Telenor & 5G-VINNI: Proving the potential of 5G innovation

Digital Operations software

NOKIA

Network slicing as a service is the key to realizing the promise and potential of 5G, but only if communications service providers (CSPs) can overcome the complexity that will come with creating and managing large number of concurrent slices. Through the 5G Verticals Innovation Infrastructure (5G-VINNI) consortium, Nokia and Norwegian CSP Telenor are proving it's possible to simplify slicing with zero-touch digital orchestration — and are building the foundation for reliable, profitable 5G services for enterprise customers.
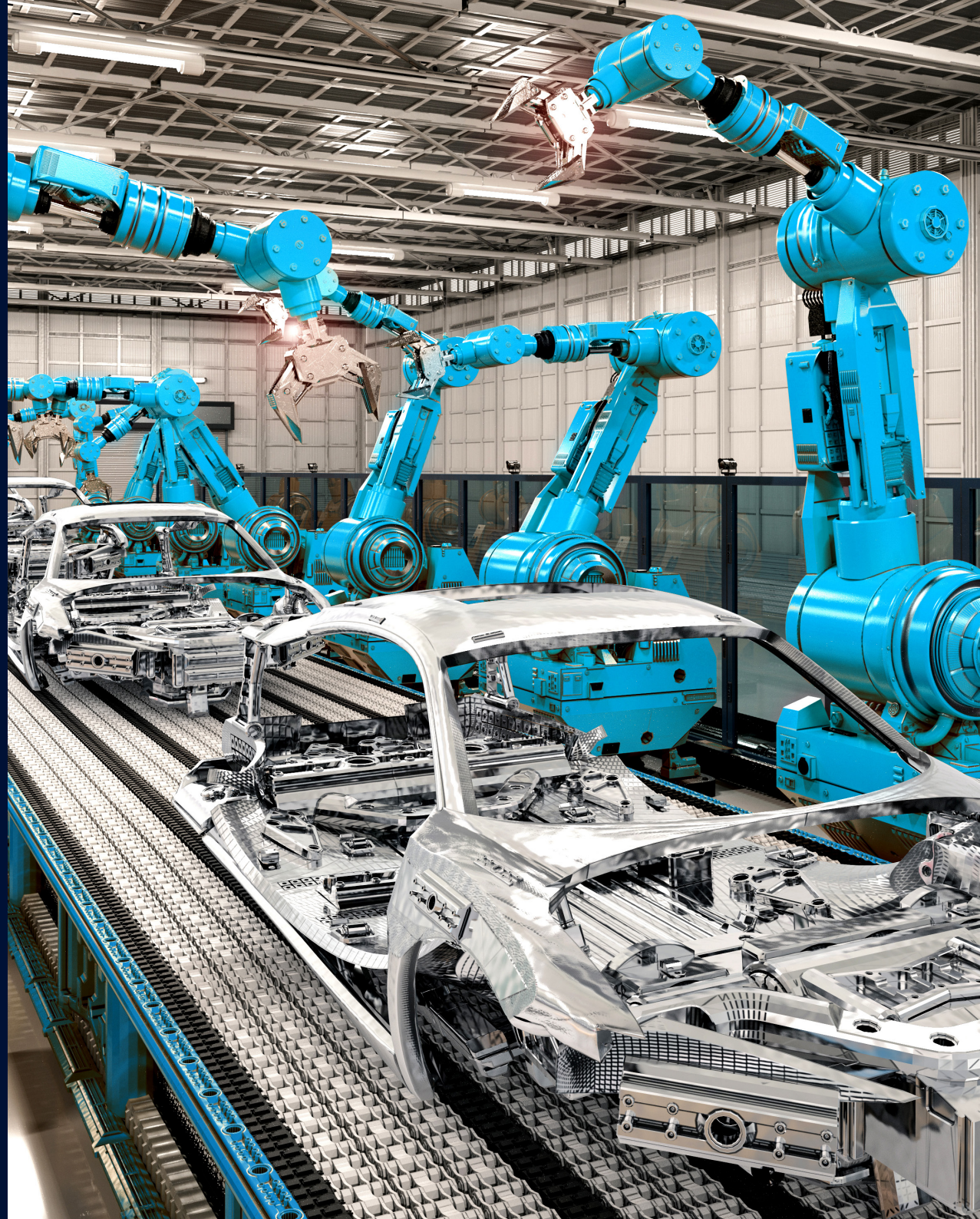
Business benefits
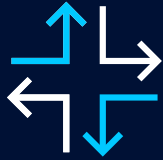
Orchestration of network slices with end-to-end automation and zero-touch management

Validation of 5G's ability to meet key performance indicators (KPIs) for industry-specific use cases

Foundation for revenue-generating B2B2X model

Challenge

For CSPs, network slicing as a service is key to capturing the 5G opportunity. By being able to quickly provision virtualized portions of their networks tailored to the precise needs of enterprise customers, CSPs can tap into the emerging B2B2X business model — and open the door to new use cases in logistics, shipping, public safety, defense and many other industries.

