IP-optical network automation use case catalog

Reduce risk and speed up implementation with prepackaged software and services

Thank you for your interest in our network automation use cases

If you're looking to accelerate the automation of your network but don't have the resources to do it in the timeframes you need, our catalog of use cases can help.

Read this ebook to discover our prepackaged automation use cases, along with examples we have delivered throughout the world.

Network automation has become a top operator initiative

Today's competitive environment demands that you get maximum value from your network. But networks are becoming more complex, which makes it tougher to reduce operating costs and increase agility.

Automation helps you create a new kind of network that is more responsive, efficient and reliable – and simpler to operate. Technologies such as model-driven mediation, intent-based networking and baseline analytics enable multivendor networks to self-configure, optimize their performance in real time and recover from failure events.

What you get with automation

Operational efficiency

Reduce the cost of repetitive tasks and make complex operations simple.

Agility

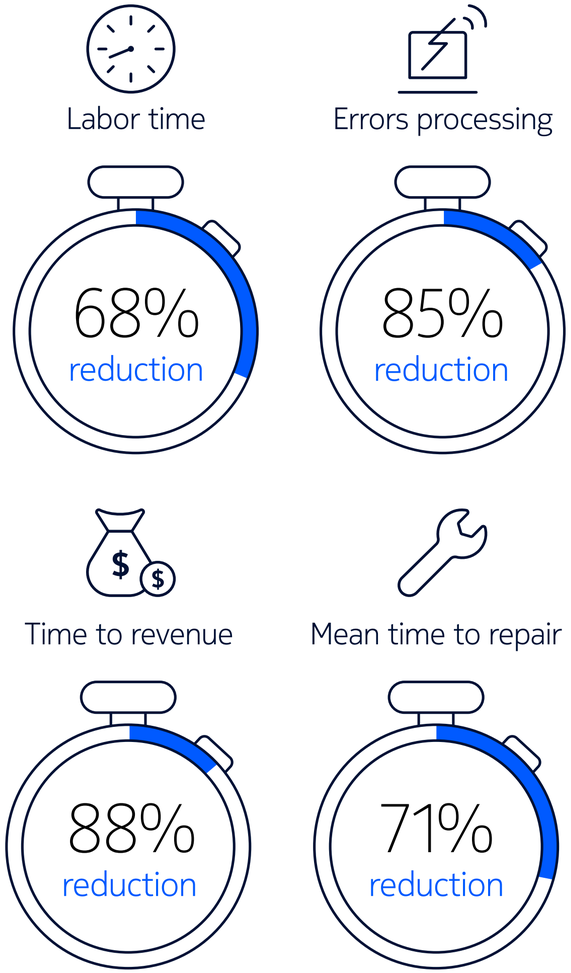
Rapidly deploy network updates and respond faster to changing demands.

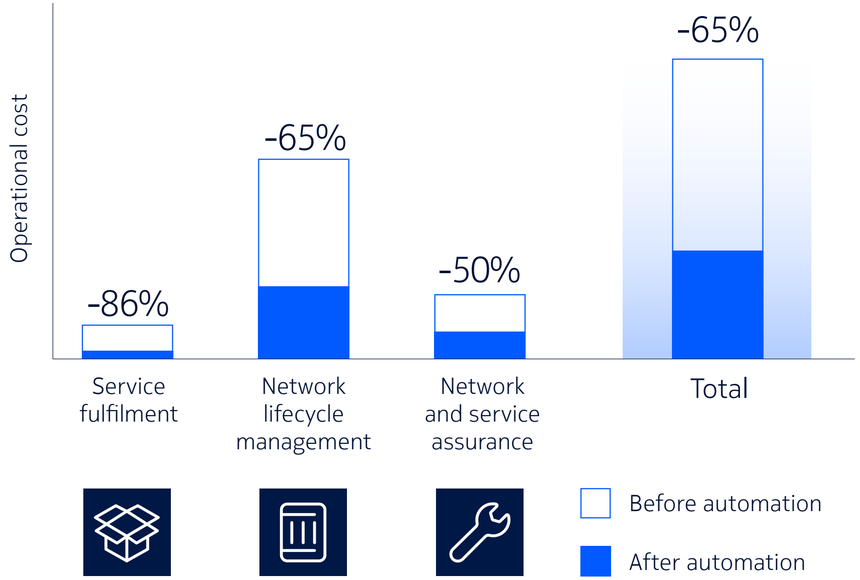
Quality

Reduce human errors and system outages and deliver consistent, predictable outcomes.

