NOKIA | NLIX

Redefining DDoS security across Europe: A new era of resilience

NL-ix delivers automated, network-based DDoS protection, powered by Nokia Deepfield Defender

Overview

NL-ix, a leading pan-European internet exchange (IX) based in the Netherlands, deployed Nokia Deepfield Defender to establish itself as the largest IX-based anti-DDoS protection for enterprises across Europe.

By leveraging AI-driven big data analytics and driving mitigation by Deepfield Defender directly on Nokia FP5-based routers, NL-ix maintains low latency and reduces transport costs, transforming the security posture for itself and its customers.

This case study highlights Nokia Deepfield Defender's capability to empower new digital service providers to not only protect their own infrastructure but also to monetize security as a service, transforming a cost center into a potential revenue stream.

"This pioneering deployment aims for zero downtime for enterprises, providing security across their entire area of operations."

JAN HOOGENBOOM, CEO, NL-IX

NL-ix: Europe's interconnection powerhouse

NL-ix is a leading European internet exchange (IX)—also commonly referred to as internet exchange point (IXP)—that enables fast, direct and secure interconnection between networks across Europe and around the world.

Guided by its business-driven mantra—"if the opportunity exists, we'll deploy in any country"—NL-ix has extended its coverage and services across Europe. From its headquarters in Rotterdam, NL-ix operates one of the largest distributed IXs, spanning more than 100 data centers in 16 metro areas in 8 countries. It offers a comprehensive suite of services, including peering, private interconnects, cloud access and low-latency routing.

NL-ix serves a diverse customer base, from internet service providers (ISPs) and carriers to enterprises, content delivery networks (CDNs) and cloud providers. These customers rely on its infrastructure to optimize traffic flow, reduce latency and enhance resilience across Europe's digital backbone.

Notable clients of NL-ix include MainStreaming, a streaming platform that has expanded its capacity to 100G in Frankfurt, Germany, through NL-ix, ensuring seamless content delivery.

A brief history of NL-ix

NL-ix was established in 2002 with the aim of interconnecting major data centers in large urban hubs and extending internet exchange services to regional data centers.

This approach enabled small- and medium-sized businesses to access the NL-ix peering platform more easily and led to NL-ix's pioneering development of a distributed internet exchange point model.

Recognizing that customer needs extend beyond public peering, NL-ix expanded its service offerings to include transit and inter-data center transport services. NL-ix supports these capabilities with a resilient, low-latency network designed to facilitate Europe-wide data exchange and traffic transport.

Today, NL-ix offers a full suite of interconnection services in more than 100 data centers across Europe. The company continues to build on its two decades of expertise, and has introduced new offerings such as Elastic Interconnect and customized access to cloud and software-as-a-service (SaaS) solutions.

While NL-ix remains an internet exchange at its core, it distinguishes itself with a broader Western European footprint than any other IX in the market.

From national platform to Europe-wide interconnection leader

Over the past decade, NL-ix has undertaken a continuous transformation, evolving from a national interconnection provider into one of Europe's most innovative and efficient distributed business internet exchanges.

At the heart of this evolution is a reimagined network architecture, purpose-built to meet increasing performance, scale, efficiency and sustainability demands.

The transformation journey began with a bold rethinking of how internet exchanges should be structured.

NL-ix moved away from the legacy "all speeds, all services, all sites" model and adopted a smarter, more agile network design. Rather than trying to provide full service at every site, the company reorganized its infrastructure around three powerful core locations connected to a series of "right-sized" edge sites, each optimized for specific workloads and traffic profiles. This design minimized stranded resources and improved utilization across the board.

Next, NL-ix eliminated unnecessary complexities across network layers. To this end, NL-ix changed the proximity of its routers so they could be directly connected. This eliminated the need for the existing optical transmission network (OTN) and resulted in a significant reduction in power requirements.

The elimination of the OTN also removed the need to perform additional electrical-to-optical conversions and optical-to-electrical conversions between the optical and routing layers, which reduced power and space requirements even further.

