NOKIA

The Nokia WaveSuite automation environment

Automating optical networks with innovative business and network insights

Application note

NOKIA

Abstract

To stay competitive, optical network operators need to lower CAPEX and OPEX while enabling new service innovation, accelerating service deployment and improving the customer experience. This application note explains how the Nokia WaveSuite automation environment helps optical network operators achieve these goals.

NOKIA

Contents

NOKIA

Introduction

Many businesses are becoming increasingly reliant on optical networks for their success. Several factors are driving this growing dependence, including the need for higher network capacity, lower service latency, network slicing capabilities, bigger data centers, more wholesale network capacity, and enhanced IoT and 5G service offers.

To stay competitive, these businesses are looking to turn their optical networks into CAPEX- and OPEX-friendly platforms that can create value by enabling new service innovation, accelerating service deployment and improving the customer experience. But as networks become more complex and budgets shrink, it's becoming more difficult for businesses to get additional value from the network in isolation.

Nokia is addressing this challenge with a use case-automation approach to optical networking. This approach combines unique optical network service delivery insights, advanced network telemetry and machine learning-based automation to support programmable actions that meet business, service and network operation needs.

Together with professional services that enable rapid automation, this approach enables optical network operators to build a smart, scalable, automated and secure optical network foundation that can create more value and lower total cost of ownership (TCO).

Building an optical foundation for business success

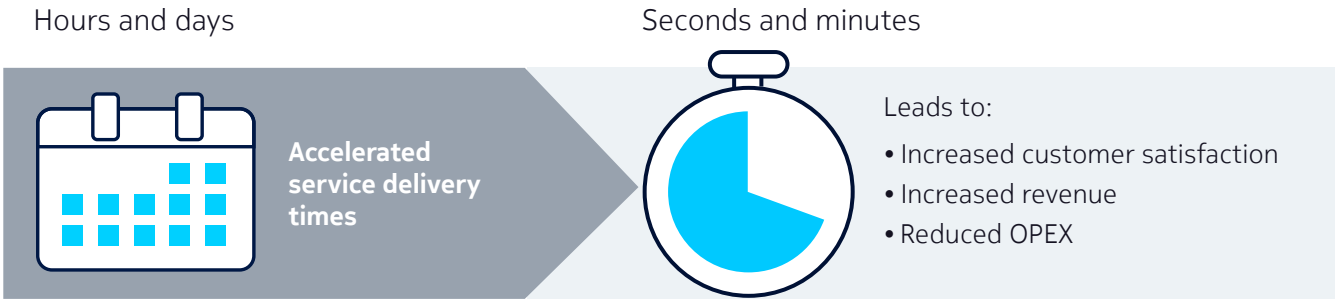
A successful network can provide the foundation for lowering operational costs and generating new revenue to help fuel innovation for future growth. To create this foundation, optical network operators need:

- Business insight that will help them streamline the optical service life cycle and create a differentiated customer experience
- Network insight that will enable them to use machine learning-based automation to make network optimization simpler, streamline operations and predict network-impacting failures
- The ability to link network and business insights so they can keep customers throughout the optical service value chain informed of service-impacting network events and their resolution
- Modern, open applications to efficiently plan, manage, control, monetize and automate optical networks
- The ability to rapidly deploy automation with standards-based interfaces and workflows to easily integrate multi-layer and multi-domain applications within their IT platforms.

Addressing new customer expectations

Many optical network operators support internal and external customers. Increasingly, external customers expect network connectivity services to be as consumable and instrumented as cloud services. They want to accelerate the delivery and activation of service-supporting equipment and get improved notifications and tracking for service-related issues (see Figure 1). Internal customers want to streamline the consumption, delivery and instrumentation of their partition, or slice, of the optical network.

