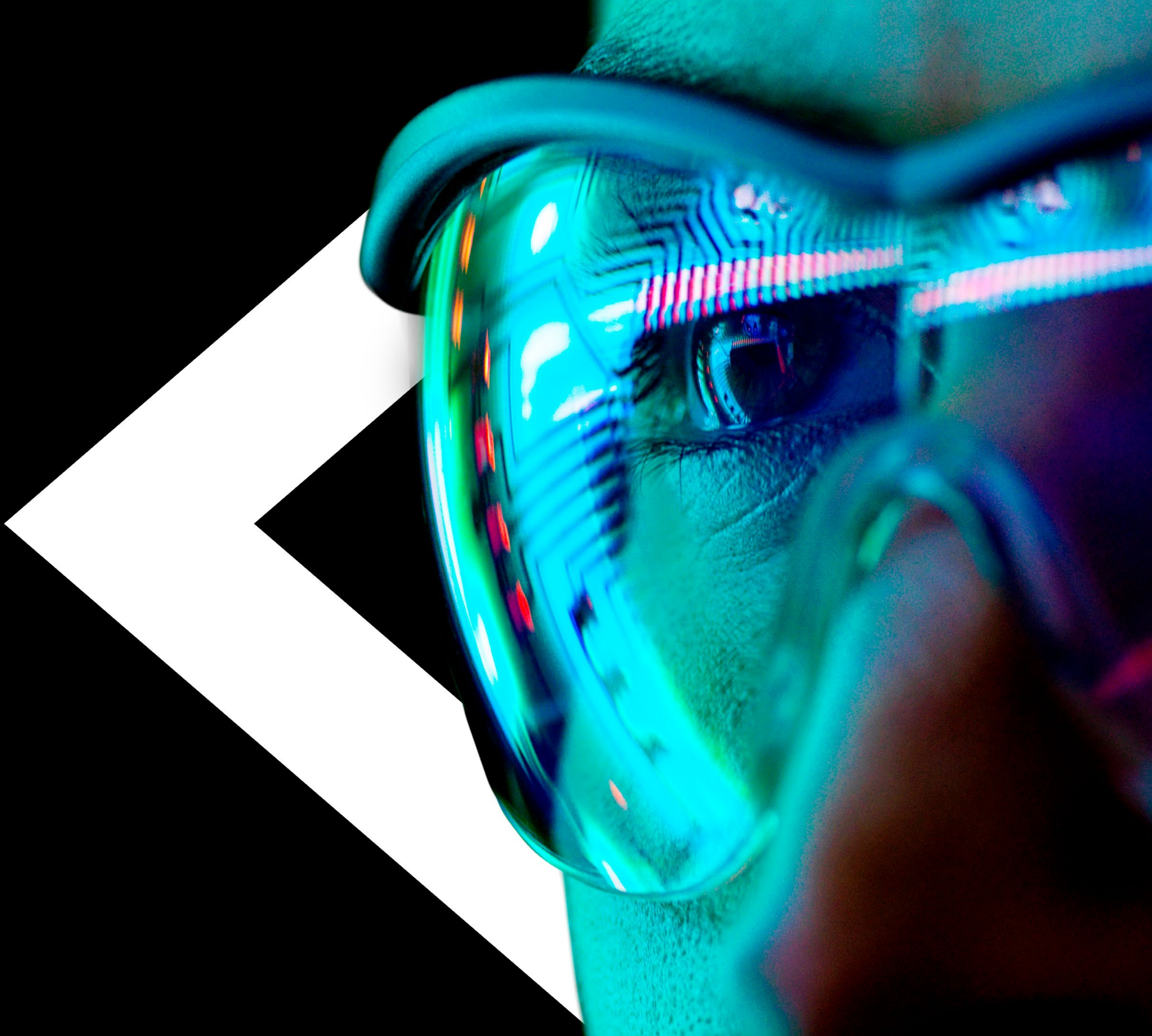# Master the unexpected with Nokia FP5

The power of network procesor innovation

NOKIA

The unexpected call of COVID-19

The recent pandemic triggered a period of unexpected growth and change for IP networks. In the first 12 months alone, network traffic grew at seven times the pace predicted by Bell Labs in 2017.