How Nokia helped NL-ix evolve its network

To ensure future-proof performance and sustainability, NL-ix deployed advanced IP routing technology from Nokia, powered by the Nokia FP5 silicon.

The new Nokia routers enabled NL-ix to offer 800 GE access to its customers. Deployment of the 7750 Service Router—powered by the FP5 processor and offering 6 Tb/s of packet forwarding capacity—allowed NL-ix to scale its points of presence (POPs) and overall network in step with customer demand.

The FP5 processor's consumption of just 0.1 W per gigabit of IP throughput allowed NL-ix to significantly improve its power efficiency. As a result, NL-ix tripled its capacity without consuming more physical space or power.

After successfully deploying FP5-based router technology in its data center in Amsterdam and supporting more than 10 Tb/s of peak traffic in 2024, NL-ix rolled it out to all 100-plus data centers across its European footprint.

This massive expansion enabled NL-ix to offer ultra-high-capacity interconnection services across the continent and transform itself into a truly Europe-wide business internet exchange. The move also solidified the company's position as a green leader in the IXP space by significantly reducing power consumption in the upgraded segments of the network.

After this technological and structural transformation, NL-ix was well-positioned to serve demanding sectors such as finance, insurance and healthcare, along with other industries that have traditionally relied on closed private networks for security and performance.

With the Nokia IP network at its core, NL-ix was able to pass the benefits of much improved scale, performance and efficiency to its customers and offer them services based on the evolved, improved, ultra-fast and energy-efficient infrastructure.

For NL-ix, DDoS security is a forethought, not an afterthought

While relying on the robust FP5-powered IP infrastructure to keep pace with customer demand and traffic growth, NL-ix was looking to set new standards for what a next-generation internet exchange could be.

With the distributed denial of service (DDoS) threat landscape shifting towards more frequent, sophisticated and impactful attacks, NL-ix sought to refresh its cybersecurity approach to make its network more resilient and robust and improve its readiness to take on new security challenges.

Building on its reputation for customer-centric innovation, NL-ix wanted to go a step further and introduce security services that would protect its customers against modern cyber threats. NL-ix aimed to support these services by integrating advanced DDoS protection directly into its core infrastructure. This strategic move would mitigate the escalating risks that DDoS attacks pose to network stability and business operations.

How Nokia helped NL-ix strengthen DDoS security

NL-ix has traditionally functioned as a neutral intermediary that facilitates data exchange without intervening in traffic flows, whether legitimate or malicious. However, the surge in DDoS incidents has prompted a shift in this approach.

Nokia offers a secure-by-design approach to routers, where security is built-in, not bolted on. This approach appealed to NL-ix because it promised to help the company implement and enforce IP network-based security policies that would provide much improved protection for its network and customers.

To complete its vision for the next-generation anti-DDoS solution, NL-ix needed network-based intelligence that could drive these security policies. Fortunately, this functionality is provided by Nokia Deepfield Defender, a software application designed for real-time DDoS detection and mitigation.

After a successful trial, NL-ix deployed the Nokia DDoS security solution, comprising Deepfield Defender and Nokia IP routers. The solution enables real-time detection and mitigation of DDoS attacks directly within NL-ix's network fabric. It allows NL-ix to respond to threats without rerouting traffic through external scrubbing centers, thereby maintaining low latency and data privacy.

This approach supported NL-ix's "Beyond Peering" vision. Implementing network-based DDoS mitigation enhanced security and improved energy efficiency by reducing the need for additional hardware and processing power for security-related functions. This aligns with NL-ix's commitment to sustainable operations.

By embedding DDoS protection into its services, NL-ix aims to provide a more resilient and secure network environment for its clients, particularly enterprises that require robust safeguards against cyber threats. This development positions NL-ix as a comprehensive service provider that goes beyond traditional peering to offer more diverse and flexible interconnectivity services to its customers.

"The Nokia anti-DDoS solution saves me money as I perform mitigation directly on the edge router. I save on bandwidth and by not having to deal with additional layers of complexity. And security is built in."