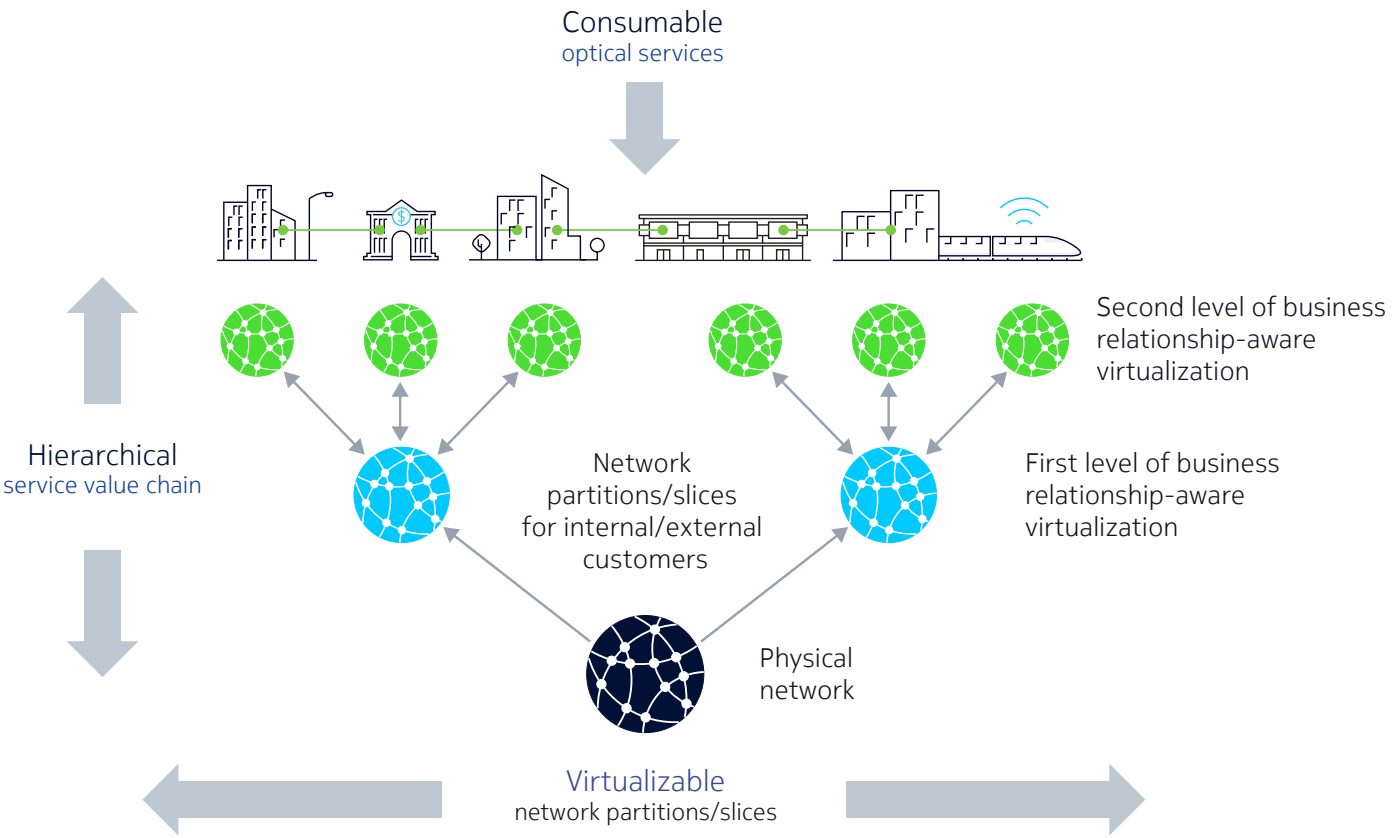
Figure 1. Optical services must become as consumable as cloud services



Service life cycle automation is key to business success

Customers of both types may also want the ability to deliver the same consumption, delivery and instrumentation capabilities to their customers in cases where optical connectivity is passed up a hierarchical service value chain (see Figure 2).

Figure 2. Hierarchical optical service value chain



NOKIA

Meeting new network performance demands

To build a successful services business, optical network operators need a programable, high-performance, scalable and secure network that keeps TCO low. High-performance networks:

- Are easy to manage and control
- Are simple to design for improved scalability
- Maximize network capacity
- Support network synchronization as a service
- Minimize latency
- Detect network issues proactively before they impact service-level agreements.

When failures do occur, high-performance networks are faster to repair, and they keep customers throughout the optical service value chain up to date on service status.

