Achieving high performance at the edge with packet core appliances

NOKIA

Introduction

The edge computing landscape is rapidly evolving. Gartner predicts that by 2025, over 75% of enterprise data will be processed at the edge, unlocking a potential $1 trillion market opportunity. This shift presents both challenges and opportunities for communications service providers (CSPs).

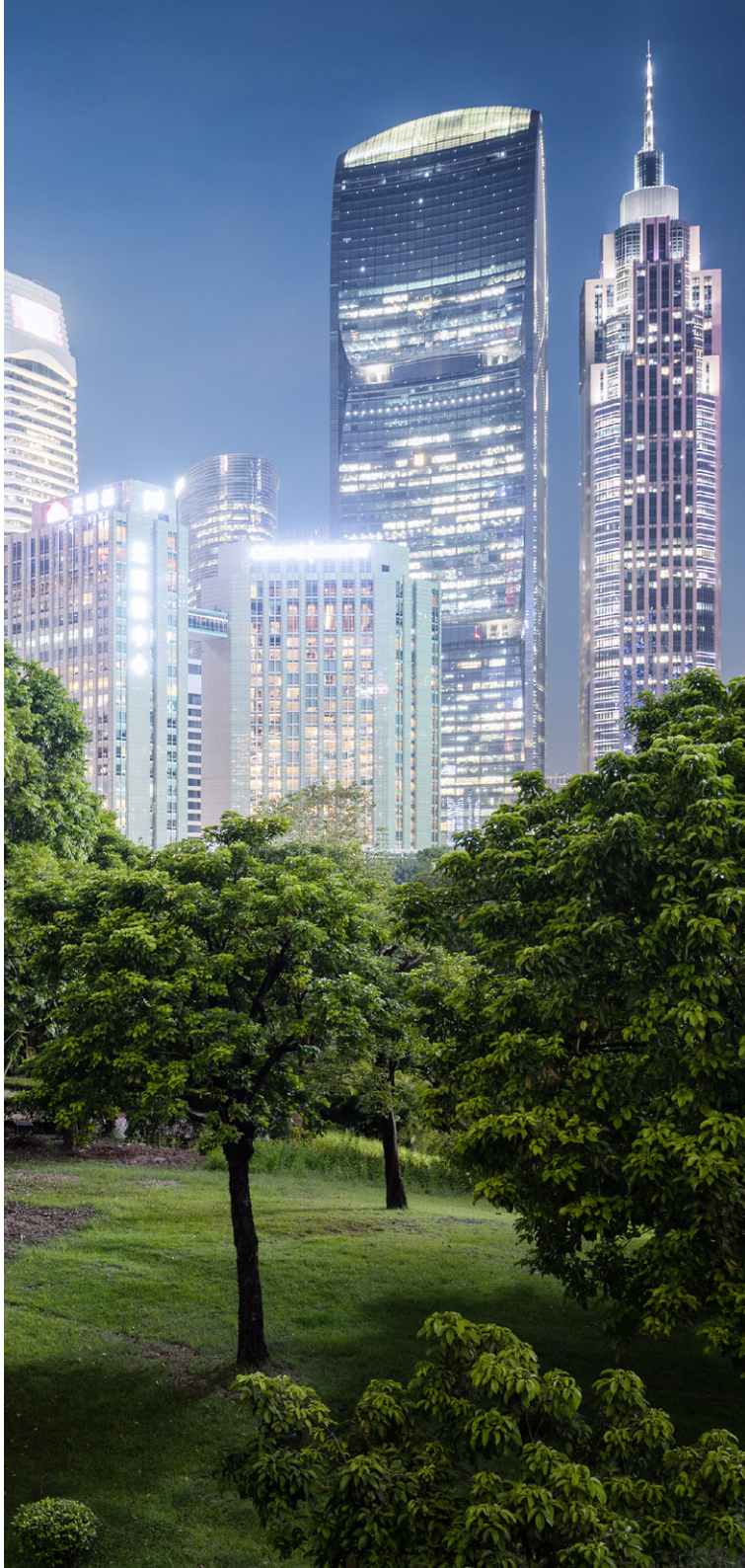
CSPs face the dual demands of high performance and high capacity to meet the expectations of their end users. While a centralized cloud solution can effectively serve a large metropolitan area, a flexible architecture with smaller, distributed units offers greater adaptability to cater to diverse demands across wider geographical regions.