The challenge is complexity driven by the wide range of requirements to support different use cases:

- A large shipping terminal needs dedicated slices throughout the port for ultra-precise crane operations and logistics.

- Autonomous public transport systems need multiple slices for navigation and steering that ensure vehicle, road or passenger safety, with additional slices for real-time passenger control and even onboard entertainment.

- To keep their stocks healthy and profitable, fish farms need slices configured to transport massive quantities of high-definition underwater video from remote off-shore edge sites.

- Paramedics performing remote emergency services need dedicated slices to stay connected with reliable performance, whether they're in an ambulance or a helicopter.

- Military personnel need instant access to highly secure slices on their mobile devices to seamlessly transition from civilian to command-and-control contexts.

CSPs looking to meet the demands of enterprise customers will need to manage hundreds, if not thousands of slices, all at the same time.

To meet the demands of all these use cases — and many others — CSPs will need to create and manage a large number of slices across their customer base, all at the same time.

Add on the challenge of rolling out 5G on top of CSPs' existing multi-vendor 4G networks and that complexity can quickly get out of hand. Slice provisioning and orchestration will need to take multiple network generations into account, with each part of the network operating on a mix of solutions and equipment from different vendors. Delivering 5G to industry verticals will require slices that work seamlessly across providers and network configurations.

5G-VINNI (5G Verticals Innovation Infrastructure) aims to demonstrate how this complexity can be overcome by making network slicing as easy as possible.

Launched by the European Commission in 2018, 5G-VINNI is a three-year, €20-million consortium that brings together 23 partners (including CSPs, network vendors and researchers) to build and test a multi-vendor, multi-national 5G environment — including network slicing as a service — against real-world enterprise use cases.

With interconnected test sites in Norway, the UK, Spain, Greece, Portugal and Germany, 5G-VINNI aims to prove that 5G slices can meet the critical KPIs demanded by industry verticals: capacity, speed, latency, user density, reliability, service creation time and more. The project is also exploring how to provide automated orchestration, operations and management systems — both for non-standalone 5G and true standalone 5G (5G SA).
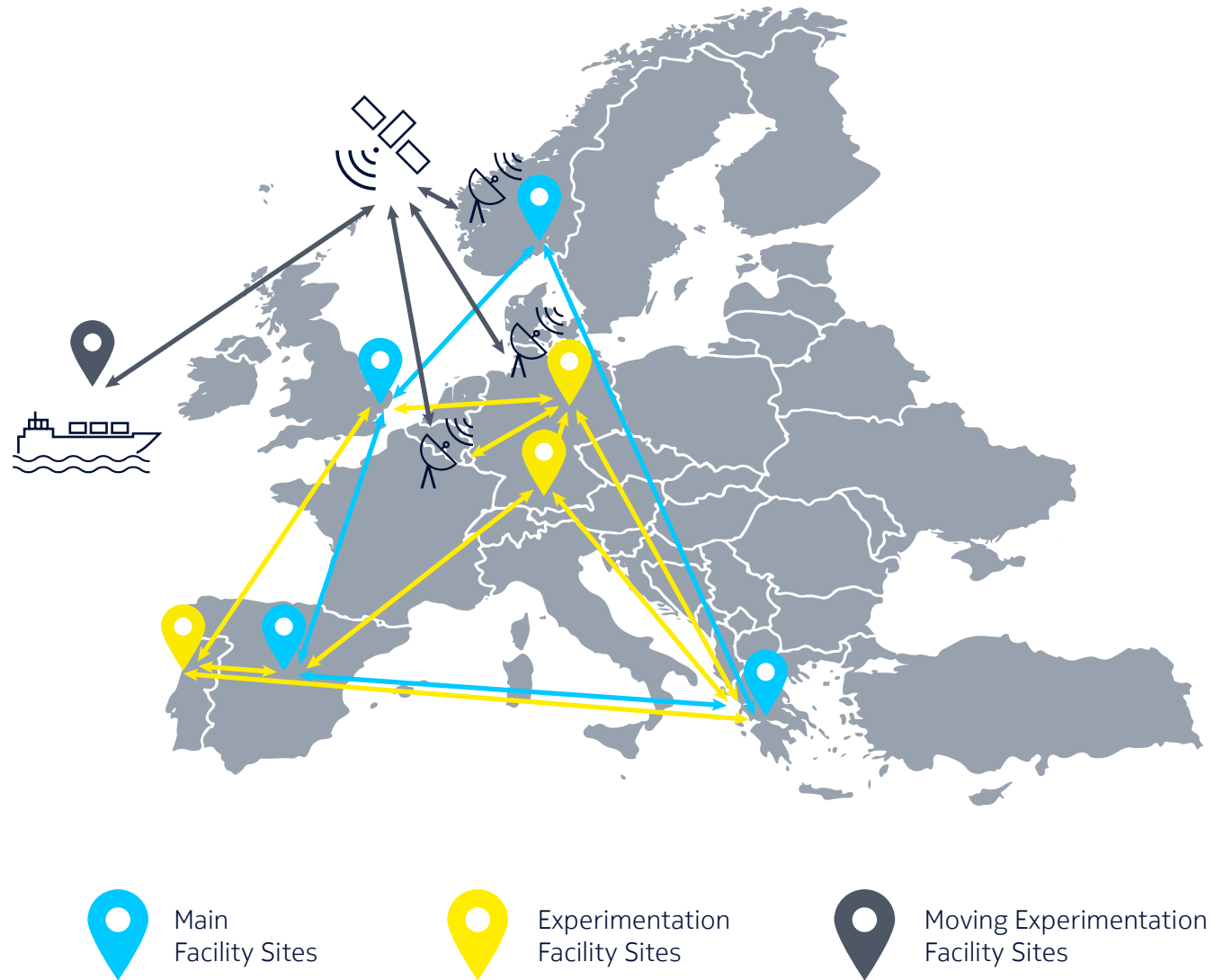