New applications, from remote learning to e-medicine, video conferencing, online grocery shopping, video streaming and gaming have taken center stage and fundamentally changed the way we live, work and play.

There is little disagreement that the bi-directional capacity challenges, new traffic models, overflowing caches and limited opportunities for evolving and upgrading networks that came with the pandemic caught us by surprise. And yet, we somehow managed to pull through. Not without many trials and the realization that we can't afford to go through another disruption like this without designing and preparing our networks to expect the unexpected — before it happens.

Network security threats have also surprised us with their ferocity. During the pandemic, distributed denial of service (DDoS) traffic became the fastest growing category of traffic on the internet, outstripping video and gaming. This is a serious problem for service providers already challenged with delivering consistently high service quality to satisfy Industry 4.0, 5G and other critical applications. Data breaches are also escalating.

Enterprises are concerned about loss of revenue and reputation, while government is concerned about the impact to critical infrastructure. Service providers increasingly need to demonstrate that data carried across their networks is protected against theft and manipulation.

Enabling the world to continue functioning, no matter what comes along, is one important role of networks. Dealing with climate change is another. The Information and Communications Technology (ICT) industry is responsible for between 5 percent and 9 percent of electricity consumption and 2 percent of global greenhouse gas emissions. To help service providers reduce these numbers, network equipment vendors must actively work to minimize the environmental impact associated with their products' manufacture and use.

For Nokia, the challenge is to provide our customers the agility to deal with unexpected disruptions like COVID-19; the advanced network security capabilities to eliminate growing network threats and the efficiency and innovation to address climate change.

How Nokia can help you master the unexpected

Nokia is helping service providers address today's challenges through the delivery of three foundational elements for mission-critical IP networks — software excellence, automation and tools, and silicon and systems.

1

Software excellence

The Nokia Service Router Operating System (SR OS) already provides a unified and consistent operational model across all IP networking applications and network hardware. We are taking SR OS to the next level by:

- using data mining to introduce and validate new features across a broad range of systems far more quickly than ever before

- introducing micro-services to upgrade service providers' applications and introduce new functionality faster and without downtime

- providing service providers with the ability to onboard their own applications on our SR-Linux network operating system

The stability of SR OS is proven in more than a million routers deployed in critical networks worldwide.

The unexpected
wake-up call of COVID-19

How Nokia can help you
master the unexpected

FP5 flexible
capability

FP5 network
security

FP5 power
efficiency

FP5 speed
and capacity

The 7750 SR
family

Master the unexpected
with FP5

2

Automation and tools

Our network automation goes beyond the digitalization of repetitive tasks to improve operational accuracy, accelerate time to market and reduce operational expense. We help service providers move rapidly from concept to implementation of new services with the Infrastructure as Code design model. Our Network Services Platform (NSP) uses intent-driven models to automatically monitor and steer networks. Deepfield Defender provides unprecedented insight into the changing landscape of DDoS threats, while Deepfield Analytics provides similar insight into networks and subscribers.

Unexpected outcomes and unpleasant surprises don't happen only at the software and network design levels, however. Our Professional Services invest in the automation of network transformation to help customers reduce risk, mitigate human error, accelerate deployment and increase return on investment.

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3

Silicon and systems

Nokia believes in the competitive advantage of industry-leading hardware, and we develop our IP hardware with an uncompromising attitude. Our IP portfolio features products based on our own silicon design, as well as products based on merchant silicon and cloud environments.

For the most challenging applications, our IP routers use our in-house developed FP silicon. These network processors allow us to build routers that guarantee deterministic performance for any service combination, even during non-steady-state events such as oversubscription and microbursts.

Nokia's new generation of network processor, FP5, builds on FP4's flexible capability and no-compromise approach to IP silicon design, adding more capacity and security capabilities while significantly driving down power consumption. FP5 lets you quickly evolve your services, neutralize new or escalating network security threats and satisfy growing capacity needs — all while maintaining optimal efficiency, performance and scale.