DIRK KALKMAN, CHIEF NETWORK ARCHITECT, NL-IX

Minimizing the impact of DDoS attacks on customers

As NL-ix continues its transformation into one of Europe's leading enterprise-focused IXs, it has prioritized stronger cybersecurity measures, particularly in defending against DDoS attacks. Recognizing the increasing demand for secure and resilient connectivity, NL-ix has integrated advanced DDoS protection directly into its core infrastructure.

The Nokia DDoS security solution utilizes existing FP5 filtering capabilities in conjunction with router-based network telemetry to identify and block DDoS-related packet flows. Using Deepfield Defender to detect DDoS threats accurately and quickly and devise the optimal mitigation strategy helped NL-ix minimize disruption to the overall network.

A key strength of this approach lies in the solution's ability to reduce the customer impact of DDoS attacks. By accurately distinguishing malicious traffic from legitimate traffic and applying the filtering at the router level, the Nokia Deepfield anti-DDoS solution significantly lowers the risk of false positives, allowing NL-ix to avoid unnecessarily removing legitimate data.

The granularity and agility of network-based mitigation are particularly important in enterprise environments, where service expectations are considerably higher than in residential networks. For industries such as fintech, where traffic integrity and consistent performance are critical, the ability to mitigate DDoS threats without compromising legitimate operations is essential.

But NL-ix's security innovation doesn't stop there. NL-ix will integrate Deepfield's advanced analytics and security capabilities into its own portal, combining Deepfield-obtained network and DDoS security insights with its own network intelligence to provide customers with a unified dashboard for managing their entire service and experience.

Through an intuitive control interface, users can categorize traffic based on trust levels, directing it through specific routes or assigning different security policies as needed. This level of control allows for tailored protection while maintaining consistent performance.

These advancements have positioned NL-ix to serve a growing roster of high-profile clients, including major financial institutions. With this infrastructure in place, NL-ix aims to deliver secure, low-latency enterprise connectivity across Europe at scale.

"This is an anti-DDoS solution that you don't often see on a large scale. Instead of one super big European scrubbing station, we will bring DDoS security to our services across almost 100 locations within Europe. We think this will be the biggest deployment of an IX-based anti-DDoS solution globally - now and in the future."

KEVIN VAN HATTEM, PRODUCT MANAGER, NL-IX

NL-ix: A continued evolution and partnership with Nokia

Today, NL-IX takes pride in being one of the first IXPs to integrate DDoS protection directly into its service offering.

This milestone reflects a broader story of continuous innovation and a commitment to bringing the latest advancements in networking technology to customers.

A technological journey that began with a new generation of routing platforms powered by the Nokia FP5 chipset and an 800G-ready network to support scalable, sustainable growth was followed by the expansion of a diverse set of business services, now available more widely across Europe.

With this robust infrastructure in place, enhancing its network with DDoS protection was the natural and efficient next step for NL-ix.