The Nokia WaveSuite automation environment

The Nokia WaveSuite automation environment delivers solutions to help give network operators the control they need to turn their networks into open, consumable platforms that create value through automation. This automation simplifies network design, optimizes network performance, streamlines operations, and accelerates network monetization and service deployment.

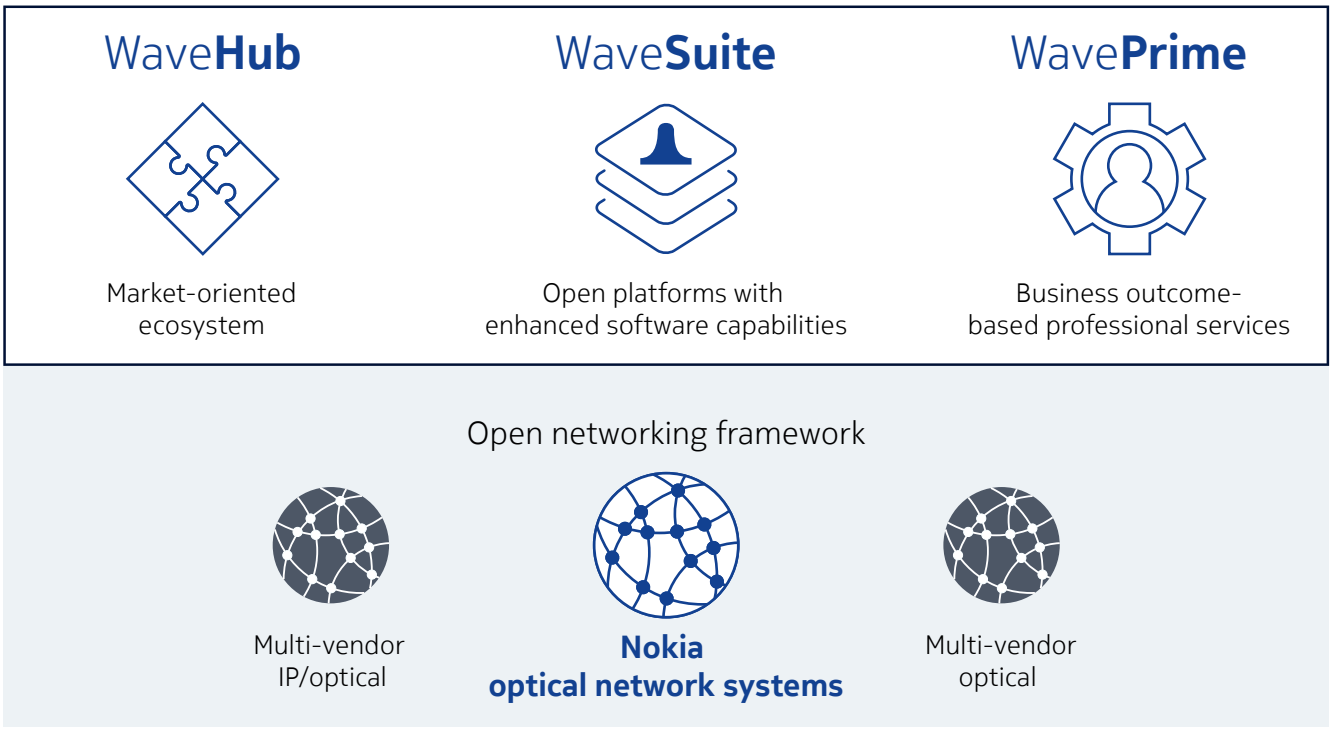
The results are lower TCO, improved ROI and streamlined delivery of differentiated revenue-generating services.

Nokia supports these solutions with four key initiatives:

- Our optical network systems, a portfolio of high-performance, application-optimized equipment that provides the network scalability and programmability that network operators need to keep up with growing bandwidth and service demands.
- WaveSuite, a set of open applications that help operators get more value and efficiency from the network. These applications enable rapid network monetization and enhance the customer experience throughout the optical service value chain. They can also help optical network operators use automation to design, operate, scale, optimize and control their networks to minimize network TCO.
- WaveHub, a market-oriented ecosystem program that enables operators to collaborate with a global community of partners to accelerate new network value creation and minimize network TCO. The ecosystem is supported by a remotely accessible lab environment that accelerates the deployment of automation.
- WavePrime, a professional services offer designed to help all optical network operators create intent-based optical networks and achieve their automation business goals.