Cloud infrastructures offer a multitude of benefits for telecommunications companies. One of the primary advantages is the increased efficiency. By using it, companies can distribute their workloads evenly across multiple servers, leading to optimized resource utilization and reduced risk of system overload.

This infrastructure also provides exceptional scalability. As the needs of the company grow, additional resources can be seamlessly integrated without the need for significant system overhauls. This scalability is not only beneficial for handling growth, but also for managing fluctuating demand, as resources can be scaled up or down as needed.

Furthermore, cloud infrastructures enhance reliability and resilience. By spreading the data and applications across multiple servers, the risk of downtime is significantly reduced. If one server fails, the workload can be quickly shifted to another, ensuring continuous service availability.

Lastly, this type of infrastructure promotes innovation. With the ability to quickly and easily scale resources, companies can experiment with new technologies and services without a large upfront investment. This can lead to the development of new, competitive offerings and a faster response to market changes.



The challenges

We learnt from our discussions with our customers that vast majority of them are facing a complex landscape where they need to optimize their networks to meet the growing demand for advanced services and applications. This includes reducing energy consumption, supporting MEC, URLLC, and the requirements of Industry 4.0 and 5.0. Let's break it down:

CSPs seek optimization: CSPs are constantly looking for ways to improve the performance of their networks, reduce their physical footprint (e.g., the size and complexity of their infrastructure), and simplify their operations. This is driven by the need to be more efficient, cost-effective, and agile in a rapidly evolving market.

Demand for mobile edge computing (MEC): MEC involves bringing computing resources closer to the edge of the network, near users and devices. This is crucial for applications that require low latency, such as real-time gaming, augmented reality, and autonomous vehicles.

Ultra-reliable low latency communications (URLLC): URLLC is a key feature of 5G that guarantees extremely low latency and high reliability. This is essential for mission-critical applications like industrial automation, remote surgery, and self-driving cars.

Industry 4.0 and 5.0 applications: These terms refer to the increasing digitization and automation of industries, driven by technologies like IoT, AI, and robotics. These applications require robust and reliable connectivity, as well as the ability to process vast amounts of data in real-time.

Energy savings: The increasing focus on sustainability and soaring electricity prices have made energy efficiency a critical factor for CSPs. As a result, they are demanding 5G Core software that minimizes energy consumption. And they are now, considering the projected CO_2 emissions of potential software solutions when making purchasing decisions.

Flexible architecture: CSPs needs to tailor their deployments based on specific requirements and optimize resource allocation.

The solution

Nokia is proposing the use of “appliances” as a solution for addressing the needs of CSPs. While not a new concept, Nokia believes this approach has been overlooked and is highly relevant for CSPs today. In the realm of software virtualization, an ‘appliance’ is a game-changing concept, pioneered by Nokia. It is a pre-packaged, self-contained unit of software, designed to be easily deployed on high-performance servers. This revolutionary approach brings several key benefits that we will discuss later on this article.

Key aspects of appliances:

Network disaggregation: refers to the separation of different network function components (primarily control-plane and user-plane), enabling capacity to be moved to the network edge, which provides greater network architecture flexibility, optimizes performance, improves overall efficiency, enhances scalability, ultimately allowing for more agile and cost-effective network deployments.

Agility: Appliances enable rapid deployment, allowing CSPs to quickly set up and launch new services, generating revenue faster.

Simplification: Through automation and operational efficiency, appliances streamline network management, further reducing complexity and improving overall efficiency.

Let me give more details about this:

Optimized deployment: Appliances can be efficiently installed on high-performance servers, maximizing their utility and reducing the need for multiple servers often required in traditional cloud environments.

Reduced infrastructure: The appliance model significantly decreases the number of servers needed, leading to cost savings and simplified management.

Custom deployment automation: Appliances can be tailored to automate deployment processes, enhancing efficiency and reducing the likelihood of human error. Nokia’s unique appliance design ensures consistent functionality across all deployment options, irrespective of the underlying hardware. This is achieved through our strategic collaborations with key chip makers, which enable us to optimize our software for their platforms. This level of optimization is a distinguishing feature of Nokia’s appliances, setting us apart in the software virtualization landscape.

