region.

As more people find themselves displaced due to these changes, it's vital to make sure they can access the internet swiftly and securely, so they can keep in contact with friends, family, and government leaders.

This demonstrates the need for diversified and resilient infrastructure that can keep people connected during disruptions, whichever form they take. Making this a reality, means choosing the right suppliers in the first place. This means selecting providers that prioritise customers before short-term gains, focusing on the long-term benefits of building market presence through resilience and reliability. By spreading risk across multiple networks, vulnerabilities can be managed more efficiently and securely. After all, it's not a case of 'if' an incident will happen, but 'when'.

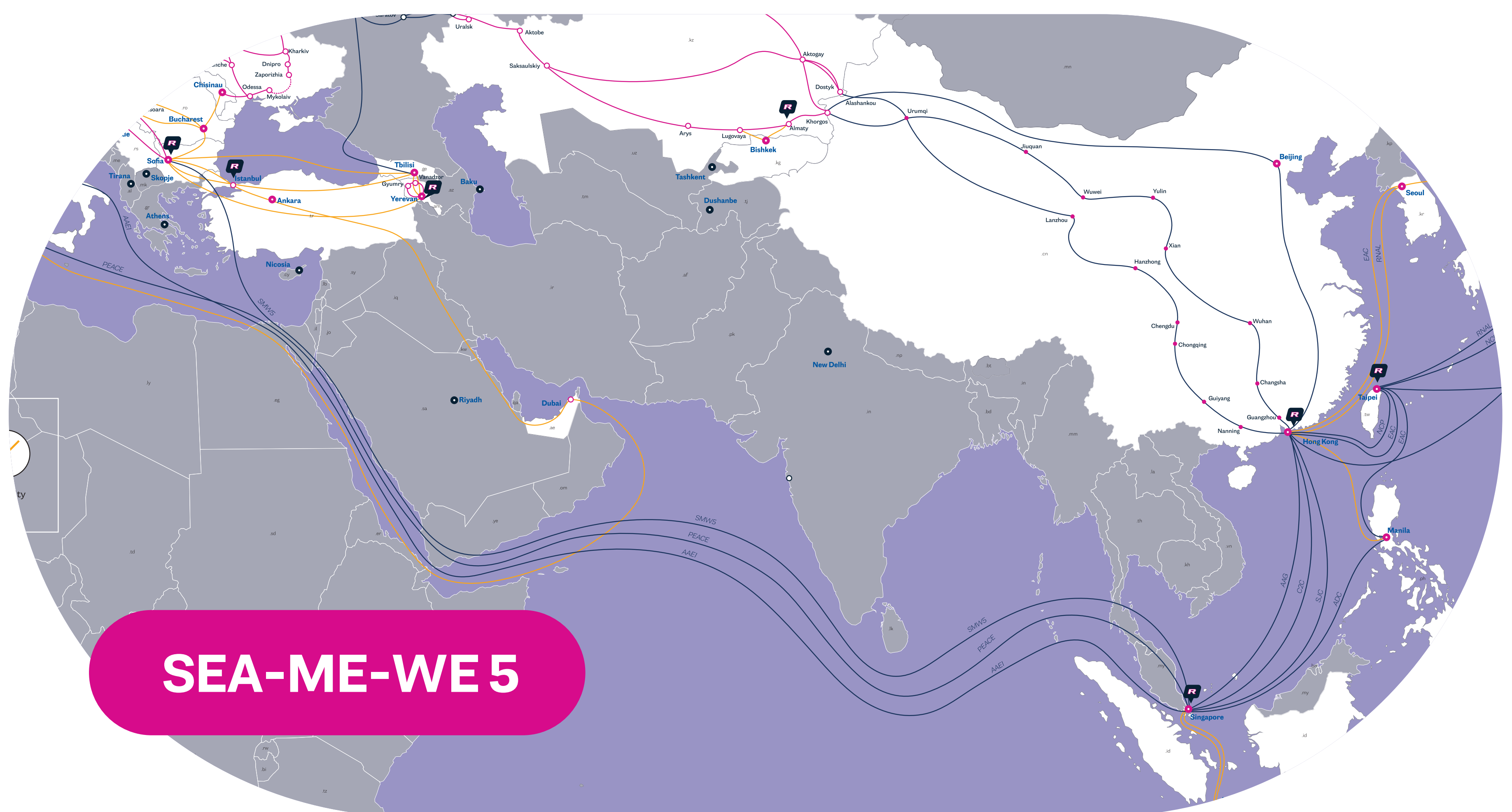


SECTION 2

# Response strategies: The strategic importance of diversified routes

**When attempting to mitigate network risks, prevention might not always be possible, as seen with incidents of civil unrest – but that’s why getting the cure right is so crucial, which means mastering response strategies.**

One example of how we’ve responded effectively to network vulnerabilities is RETN’s doubling of capacity across China and Central Asia following the subsea cuts. This includes prioritising terrestrial routes and ensuring multiple subsea cable systems are in place, rather than attempting to funnel traffic through fewer higher-capacity cables.