FP5 flexible capability
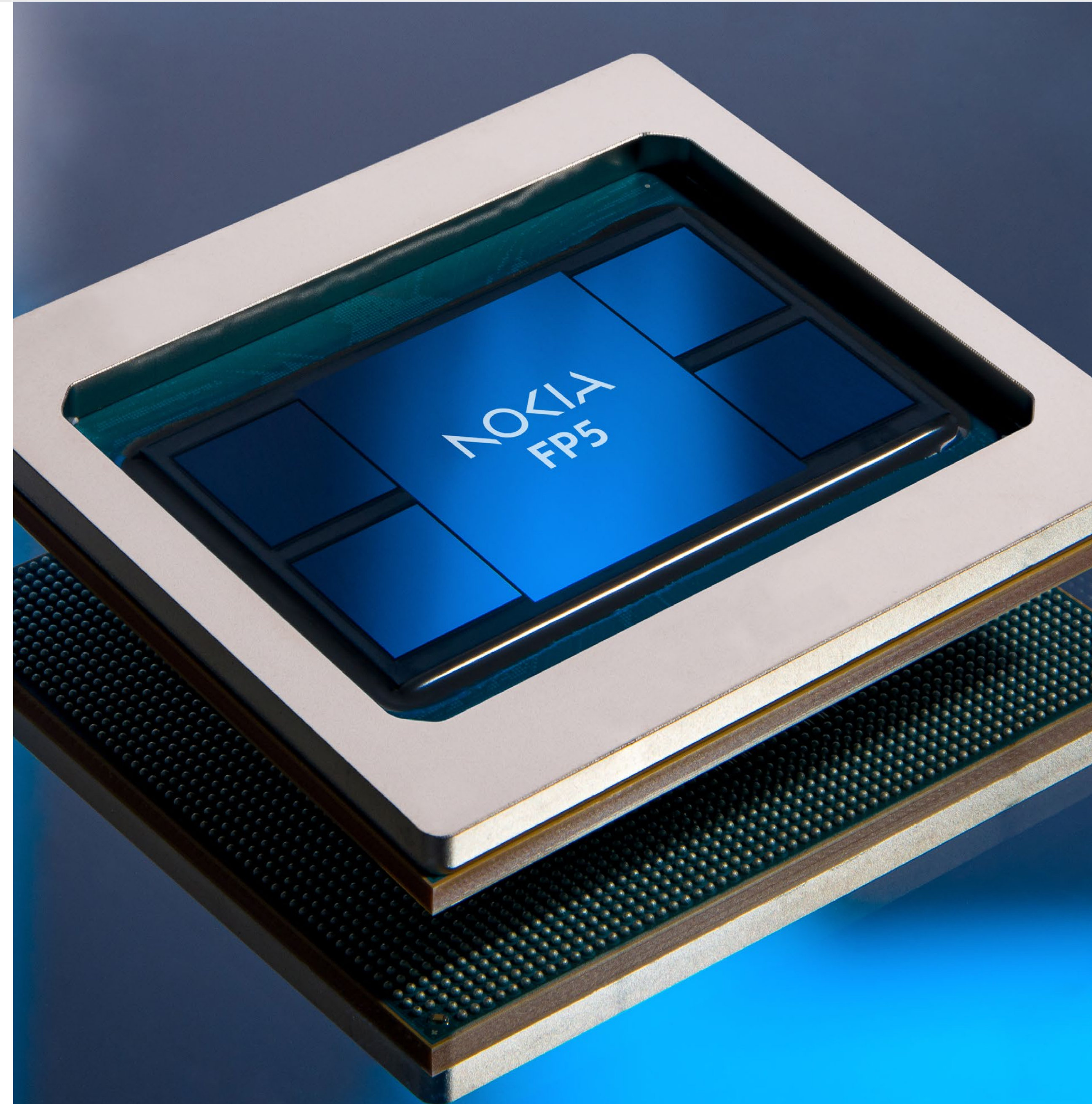
Master service evolution and rapid change

With FP5, service providers aren't forced to choose between services or settle for a reduced feature set and unpredictable performance. Time and time again, our customers have re-purposed the same hardware for numerous use cases with no compromise to performance or function. We allow our customers to pivot with market need, from MPLS to layer 2 eVPNs, from segment routing to 5G backhaul networks. They can run existing services hotter without performance impact or the need for new or additional hardware. To ensure performance is never impacted during bursts of traffic, line rate memories and full buffering are used throughout.