The quantitative benefits of IP network automation

Quantitative benefits from network automation in the areas of service fulfilment, network lifecycle management, and network and service assurance have been estimated for an operator providing IP services.





Source: Analysys Mason, Operator benefits from the automation of IP networks

No one said automating was easy

Automation is not about purchasing a **tool,** it's about delivering a **project**

Automation is meant to reduce network complexity. But it can be difficult to implement.

Choosing the right automation tool is an essential first step. But it's just as important to have skills that will help you integrate the tool into your network environment and use it efficiently and effectively. These skills are rare and expensive to acquire.

Project management is also critical to a successful automation journey. You need a thorough plan that provides answers to critical questions right from the beginning:

- Where should we start?
- How much will it cost?
- How long will it take?

Make automation deployment predictable

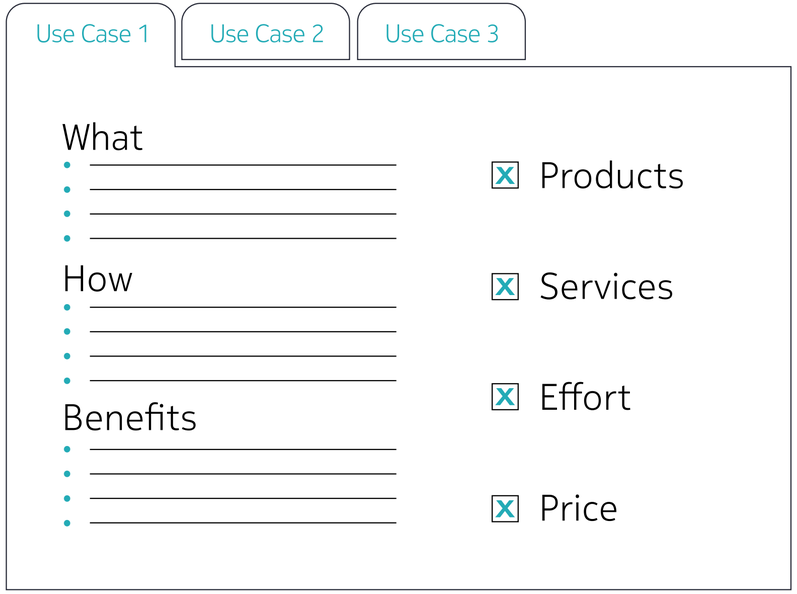
We have built a collection of predefined use cases that will help you quickly introduce a broad set of automation functions into your IP-optical network.

The collection covers all aspects of the network services lifecycle: equipment configuration, service fulfillment, network assurance and traffic optimization.

Our proven use cases reduce risk, speed up implementation and ensure predictable results.

Before you start with one of our use cases, you'll know:

- How it works
- What benefits it brings
- What product features and services it requires
- How long it will take to implement
- How much it will cost