Take the damage to the SEA-ME-WE 5 submarine cable in the Strait of Malacca, which took place in April 2024. As one of only two subsea cables that connect Bangladesh, **this incident slashed internet capacity in Bangladesh by a third**, annihilating all traffic between Singapore and SEA-ME-WE 5’s Kuakata landing station. During the same year, repairs to the Red Sea cuts didn’t start for months due to regional instability.

The shadows of these incidents loom large across RETN’s customer base, where demand for resilience to safeguard against future instability is growing. That’s why, for all serious network operators, prioritising the deployment of diversified routes is essential. This involves evaluating current infrastructure for single points of failure and investing proactively in additional architecture. As a minimum, network operators should provide at least 4 routes for any geography, preferably 5+.



In Central Asia, there is no subsea connectivity, with landlocked countries sandwiched between Russia and China. Due to the extreme fiber distances of circa 6000-7000km between Central Asia and global internet exchange hubs in Frankfurt and Hong Kong, these links were traditionally very expensive and experienced frequent fiber cuts.

**That’s why we invested in building [TRANSKZ](#), a unique terrestrial cable connecting Europe to Asia where we provide protected services by default (whereby data reroutes to a redundant path automatically in the event of a failure), using the latest equipment capable of supporting modern data transfer rates.**

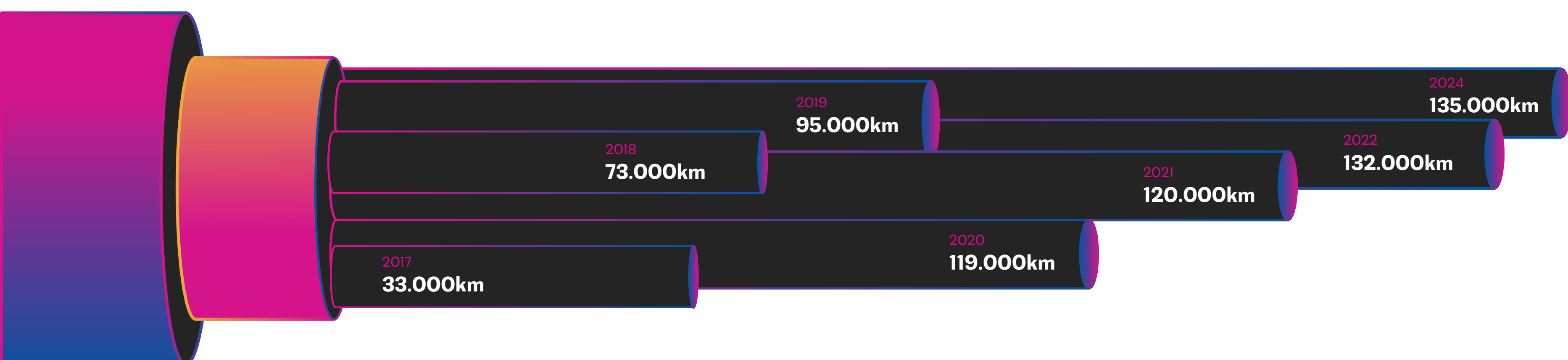
A major aim of this project was to enable digital transformation in Central Asian countries, whilst also providing low latency routes between Asia and Europe.