Figure 3 shows the Nokia WaveSuite automation environment.

Figure 3. Nokia WaveSuite automation environment

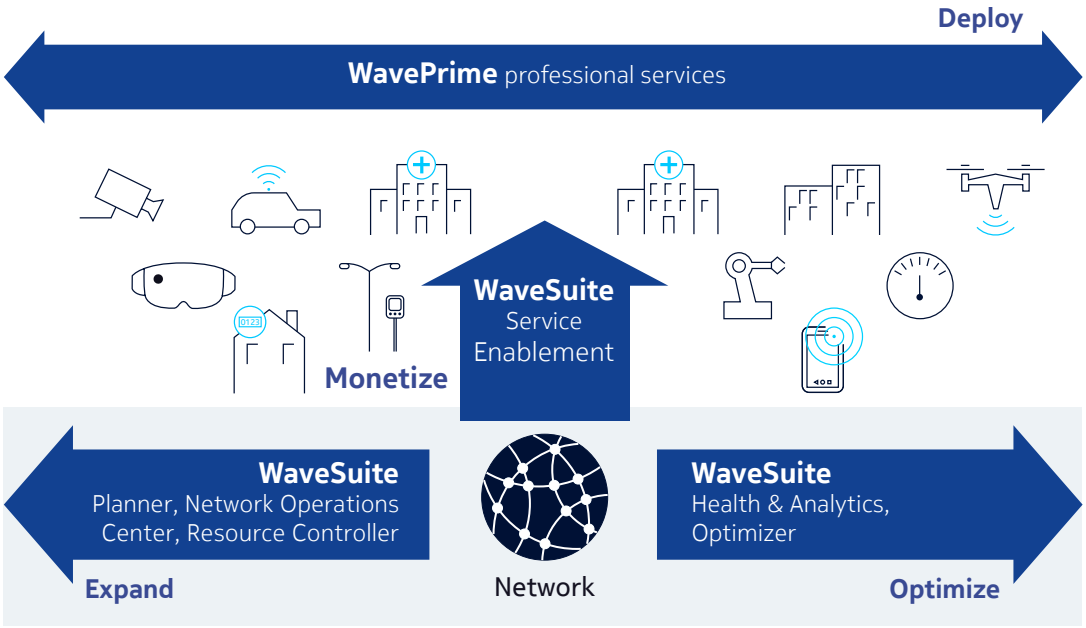


A key component to this offer is a cloud-hosted, remotely-accessible network digital twin service. With digital twins, network operators can create virtual replicas of existing or planned physical networks. This capability provides a risk-free environment in which they can experiment with changes such as new business process automation before implementing the changes in the production network.

WavePrime can also customize application interfaces and workflows to easily integrate with multi-layer and multi-domain environments.

Together, these initiatives enable network operators to support new approaches that further improve business outcomes and rapidly deploy automation for network expansion, optimization and monetization (see Figure 4).

Figure 4. Automation solutions to expand, optimize and monetize the optical network