Main Facility Sites

Experimentation Facility Sites

Moving Experimentation Facility Sites

Figure 1. 5G-VINNI test sites across Europe

Solution

Norway's 5G-VINNI facility site is hosted by Telenor Research in Oslo. A long-standing Nokia customer, Telenor chose Nokia to implement, manage and orchestrate the network functions virtualized infrastructure (NFVI) in a multi-vendor environment. The NFVI consists of a primary site as well as multiple edge sites located close to the end users' locations. These sites are serving as test beds for innovative 5G use cases across many industry verticals, including aquaculture, public safety, defense and eHealth.

In a fish farm in central Norway, offshore cameras are bringing data to an edge site for pre-processing and analytics before sending the information back to the primary site. Another edge site has been set up 60 km south-east of Oslo for a defense/military use case.

Inter-facility network slices have connected the Norway facility to those in the UK, Spain and Greece — allowing one CSP to scale its operations using another's service and increasing capacity across the entire network. In practical terms, this would enable a surgeon in the UK to treat a mountain climber in Norway, or a NATO team deployed on the ground in one country to be commanded from another.

With its digital management and orchestration platform, Nokia is providing all of the primary components required to design, deploy, modify, monitor and decommission sliced-based network services in a multi-vendor network. These components include a service and resource inventory, functions for tracking slice instantiation and management, and catalogue functions for onboarding network services. The solution is deployed on AWS cloud.