However, when the Red Sea disruptions arose, thanks to TRANSKZ, RETN was able to maintain high levels of connectivity between affected regions and TRANSKZ became not just a service for Central Asia and those requiring low latency connections, but a major part of the global internet backbone. Whilst many operators were forced to route Europe-Asia traffic via the US, with much greater latency, RETN’s Europe-Asia traffic saw no significant change in performance.

**Thanks to TRANSKZ, RETN was able to maintain high levels of connectivity between affected regions.**

Further changes are on the horizon, such as [AzerTelecom's prospective cable project](#) from Kazakhstan to Azerbaijan via the Caspian Sea, diversifying further the connections between Europe and Asia.

Diving deeper into the technicalities: while in 2023 we invested heavily into the expansion of our pan-European network with 400G+ backbone links terrestrially, with extended subsea outages we now see a strategic approach for most network service providers to expand 100G capacity across a larger selection of subsea routes to cover connectivity requirements. This will increase resilience against potential disruptions by diversifying routes while minimising delays when rolling out new technology.



### RETN's Continuous Network Expansion

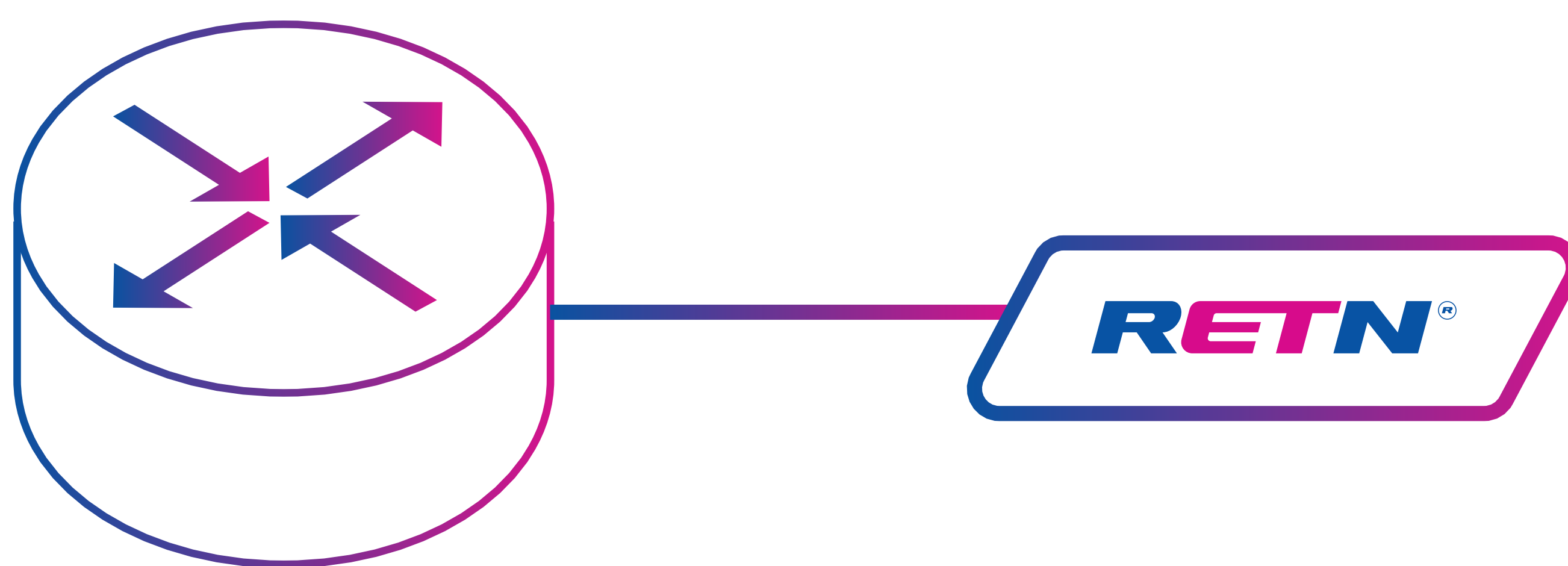
Reaching out to new markets, building new routes, achieving greater redundancy - to help you connect with one network.