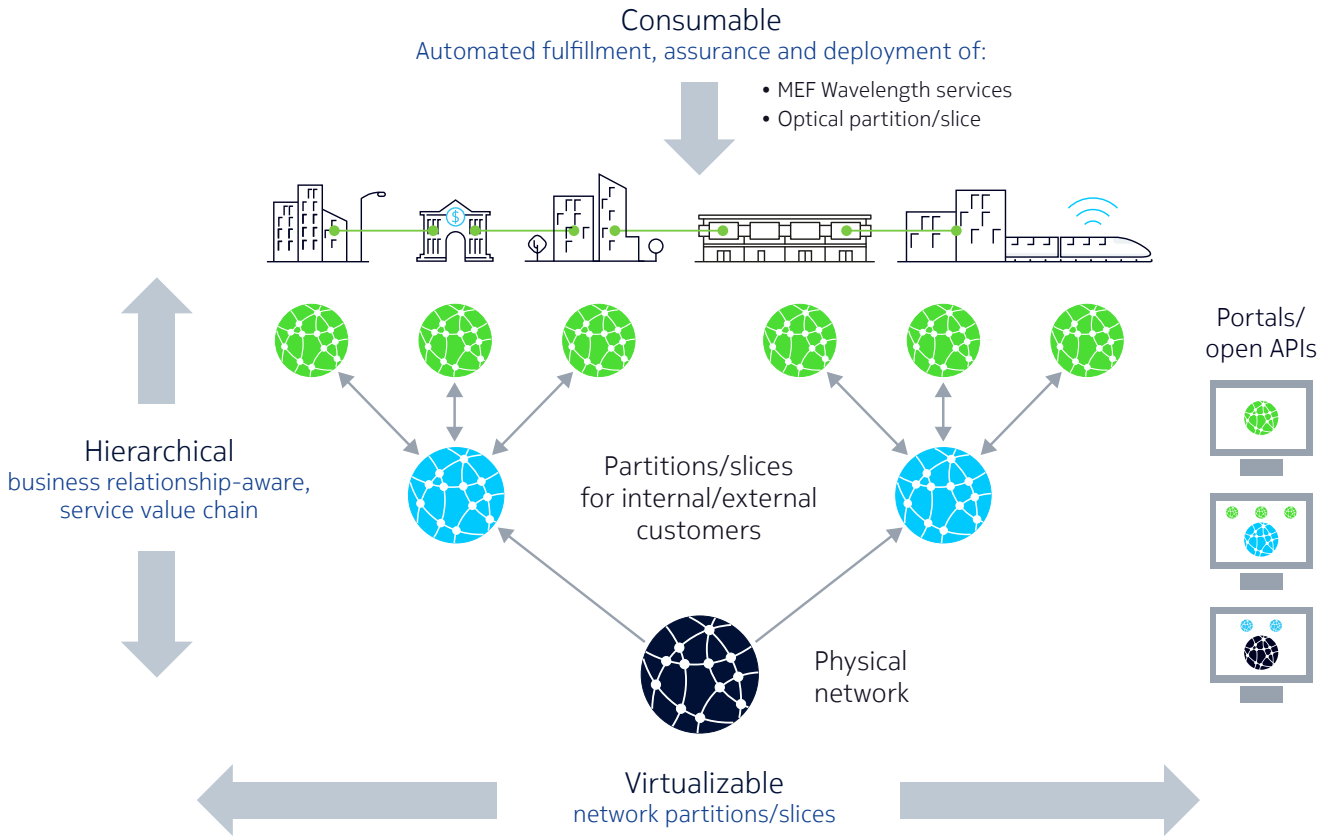
A model that understands the optical service value chain

A foundational component of the Nokia automation environment is a patented B2B2X (business-to-business-to-any) software model that understands the business of delivering and selling optical services. The model covers the hierarchical optical service business value chain that extends from the physical network operator to its customers and its customers' customers.

For example, a physical network operator can use software modeled around this hierarchy to quickly advertise and distribute capacity to internal business units and/or external partners. These entities can then quickly distribute this capacity to regional sales forces to monetize it.

This hierarchical model is a foundational pillar of the WaveSuite applications, which enable optical service automation, deployment and troubleshooting. Together, these open applications enable use cases that facilitate new service innovation, service life cycle automation and service differentiation throughout the optical service value chain (see Figure 5).

Figure 5. Nokia WaveSuite: An insightful optical services value chain model



WaveSuite: Automation that creates value for operators and customers

By leveraging this hierarchical valve chain model, the Nokia WaveSuite Service Enablement (WS-SE) application provides the tools that optical network operators need to improve service monetization, instrumentation and quality of experience for internal and external customers as well as their respective customers.

Automated service monetization

WaveSuite Service Enablement helps optical network operators increase revenue without making a large CAPEX and OPEX investment. This open application enables operators to create more consumable networks that support more customers and new go-to-market channels. WS-SE expands revenue potential by using the hierarchical value chain model to virtualize the network and support new services and business partnerships.

For example, a physical network operator could sell a virtual slice of its network to a partner. When the partner sells services to its customers, the physical network operator receives revenue without needing to be involved in the partner's business transactions.