What are the benefits?

The benefits and applications of appliances in technology, specifically in the control plane and user plane, can be summarized as:

Control plane and user plane appliances: These are critical components of any network infrastructure. The control plane is responsible for network management, including routing and signaling, while the user plane handles data traffic forwarding and routing.

Flexible capacity: Appliances in the control plane and user plane are designed to handle large volumes of data and high-speed connectivity. They are scalable and can be expanded to meet increasing data demands. This is especially important in the era of 5G and beyond, where data traffic is expected to grow exponentially. The appliance model offers a range of capacity options, allowing for scalability and adaptability to varying business needs.

Cost-effectiveness: By separating the control plane and user plane, network operators can optimize each plane's resources independently. This separation allows for more efficient use of resources, reducing overall costs.

Mobile edge computing (MEC): Appliances in the control plane and user plane play a key role in enabling MEC. MEC brings computation and data storage closer to the network edge, reducing latency and improving user experience.

Reduced latency: By distributing the user plane to the edge of the network, appliances minimize the distance data travels, resulting in faster response times and improved user experience.

Increased reliability: Edge distribution also enhances network resilience.

If one part of the network experiences an issue, other parts can continue operating smoothly.

Local service enablement: Appliances facilitate the deployment of localized services for businesses, allowing them to leverage the network's capabilities for specific needs.

Energy savings: Nokia's cloud packet core delivered significant energy consumption reduction through optimized hardware, software enhancements, and virtualization/cloud-native technologies. We push performance boundaries with next-generation chips and software innovations like AI/ML, while prioritizing energy efficiency to reduce carbon footprint and lower operational costs.

Examples

Let me give an example: FWA is a significant use case for 5G, and it's a concept that end users are already quite familiar with. On top of it, Nokia has added the ethernet functionality, creating the ethernet over 5G FWA, that enables enterprises to extend their VLANS from one point to another on an affordable, reliable and secure way. Enterprises require this service on remote areas, with low latency and high-capacity, what is the perfect use case for appliances.

Ultra-reliable low-latency communication (URLLC) services: URLLC is a key feature of 5G networks. Appliances in the control plane and user plane ensure reliable, low-latency communication, which is critical for applications such as autonomous driving, remote surgery, and industrial automation.

Another example is Industry 4.0 and 5.0 applications: These industrial revolutions are characterized by increased automation and data exchange in manufacturing technologies. Appliances in the control plane and user plane facilitate this data exchange, enabling advanced applications such as smart factories and internet of things (IoT). For example, video analytics for security and safety, autonomous vehicle driving and AI based monitoring are services that will demand extreme capacity and low latency that appliances can deliver.