**Time for change: fixing decade-long design flaws**

**Of course, there can be no progress without customers calling for change.**

Enterprises and ISPs should regularly review their network dependencies and work closely with network providers to ensure that they are covered by multiple redundant routes. For example, asking for regular resilience reports from providers can help shed light on how potential risks are being mitigated. This could include ensuring flexible network architecture and that network infrastructure is able to keep up with evolving security and compliance requirements.

Lessons must be learnt from what is now a decade-long issue of poor network design worldwide, the ramifications of which are worsened when relying heavily on single points of failure. Dynamic traffic management becomes possible by creating more resilient and diversified routing options. This approach means network risks – whether the source is geopolitical, environmental, or in the supply chain – can be spread across different cable systems. Adopting this response strategy is key to unlocking network stability for everyone.





## SECTION 3

# Collaborative competition: Regulatory changes and the role of Big Tech

Having established ideal response strategies, more attention must be paid to the regulatory practices and market consolidation efforts shaping digital infrastructure. Across Europe, the telecommunications industry faces challenges due to regulatory inconsistencies and market dominance by ISPs, impacting network resilience.

As such, **the European Telecommunications Network Operators Association (ETNO) has been calling for transformative connectivity policies** to secure Europe's competitiveness. The announcement came just a few months after major players including **Nokia and IBM called for urgent action** and collaboration to meet Europe's digital and advanced connectivity competitiveness needs.

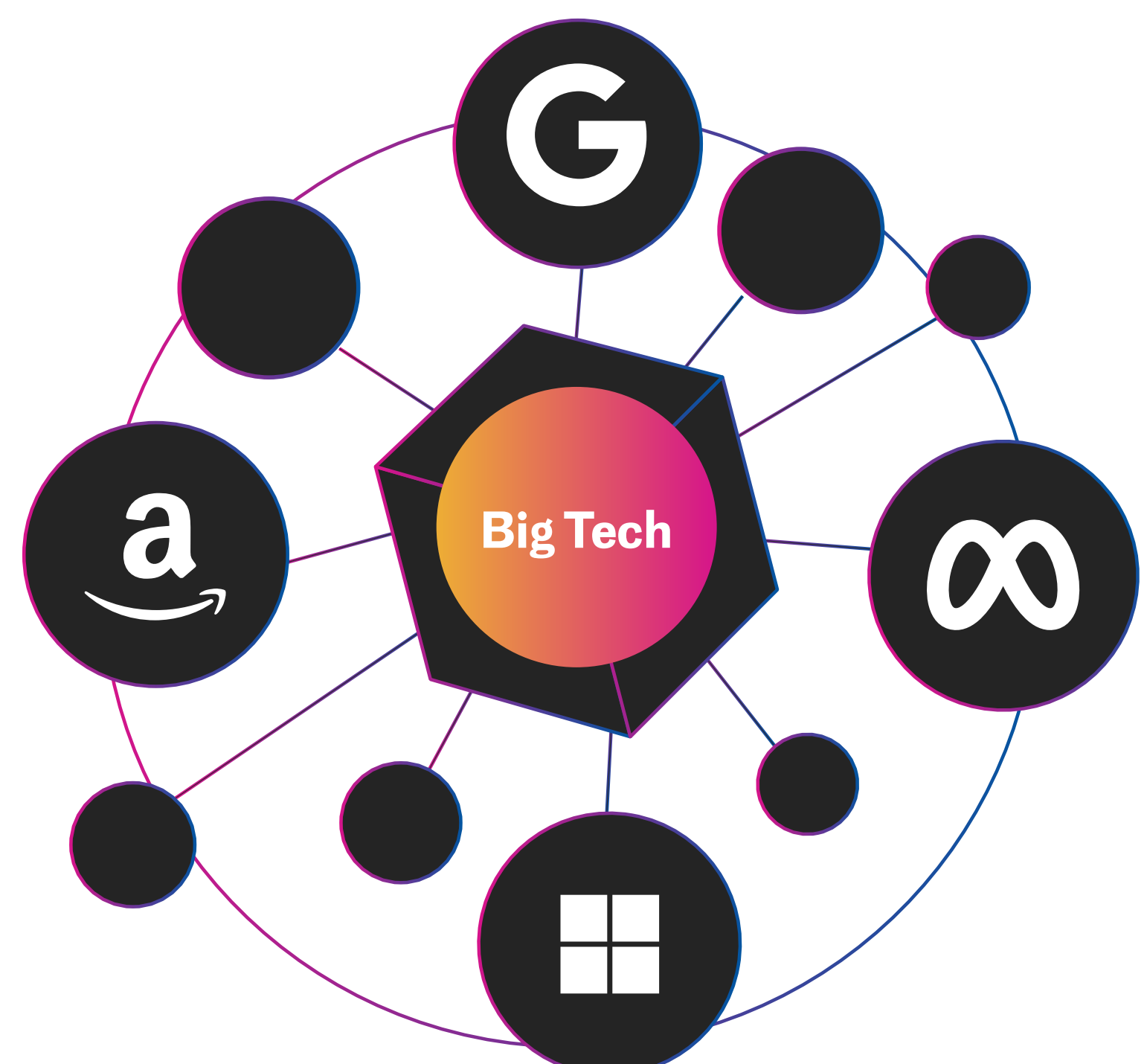
This might seem like a step in the right direction, but it raises the question: what are the motivations behind this move? It could be a strategic tactic to drive market consolidation rather than genuinely improving network infrastructure. While ETNO may argue for more open markets, this could reduce competition by enabling larger operators to acquire smaller players more easily, consolidating their market power.