Like its FP predecessors, FP5 has a fully programmable data-path that can deliver major new features and capabilities through simple microcode updates. FP software programmability is unique in the industry in its scope and proven ability. FP chipsets sit at the heart of the longest serving routers in the industry, having gone through the most software updates and provided the lowest TCO of any IP silicon in the market. Multiple FP generations, including FP4 and FP5, can share the same chassis and a consistent feature set to provide optimal flexibility and maximize investment protection.

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FP5 network
security

Master escalating network-level threats

To help service providers avoid the high cost and complexity of appliance-based network security models, line rate encryption and other network security capabilities have been built directly into FP5 silicon.

While many encryption options provide the basic mechanism for encrypting traffic flowing through service provider networks, none have provided the combination of low latency, simplicity and transport flexibility required for universal service provider deployment. Silicon-based MACsec is fast, but it requires packets to be unencrypted and re-encrypted at every router hop, creating operating complexity and increasing risk. IPsec provides end-to-end encryption in IP networks, but it has a far more complex control plane and requires software intervention, making it far slower and unsuitable for time-sensitive networking. Neither support native encryption over MPLS or segment routing, and the combination creates operational havoc for those charged with maintaining it.

ANYsec transforms network encryption for service providers by extending MACsec technology so it can natively encrypt thousands of individually engineered tunnels, slices and flows over IP, MPLS or segment routing networks. ANYsec allows service providers to transform any low-latency service — whether internal transport, wholesale, backhaul, or VPN — into a secure low-latency service. It can accomplish this with a flip of a switch at any time, anywhere, and for any network transport or load conditions without impacting performance.

Deepfield Defender big data analytics leverages FP5 in Nokia 7750 Service Router (SR) routers to provide a more accurate, economical and lower-latency alternative to centralized DDoS scrubbers. The massive filtering scale and performance headroom in FP5 chipsets allows them to act as highly precise attack sensors and mitigation elements without compromising other services running on the same chipsets.

FP5 power efficiency
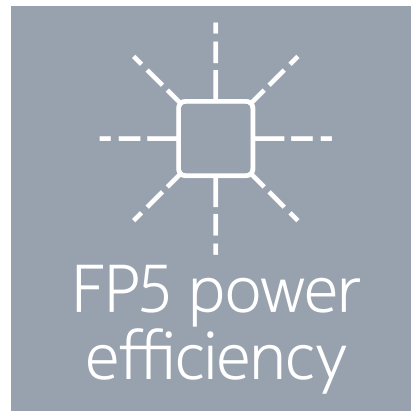
Master the size of your carbon footprint

FP5 sets a new benchmark for power efficiency in IP routing with a 75 percent reduction in power consumption over previous generations. It reduces power consumption even more if only a fraction of capacity is used. Within the same power envelope, FP5 increases the system capacity by more than 3X over previous generation FP silicon and the use of intelligent aggregation mode increases the slot capacity by more than 3X. With FP5, power efficiency is always optimized, no matter what the load conditions.

FP5 maintains consistently high performance, even as it takes on multiple concurrent roles with all features and capabilities enabled and running at line rate. This allows service providers to do more with fewer routers and line cards, minimizing their overall power consumption. Highly efficient cooling allows service providers to mate high capacity 400G ZR/ZR+ and 800G optics with FP5, concentrating uplinks and lowering total power consumption even further.

Our highly adaptable silicon and systems are all designed for long-term re-use and have the highest longevity in the industry. We take back excess or obsolete products, refurbish and resell equipment and dispose of end-of-life products responsibly, avoiding up to 40 percent of the CO_2 emissions of the manufacturing process. We have publicly committed to lower our carbon emissions by 50 percent from 2019 to 2030 and have helped convince over 260 of our suppliers to make their own emission reduction commitments.

FP5 speed & capacity

Master unprecedented, unpredictable growth

To help service providers achieve massive scale without compromises, FP5 provides more capacity than any other programmable network processor silicon in the market without sacrificing the performance or breadth of its IP/MPLS/segment routing feature set.