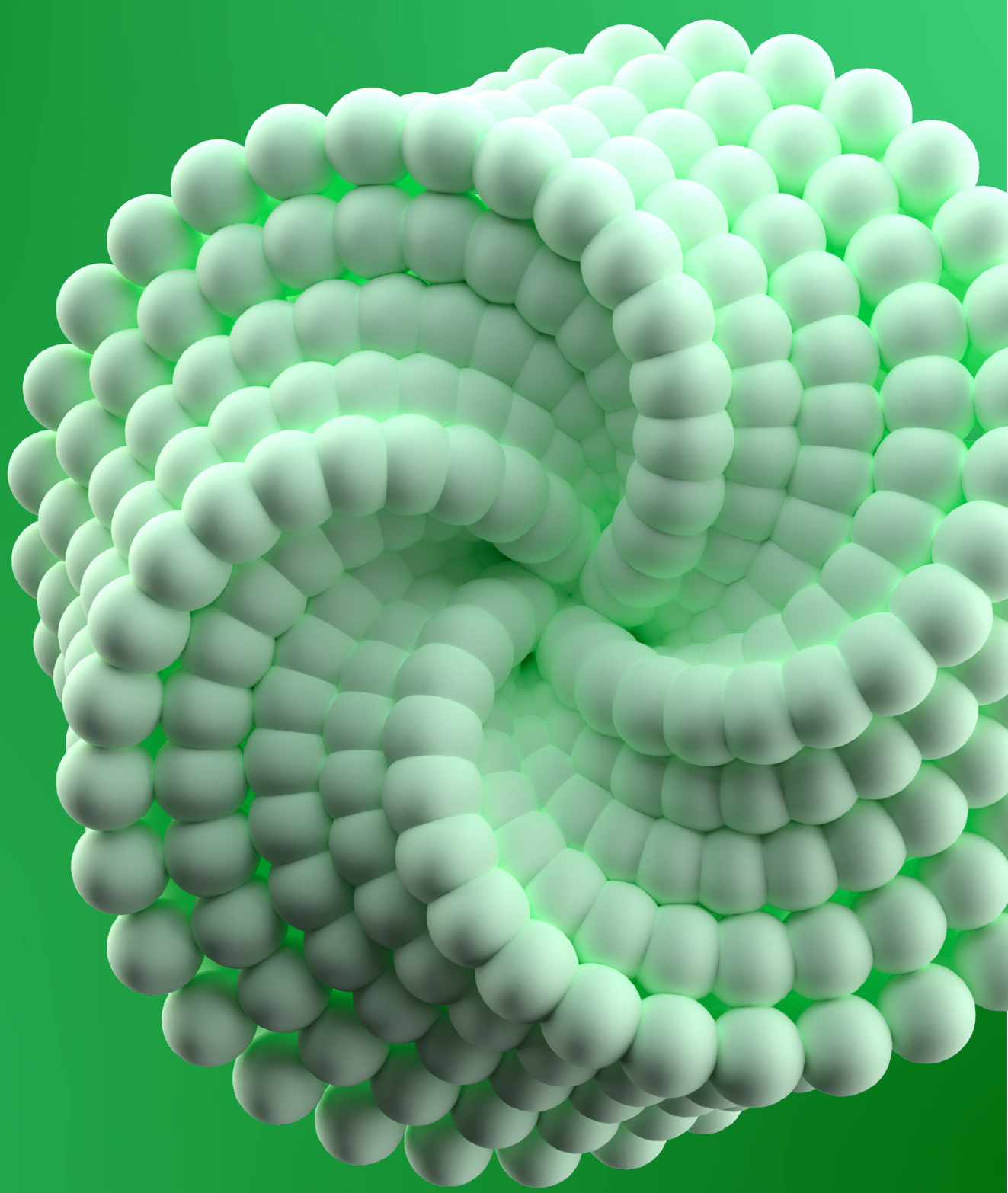
Conclusion

Strategic deployment of appliances can dramatically enhance network flexibility and performance, leading to optimized operations and reduced costs. Nokia's latest high-capacity variant boasts an impressive four-fold increase in capacity compared to its predecessor, all within the same compact 2-server footprint.

Our appliances, renowned for their high capacity and minimal footprint, offer a cost-effective solution with total cost of ownership (TCO) reductions of up to 40%, depending on network configurations, traffic patterns, and other factors. Designed to isolate user plane challenges from your cloud network operations, our appliances empower you to focus on driving your business forward.

We remain committed to anticipating future technological advancements, ensuring continued capacity expansion. As you navigate the evolving landscape of 5GSA, edge deployment, network slicing, fixed wireless access (FWA), and enterprise opportunities, we invite you to explore the capabilities of our Nokia appliance.

For more information visit our Cloud Packet Core website.



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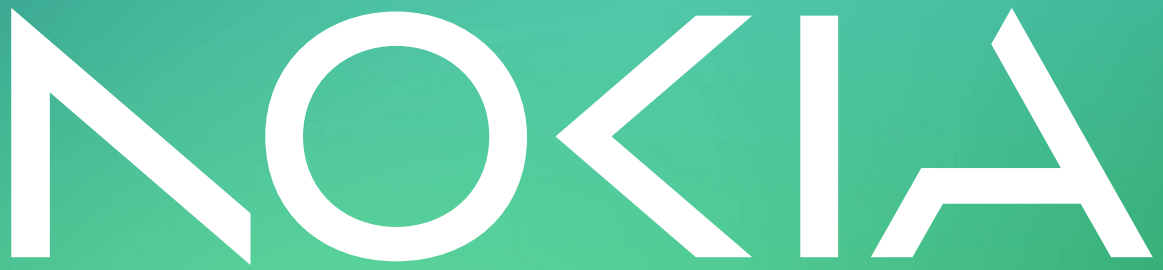

About Nokia

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.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. 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.