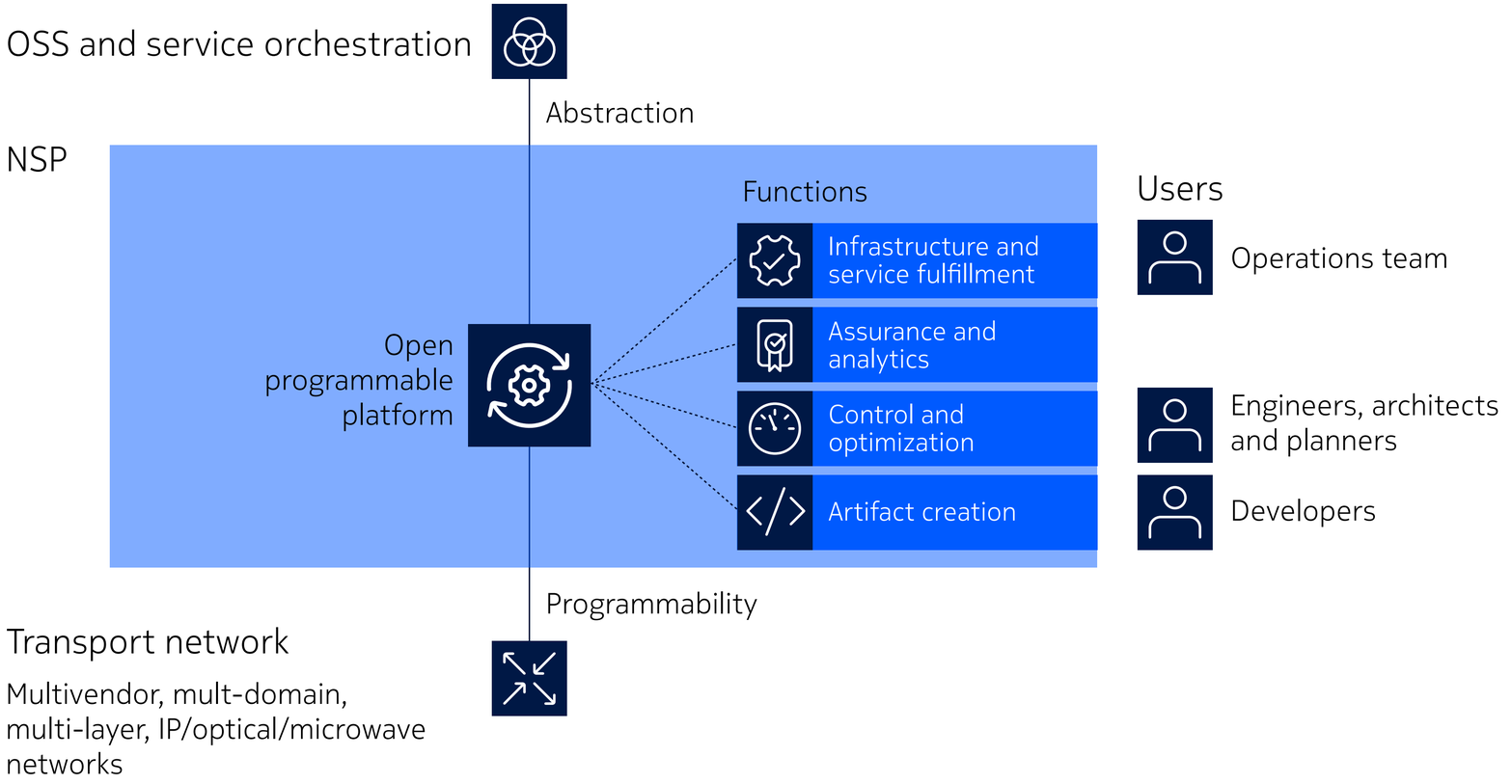
The Network Services Platform (NSP) is our toolbox

Our use cases leverage the Nokia Network Services Platform (NSP) as a toolbox.

NSP accelerates service fulfillment and simplifies network management, assurance and optimization. These capabilities maximize the agility, efficiency and reliability of IP, optical and microwave networks.

More than 930 network operators worldwide have deployed the NSP, and we support them with a team of knowledgeable experts. We're ready to use our proven technology and expertise to help you accelerate the deployment of network automation.

Read our NSP brochure to find out more.