Nokia also provided templates for uRLLC, mMTC and eMBB services to support lifecycle management operations of network slice and subnet instances.
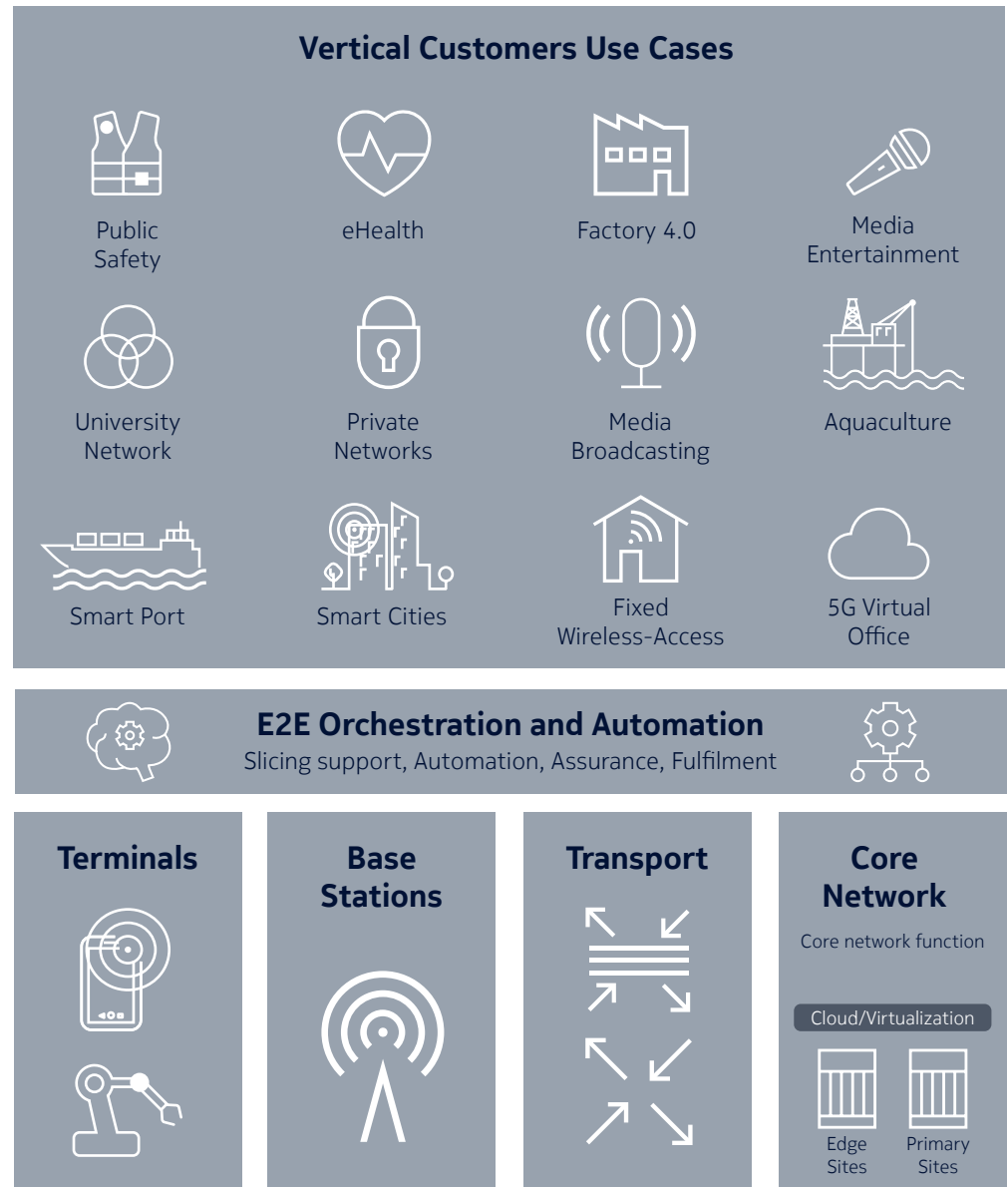

Figure 2. 5G-VINNI Norway facility site, use cases and projects

Vertical Customers Use Cases

Public Safety	eHealth	Factory 4.0	Media Entertainment
University Network	Private Networks	Media Broadcasting	Aquaculture
Smart Port	Smart Cities	Fixed Wireless-Access	5G Virtual Office

E2E Orchestration and Automation
Slicing support, Automation, Assurance, Fulfilment

Terminals

Base Stations

Transport

Core Network
Core network function
Cloud/Virtualization
Edge Sites
Primary Sites

Results

The results seen at the Telenor site and others as part of the 5G-VINNI project are promising — showing the real potential for 5G to meet the demands of enterprise customers across multiple industries. At the 3rd Nordic Conference on ICT held in November 2020, the Telenor team conducted successful demonstrations in three crucial areas:

- Delivering live, **zero-touch, end-to-end network slice orchestration and automation**, including one-click deployment of a slice consisting of two network services under two different tenants and security zones, virtual network functions, and software-defined networking and firewall policies.

- Implementing **two network slices of different service levels** for the Norwegian Armed Forces, with users accessing each slice on the same 5G phone in real time.

- Connecting a 5G device to a **standalone 5G slice**, including connecting different users to different slices and redirecting them from one slice to another.