Capable of full 6.0 Tb/s in a 70 percent smaller footprint than its predecessor, FP5 enables three times the capacity of our previous chassis-based systems. It enables 18 Tb/s FD (19.2 Tb/s with intelligent aggregation) line cards, high-density 800GE ports and the ability to scale up to 1.6 Tb/s speeds for clear channel routing.

At 6.0 Tb/s, FP5 is also ideally dimensioned to scale 7750 SR systems downwards. Compact 7750 SR systems are available in power-optimized 2.8 Tb/s FD, 6.0 Tb/s FD and 19.2 Tb/s FD versions to help service providers master the unexpected for any range of connectivity and capacity requirements.

The 7750 SR family

Your route to the remarkable

Nokia 7750 SR-1-24D

Nokia 7750 SR-1-48D

Nokia 7750 SR-1x-48D

Nokia 7750 SR-1-46s

Nokia 7750 SR-1-92s

Nokia 7750 SR-1x-92s

Nokia 7750 SR-1se

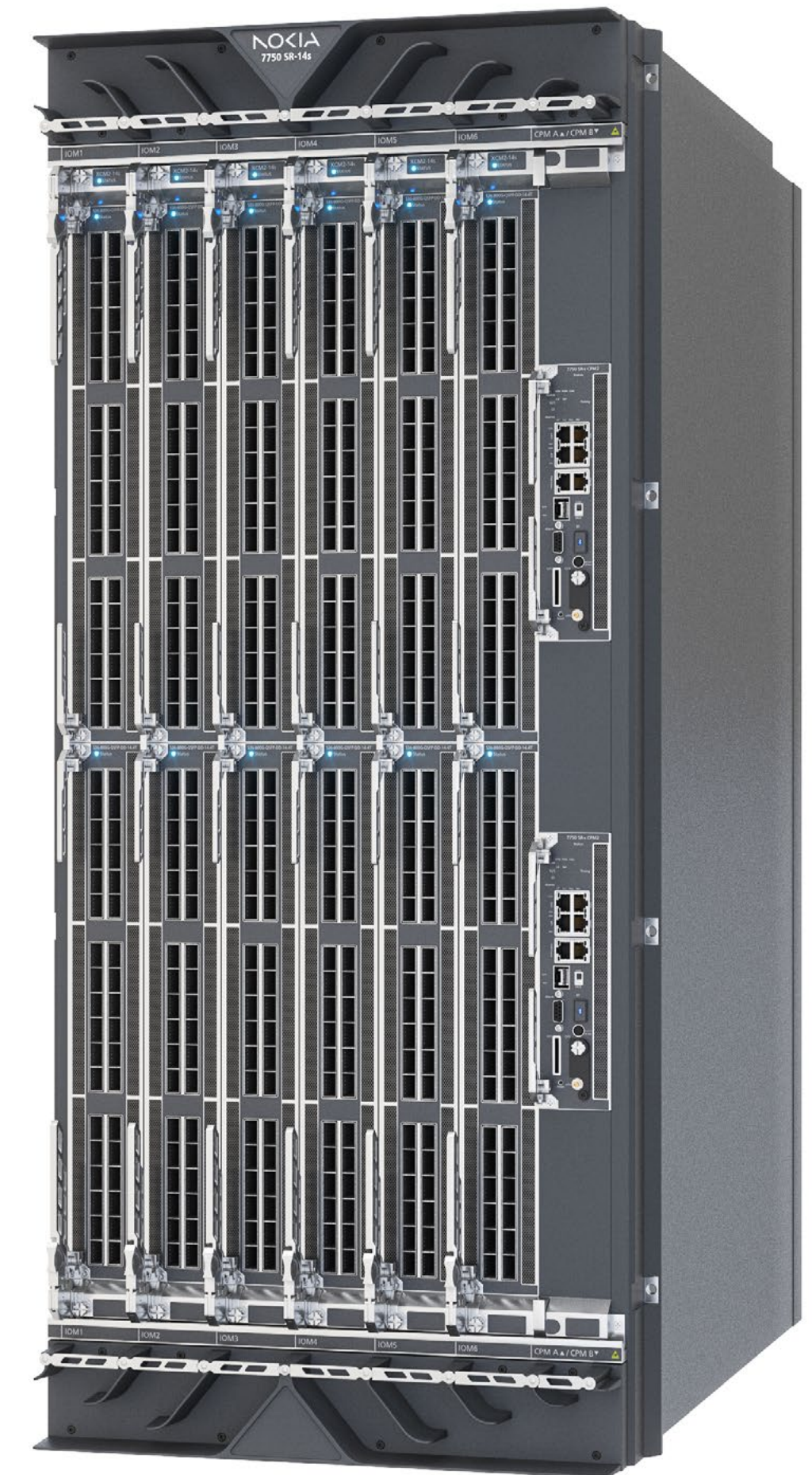Nokia 7750 SR-2se
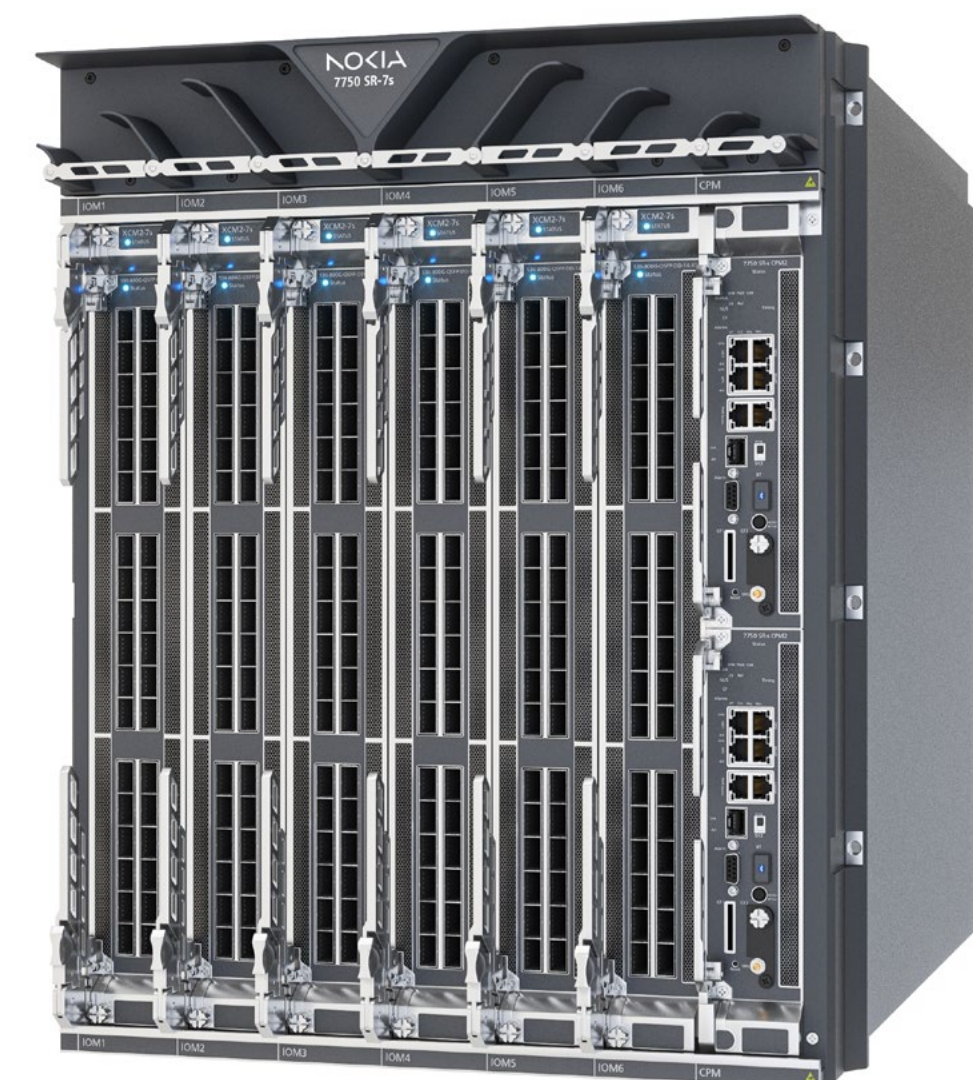
Nokia 7750 SR-7s

Nokia 7750 SR-14s

Master the unexpected with FP5

With FP5, we are confirming our commitment to innovative technologies that continue to ensure our customers have the right foundation for the future by placing their trust in us. This includes addressing the challenges we know — the need for scalable capacity and power efficiency to deliver more bandwidth more efficiently than ever before and the challenges we can't predict — by providing the flexible capability and integrated network security to deal with anything that may come their way.