WS-SE and associated hierarchical, tenant-based web portals help streamline the sale of optical services by supporting all aspects of the optical service life cycle throughout the business hierarchy.

Machine learning and network automation

The Nokia WaveSuite Health and Analytics (WS-HA) application and data lake environment help optical network operators accelerate the use of machine learning to automate their networks . Operators can use the capabilities of the data lake environment to securely gather network data and explore new ways to apply machine learning to a broad range of optical networking topics. Data related to network topology, analog and digital KPIs, environment telemetry and other WaveSuite applications is used to create a comprehensive data lake from which machine learning models can learn.

An advanced Nokia optical network systems streaming telemetry implementation reduces the bandwidth required to support data capture so that existing network management functions are not impacted.

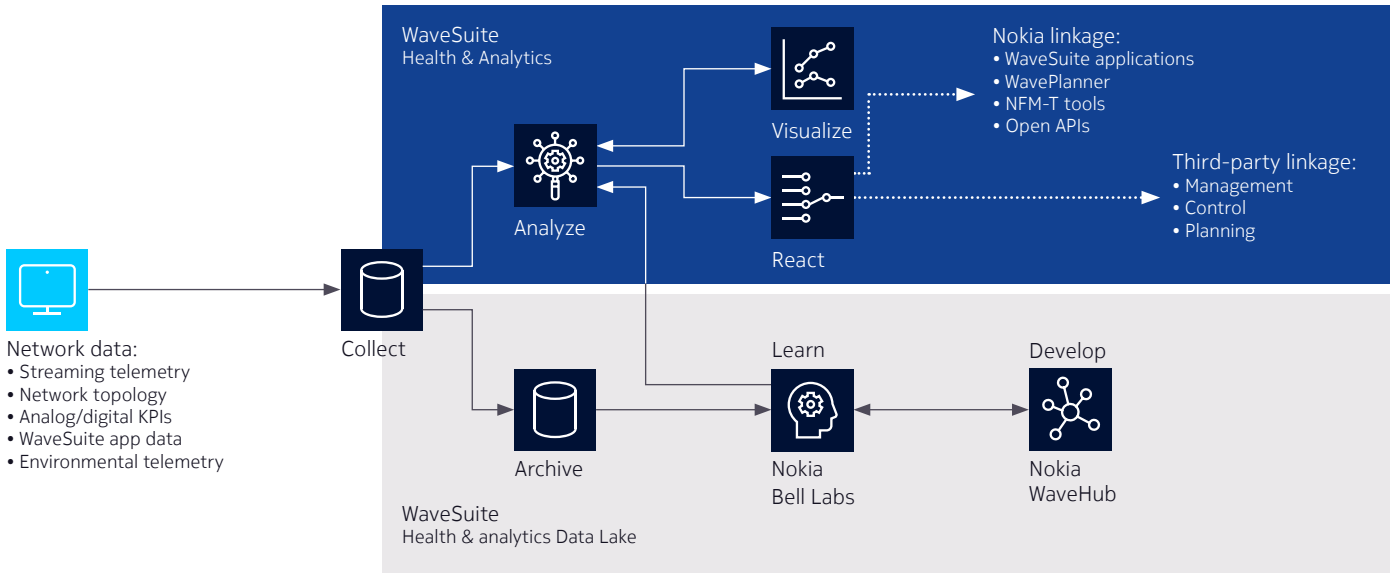
Operators can also consult with experts from Nokia Bell Labs, who can help match algorithms with data to maximize the accuracy of machine learning prediction, classification and detection.

The WS-HA application wraps machine learnings in a user-friendly, open wrapper to facilitate their deployment and operation. To support the creation of workflow automation, including closed-loop operation, interfaces to the following products can be used to trigger desired outcomes:

- Other Nokia WaveSuite applications, including the Nokia WaveSuite Planner and Optimizer applications, which enable rapid network expansion to support services
- The Nokia Network Services Platform (NSP), which provides IP/optical multi-layer, cross-domain and end-to-end coordinated management of IP routing and optical transport assets
- Third-party software.

Figure 6 shows the WaveSuite tools.