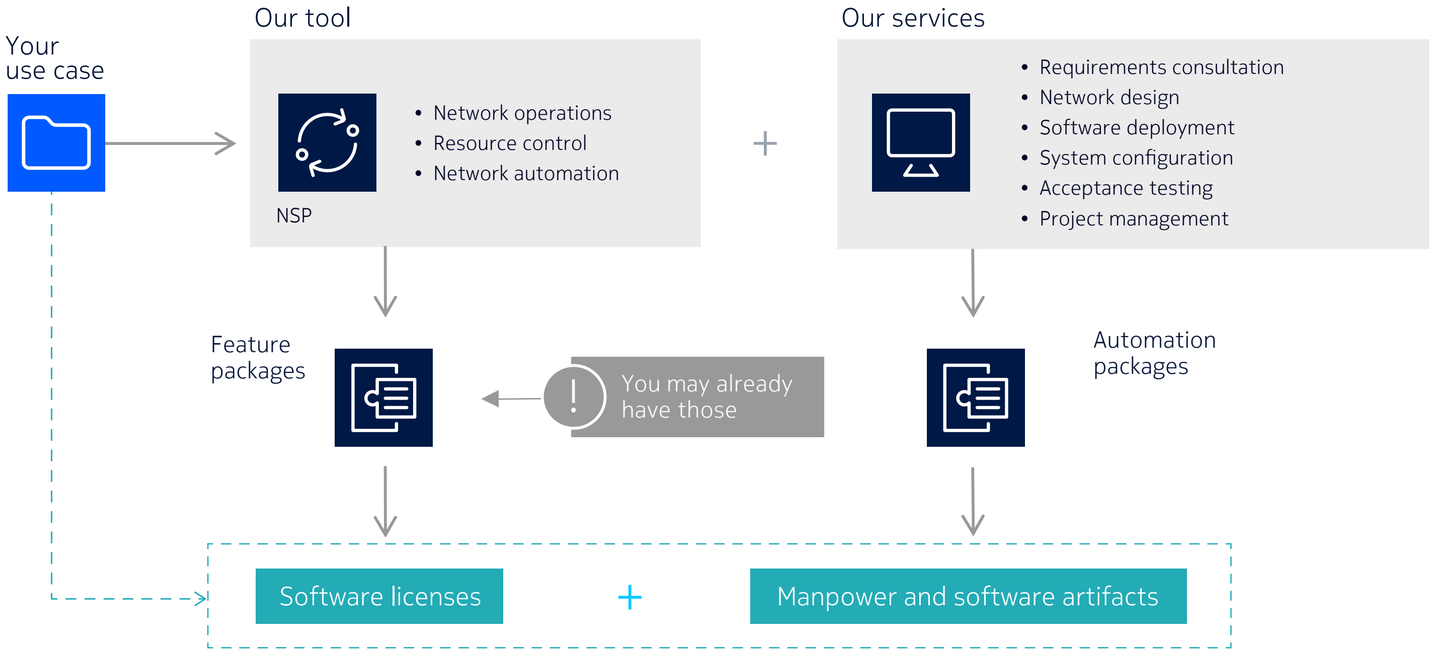


A bundle of tools and services

We implement our use cases using a combination of feature and automation packages.

Feature packages consist of off-the-shelf NSP software functionality for network configuration, provisioning, assurance and optimization.

Automation packages implement the use cases into specific service provider environments. They combine professional services and software artifacts such as workflows, intents (deployment templates), network adaptors and custom reports.