Through these demonstrations and its ongoing commitment to 5G-VINNI's success, Nokia is helping prove that network slicing as a service will deliver on the promise and potential of 5G — and in doing so, is creating the foundation for successful B2B2X partnerships between CSPs and industry verticals.
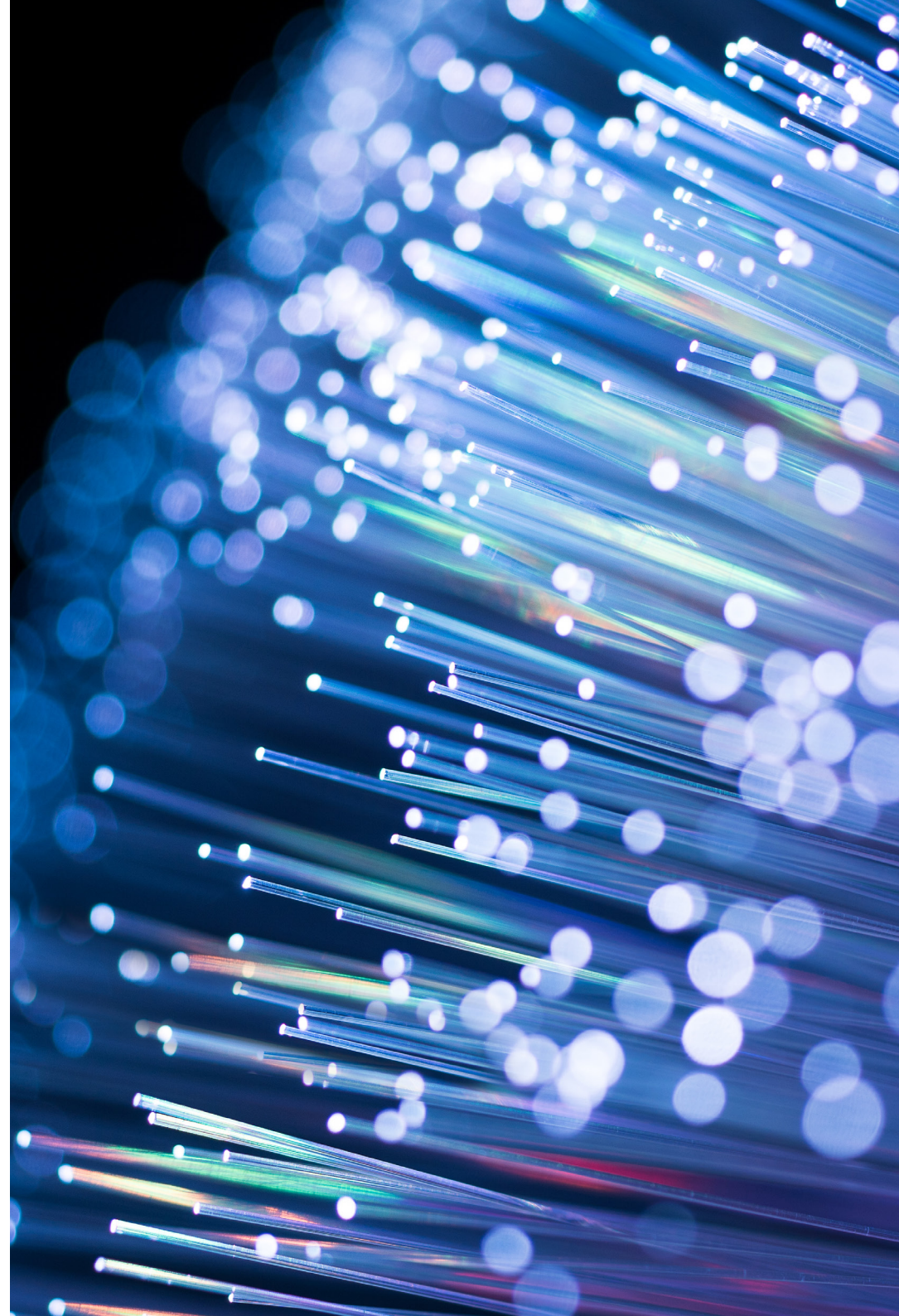
"Automated orchestration and management of network slices will be critical to integrating vertical industries into the 5G ecosystem. By working across technical and organizational boundaries with all our test site partners, Nokia is playing a key role in the success of 5G-VINNI."

Pål Grønsund, Senior Research Scientist,
5G-VINNI Coordinator

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About Nokia

We create technology that helps the world act together. As a trusted partner for critical networks, we are committed to innovation and technology leadership across mobile, fixed and cloud networks. We create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs. Adhering to the highest standards of integrity and security, we help build the capabilities needed for a more productive, sustainable and inclusive world.

Our communications service provider customers support more than 6.4 billion subscriptions with our radio networks, and our enterprise customers have deployed over 1,300 industrial networks worldwide. Adhering to the highest ethical standards, we transform how people live, work and communicate. For our latest updates, please visit us online www.nokia.com and follow us on Twitter @nokia.