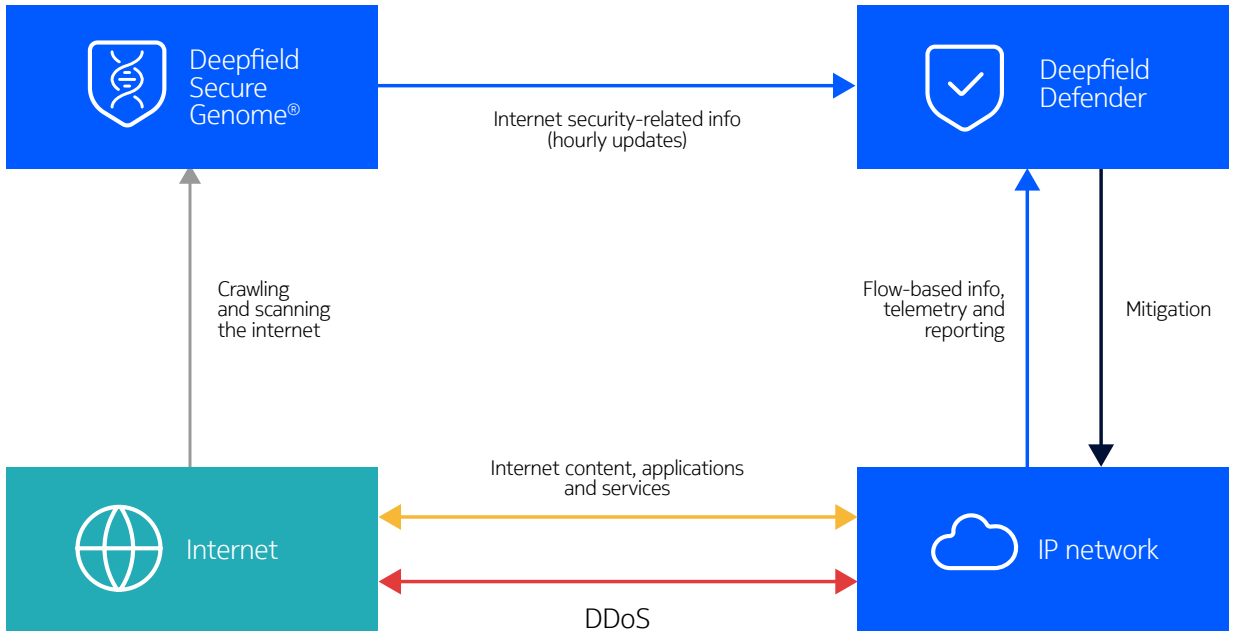
By leveraging Deepfield Defender and Deepfield Secure Genome®, NL-ix enables accurate, fast, large-scale DDoS detection and mitigation that is automated and built directly into the data plane.

Still, this story is not about technology for the sake of technology. It is about NL-ix following the latest technologies as it evolves its network, including the security aspect of networking, and passing the benefits on to its customers.

NL-ix’ s next-generation anti-DDoS solution

The Nokia DDoS security solution enables NL-ix to defend against DDoS attacks with unprecedented accuracy, speed, scale, efficiency and cost-effectiveness—directly at the network edge or in centralized deployments. The solution includes two main elements:

- Nokia Deepfield Defender, an AI-driven big data analytics software application that provides fast and accurate DDoS detection and facilitates agile mitigation of all types of DDoS attacks
- Nokia 7750 Service Routers, with built-in security capabilities that do not hinder routing performance.



Holistic, 360-degree DDoS protection with Deepfield Defender

Deepfield Defender combines network data (including telemetry, DNS and BGP) with the patented Nokia Deepfield Secure Genome, a cloud-based data feed that continuously tracks the security context of the internet.

Secure Genome has detailed visibility into more than five billion IPv4 and IPv6 addresses. It tracks more than 30 categories of internet traffic and applies more than 100 machine learning (ML) rules to automatically classify and precisely allocate applications and flows into security-related traffic types and categories. It “knows” the intricate security details of the internet, including prior attacks, insecure servers and compromised Internet of Things (IoT) devices that can be used for DDoS attacks.

Deepfield Defender correlates knowledge from Secure Genome with information obtained from the network to detect DDoS attacks faster and more accurately. It drives agile network-based mitigation using advanced IP routers such as Nokia FP4/FP5/FPcx-based IP routers or dedicated mitigation systems such as the Nokia 7750 Defender Mitigation System (DMS).

Using advanced artificial intelligence (AI) and ML algorithms, Deepfield Defender calculates the optimal mitigation strategy for a particular DDoS attack (or multiple concurrent attacks) in real time and instructs routers or the DMS to apply these filters and neutralize the attack.

Nokia uses Deepfield Defender as the foundation for its next-generation DDoS detection and mitigation solution.

Leveraging rich telemetry and the programmability of the IP network itself, Deepfield Defender offers significant advantages over legacy scrubber- or deep packet inspection (DPI)-based approaches. These include better scalability, more accurate DDoS detection with fewer false positives, and more efficient and rapid DDoS mitigation in the most cost-efficient manner.

With Deepfield Defender, NL-ix gets the holistic, 360-degree DDoS security it needs for cloud and AI applications.

Network-based mitigation with 7750 SR

The Nokia solution performs network-based mitigation using the 7750 SR family. Powered by the Nokia FP5 network processor, these routers deliver scalable, agile and granular DDoS mitigation on a large scale. They remove only DDoS traffic and minimize the effect of DDoS attacks on services and customers.