Figure 6. WaveSuite tools to collect, visualize, analyze and react to data with in-depth network insight



Automation for network design, operations and control

The Nokia WaveSuite applications for optical network design, operations and control help optical network operators respond quickly to fast-changing optical network demands, simplify their network management, get the most from optical network resources, and ensure maximum service performance and availability.

The applications build on an open, modular advanced and proven Nokia network management and control software base to reduce the risk of migrating to open software defined networks (SDNs) and automation.

These applications answer the need for more responsive, efficient and reliable networks with:

- An open, programmable management platform that enables your engineers and developers to automate network operations and ease integration with orchestrators and operations support systems (OSS)
- Resource control capabilities that let your network engineering and operations teams visualize network topology, monetize network synchronization, enable multi-vendor initiatives, control the network, and discover optimal services paths in the network optimize traffic in real time
- A complete suite of ready-to-use applications that help your network operations teams cover automation use cases for network management, optimization, capacity reservation and calendaring, equipment integration, provisioning and planning.

WaveHub: An ecosystem program that accelerates automation and innovation

To survive and thrive, optical network operators need continuous innovation that will enable them to extract more value from the network and lower operating costs. Nokia WaveHub is a market-oriented ecosystem program that brings network operators together with hardware and software vendors, research institutions, system integrators and other innovators to develop new ways to create value. WaveHub also provides a pre-configured network simulation lab environment to help realize value creation.

This global program is designed to:

- Accelerate business growth
- Help members become more successful by leveraging innovations from a diverse ecosystem
- Remove barriers to collaboration to make innovating easier.

Nokia manages WaveHub using the Nokia Open Ecosystem Platform (OpEN), a purpose-built collaboration environment. WaveHub encourages an agile, mock-up driven, iterative, fail-fast experimentation process. It also supports traditional and DevOps delivery models.

Virtual lab environment

WaveHub Labs provides an alternative to in-house development labs. It focuses on reducing time to revenue by helping network operators reduce cost and complexity while enabling more rapid integration testing and solution development.

Developer portal

The WaveHub Developer Portal is a cloud-hosted environment that Nokia customers and partners can use to facilitate and accelerate the creation of new solutions. It includes resources such as a catalog of ready-to-go, on-demand virtual labs, information about Nokia APIs, and use cases.

Innovation marketplace

The WaveHub Innovation Marketplace is a digital storefront for solutions created through the WaveHub ecosystem. It enables new value chains and go-to-market opportunities.

WavePrime: Professional services that enable rapid automation

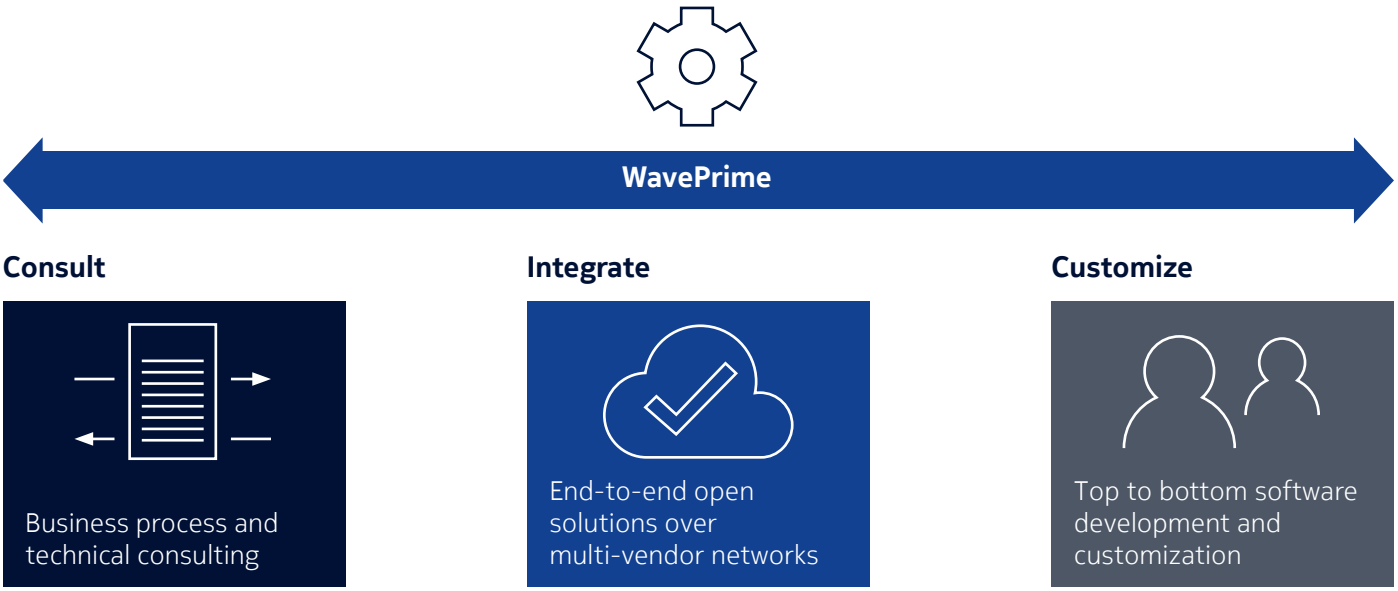
The Nokia WavePrime professional services team provides expertise, tool sets and best practices to help network operators build insight-driven communications networks that protect and grow their businesses.