## The purchasing power of giants

# Another factor that warrants further examination is the influence of Big Tech giants on cable investments.

As gargantuan content companies, just one order from Google, Microsoft, Amazon, or Meta is needed to invest in new cable systems. For better or worse, building network infrastructure depends on the purchasing power of these behemoths.

Ultimately, it's clear that the European telecoms market faces significant challenges in effectively supporting new investments. Conversely, there's a particularly **strong demand for fresh infrastructure** in the Gulf and South Asia – two of the fastest-growing regions in the world. That's why, looking further afield, there are untapped opportunities to create resilient and future-proof connectivity.



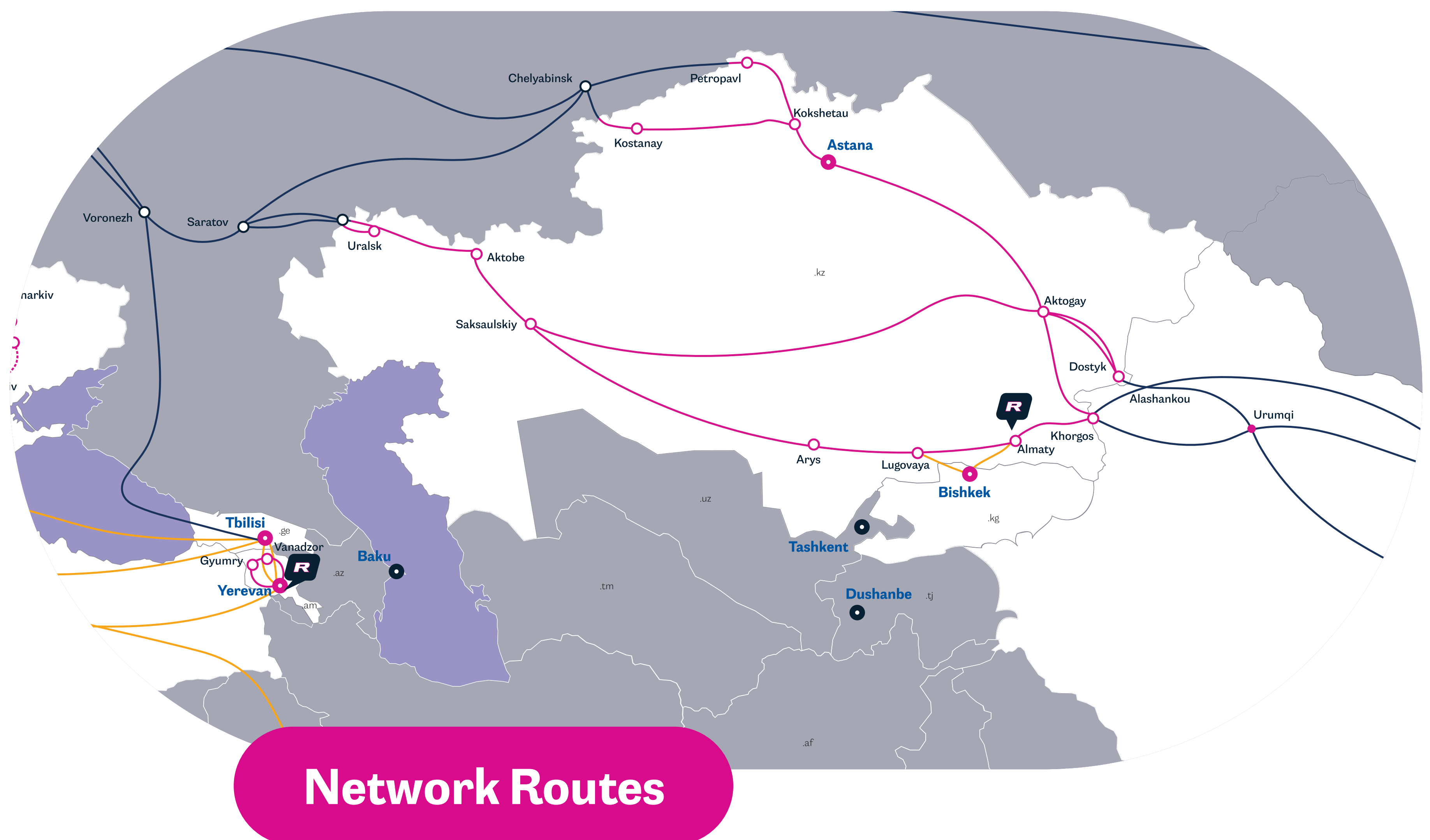
SECTION 4

# Country matters: Connecting and developing overlooked regions

The last piece of this puzzle is connecting and developing historically overlooked regions. It's widely understood that improved digital infrastructure drives prosperity in rural areas, giving people new ways to generate income.

However, the economic opportunities achieved are mostly individual.

Conversely, connecting entire countries that have been previously overlooked – such as **Armenia, Kyrgyzstan, Tajikistan and Georgia** – brings whole industries to countries, while also allowing these same countries to establish their own global industries and exports.