With the 7750 SR, NL-ix gets performance without compromise. It can scale mitigation to terabit levels while ensuring predictable IP routing and high performance.

Expert DDoS support by Deepfield ERTS

Deepfield Defender and the 7750 SR are complemented by the Deepfield Emergency Response Team Support (ERTS) service. Staffed by Nokia security experts, this 24/7 global support service further empowers NL-ix's network engineering and security operations teams to stop DDoS attacks.

Summary

Nokia Deepfield is more than an advanced network analytics and security solution; it is a foundational enhancement that transforms the IP network into an intelligent, resilient, and highly optimized asset. By correlating vast, multi-dimensional data sets with unique internet intelligence from its Cloud and Secure Genome feeds, Deepfield provides the deep, previously unattainable insights necessary to navigate the increasing complexities of today's digital landscape.

This comprehensive portfolio empowers organizations to drive sustained competitive advantage through several key avenues:

- **Ensuring uninterrupted services:** Deepfield Defender provides AI-driven, automated DDoS protection that scales to match any attack size. It neutralizes threats in seconds and safeguards business continuity and brand reputation. This capability directly protects revenue streams and minimizes the significant financial and operational overhead associated with cyberattacks.
- **Optimizing network performance:** Deepfield's holistic visibility and operational intelligence enable precise capacity planning, proactive troubleshooting, and efficient resource allocation. This leads to improved Quality of Experience (QoE) for end-users, reduced operational costs, and the ability to proactively manage network growth and performance.
- **Unlocking new value:** Beyond cost avoidance, Deepfield facilitates new revenue streams, notably through the enablement of DDoS Protection as a Service (DDoS-aaS, or DaaS) for service providers. It also enhances customer satisfaction and retention by ensuring superior service delivery, directly impacting market share and long-term growth.

The software-based, no-DPI architecture and petabyte-scale capabilities of Deepfield ensure that it remains a cost-effective, scalable, and relevant solution for the evolving demands of 5G, IoT, and increasingly encrypted web traffic. This architectural advantage provides long-term cost savings, agility, and risk mitigation against technological obsolescence, securing investments in IP infrastructure for the future.

For executive leaders, investing in Nokia Deepfield is not merely a technical upgrade but a strategic imperative. It is the intelligence layer required to transform IP networks into active, sensing entities that can "sense, think and act". This enables organizations to secure critical infrastructure, enhance operational efficiency, and capture new market opportunities in an increasingly inter-connected and threat-laden world, positioning them for sustained success and resilience.

Find out more

Visit our website to learn more about how our 7750 SR family, Deepfield Defender and support services can help you keep pace with growing capacity demand and defend your network and your customers against DDoS attacks with unprecedented scale, effectiveness and cost-efficiency.

Stop DDoS traffic before it affects your customers and services.

- Deepfield Defender
- 7750 Service Router
- FP technology
- Deepfield Emergency Response Team Support Service

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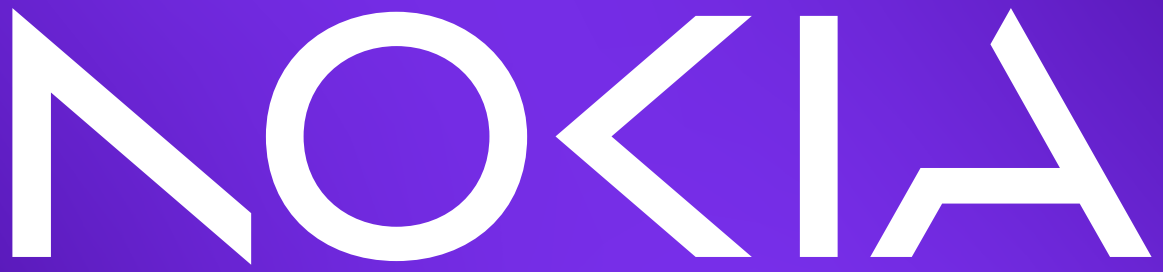

About Nokia

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.