With WavePrime, operators can access a wide range of services that help them accelerate automation and extract maximum tactical and strategic value from their optical networks. These services include:

- Network modernization and transformation services
- Network operations, administration, maintenance and provisioning (OAM&P) and SDN controller systems integration of optical products and northbound OSS/BSS software
- Network consultation and design
- Business process automation and closed-loop workflow optimization
- Network data intelligence extraction and reporting.

WavePrime services enable operators to turn their networks into secure, efficient and resilient infrastructures with open interfaces and multivendor support. The services use a business outcome-focused methodology to ensure success (see Figure 7).

Figure 7. WavePrime: Accelerating automation deployment for business success



Optimizing performance with digital twins

The WavePrime services team can create a digital twin of an operator's current or planned physical network in a secure private cloud environment. This digital twin allows the operator to simulate and benchmark a comprehensive set of business process activities in a virtual environment. The operator can use the insights gained from these simulations to optimize its physical production network.

Activities that can be efficiently carried out in the digital twin environment include:

- Business and network modeling
- Design and integration
- Training
- Testing and homologation
- Assessments and audits
- Simulation and what-if analysis
- Disaster recovery
- Application development.

A complete network services portfolio

In addition to WavePrime professional services, Nokia offers a comprehensive suite of network life cycle services that features:

- Maintenance and care services, including troubleshooting, repair or exchange, and issue resolution
- Learning services, including training and certification for our IP and optical products and solutions
- Deployment services, including site selection, installation, commissioning and decommissioning.

Summary

A successful network provides its operator with a foundation for lowering operating costs and generating new revenue to fuel innovation for future growth. The Nokia WaveSuite automation environment helps optical network operators achieve this success with our industry-leading innovation and portfolio, open applications that monetize the network, and machine learning-driven automation that lowers network TCO. In addition, our global ecosystem program brings diverse innovators together to create value, and our professional services fuel new automation innovation.

Learn more

To learn more about how Nokia WaveSuite applications can help you get new value from optical networks, visit our WaveSuite web page.

Abbreviations

BSS	business support systems
CAPEX	capital expenditures
KPI	key performance indicator
IoT	Internet of Things
OPEX	operating expenditures
OSS	operations support systems
OTDR	Optical Time Domain Reflectometer
ROI	return on investment
SDN	software defined network/software defined networking
TCO	total cost of ownership

About Nokia

We create the critical networks and technologies to bring together the world's intelligence, across businesses, cities, supply chains and societies.

With our commitment to innovation and technology leadership, driven by the award-winning Nokia Bell Labs, we deliver networks at the limits of science across mobile, infrastructure, cloud, and enabling technologies.

Adhering to the highest standards of integrity and security, we help build the capabilities we need for a more productive, sustainable and inclusive world.

For our latest updates, please visit us online www.nokia.com and follow us on Twitter @nokia.

Nokia OYJ
Karakaari 7
02610 Espoo
Finland
Tel. +358 (0) 10 44 88 000

Document code: 210414 (June) CID207130