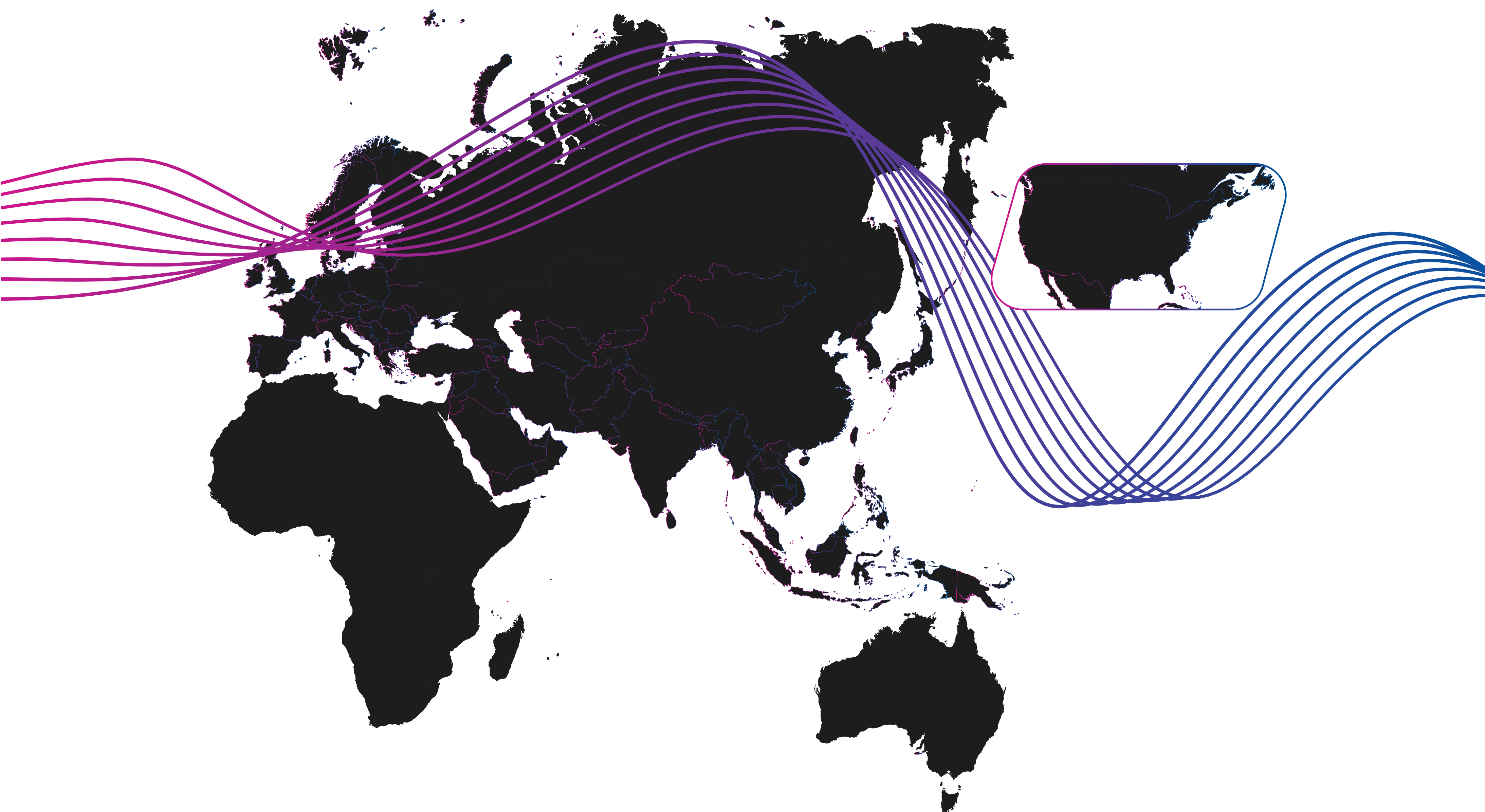


**Bigger and bolder ambitions**

**Digitally developing these regions enables industrial development on a much bigger scale.**

This brings a broader impact on regional and global connectivity that benefits everyone, **levelling up individuals and industries** alike. Going bigger and bolder, investing in cross-regional partnerships is key to securing access to alternative connectivity routes during geopolitical crises.

Of course, when first embarking on the connectivity journey, it's not always clear where to start or what success looks like. That's why we've compiled a list of questions we encourage enterprises to ask when selecting providers. Prospective customers who follow this checklist will maximise ROI and help improve overall industry resilience.





## 5 questions to ask when designing your network

- 1 How does the network architecture of our provider align with the future growth of our business?**

Network providers must be able to handle both current and future bandwidth requirement, so scaling is seamless.
- 2 What's the true cost of network disruptions and downtime?**

It's not just repairs that cost money – financial damage from lost business and unhappy customers really stacks up, so pick a provider that doesn't cut corners.
- 3 How does the network infrastructure keep up with evolving security threats and compliance requirements?**

Priorities should include encryption, DDoS protection, intrusion detection, and compliance with relevant regulations.
- 4 What's the best way to manage network latency and performance optimisation?**

Flexible architecture is key, so look for adaptability in network design, the ability to scale services up or down, and support for emerging technologies.
- 5 Which geographical regions are a priority and do any have single points of failure?**

Assess redundancy, failover systems, and SLA commitments to ensure reliable uptime across all regional operations.