Click here for more information
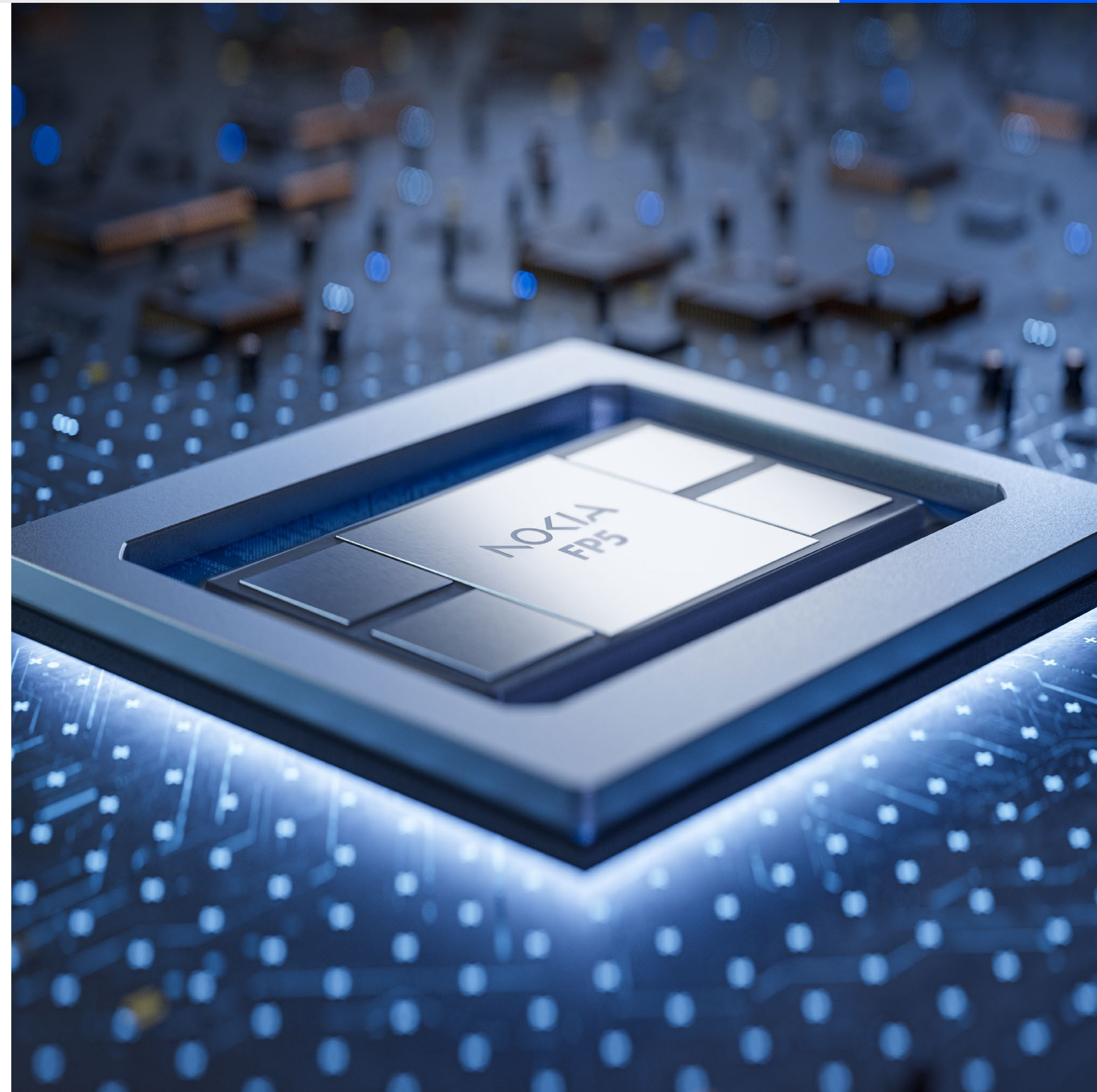
About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.