# Conclusion

**As geopolitical risks grow alongside humanity's dependence on connectivity, the need for resilient, secure, and adaptable network infrastructure has never been more critical.**

While alternative options like satellite-based connectivity (most prominently NATO's program) can help plug gaps when subsea cable disruptions arise, they are not a silver bullet. Satellite networks provide temporary relief for essential services but lack the capacity and dependability to replace the extensive data traffic carried by subsea cables. That's why terrestrial and subsea networks with diverse routes are so vital.

Still, there are challenges to overcome, as building resilient networks requires more than technology. In Europe, as the regulatory environment tightens, network operators must remain agile and compliant. Moreover, across the supply chain, picking the right partner is crucial. At RETN, we pride ourselves on our relationships with industry leaders like **Infinera** and Juniper, nurtured over time through meaningful collaboration, such as lending a hand as beta testers to improve reliability. We understand that the reliability and trustworthiness of vendors can make or break a business; more enterprises must recognise this.

Additionally, cautious innovation is key. Investing more resources upfront and thoroughly testing new technologies before implementation minimises the risks of disruptions further down the line. When network providers cut corners in a cash grab, customers pay the price, finding themselves more susceptible to vulnerabilities later. Inevitably, this costs more time and money in repairs and lost revenue. RETN's approach – the foundation of which includes extensive lab testing, selecting the right suppliers, and being judicious in deployment – ensures that new technologies enhance rather than compromise network resilience.

Consider the increasing investment in energy-efficient building designs, materials, and systems (such as advanced insulation and solar panels). Spending more upfront leads to substantial savings in energy bills and reduced maintenance costs while also increasing property values over time. Prioritising resilient network infrastructure yields the same outcomes: customers and investors alike will consider stability a competitive advantage while the planet will be better protected.

**Connecting the future requires a holistic approach that balances innovation with care, navigates a complex regulatory landscape, and prioritises strategic relationships.**

Ultimately, building the networks of the future demands a fundamental shift in priorities – one that places the needs of people and communities above short-term financial gains. By engineering resilience, reliability, and security, we can build ethical and strategic networks that not only survive the pressures of today but thrive in the uncertainties – defining the industry leaders of tomorrow.



# About RETN

RETN is one of the fastest growing independent global network services providers, with unique resources to connect Europe and Asia.

Offering a wide range of connectivity services, such as IP transit, Ethernet & VPN, Capacity, Remote peering to major IXPs, Colocation and Cloud Connect, RETN's network runs on leading equipment vendors such as Infinera, Juniper and Ciena.

RETN's unique solution to connect Europe and Asia is built on its own homogenous DWDM and IP/MPLS Network Platform and widely branched land routes, passing through Western Europe, Eastern Europe and up to the border with China and further onwards into Southeast Asia.

RETN provides telecommunication services throughout its Eurasian network with short lead times, industry leading uptimes, and multiple layers of redundancy.



**WINNER**  
Best Pan-European  
Carrier



**SHORTLISTED**  
Best Pan-European  
Connectivity Provider



**SHORTLISTED**  
Innovation Disruptor  
of the Year



Peering Provider  
Verified Gold

**Google Peering  
Provider Verified Gold**

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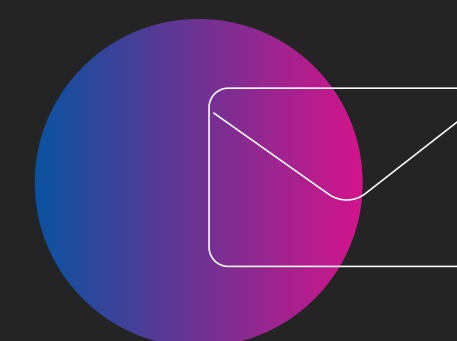
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