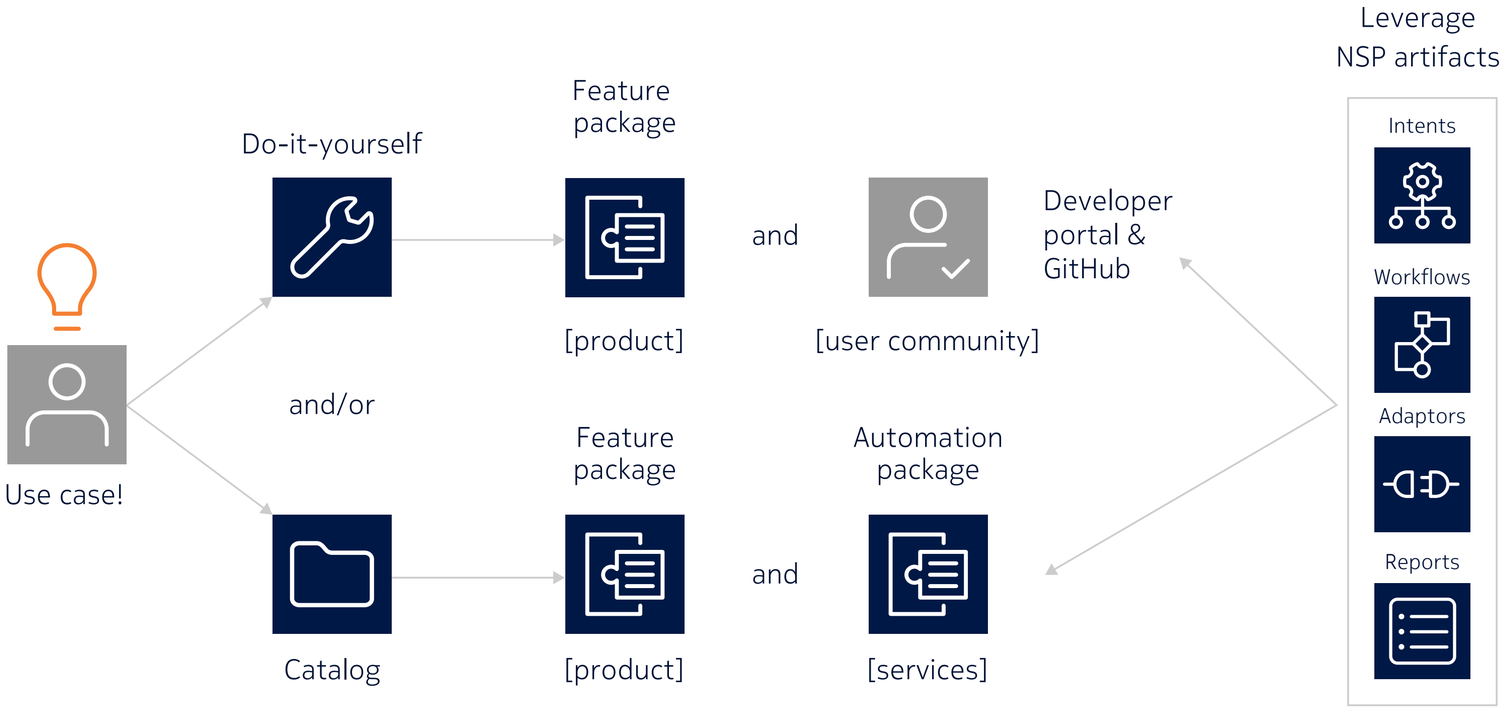
More ways to automate with NSP

Our use case catalog isn't the only automation option we provide. You can also use NSP to take a do-it-yourself approach to automation.

NSP's open programmable platform provides you with a superior toolset for building your own network automation use cases. You can take advantage of our developer portal and user community to access documented APIs, code snippets, tutorials and more.

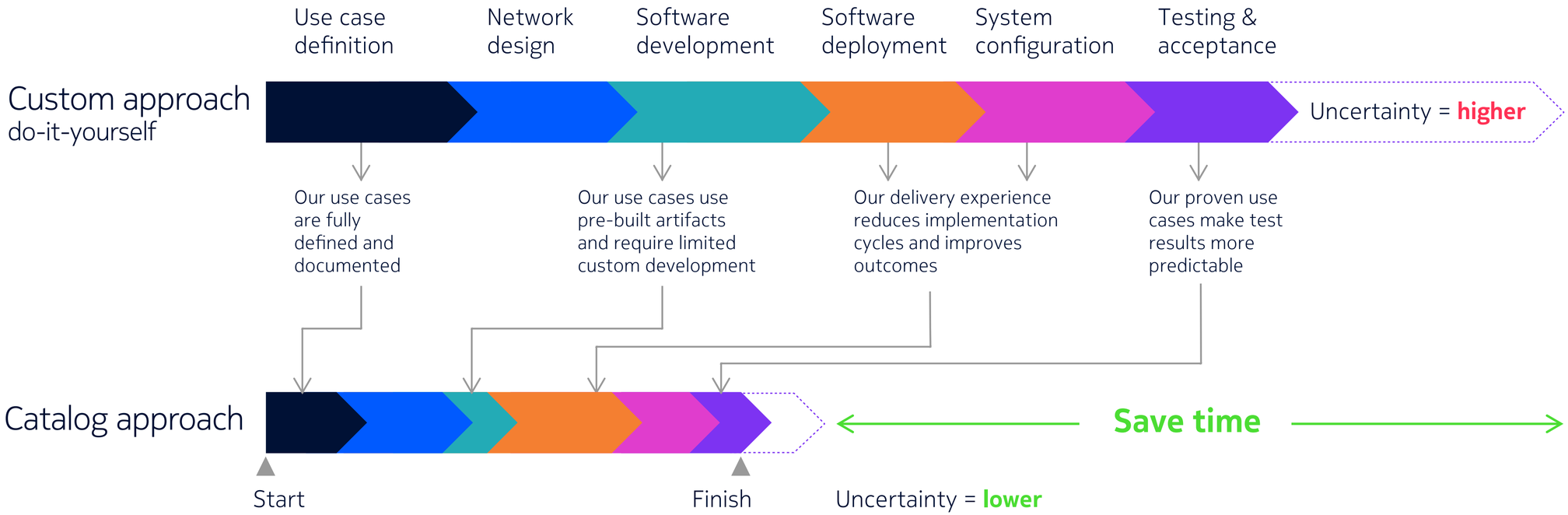
If you want expert help, you can contract with our NSP professional services team to create bespoke automation use cases that meet your needs.

Check out our developer portal and join our community of world-class innovators and programmers.



Accelerate time-to-market with Nokia automation use cases

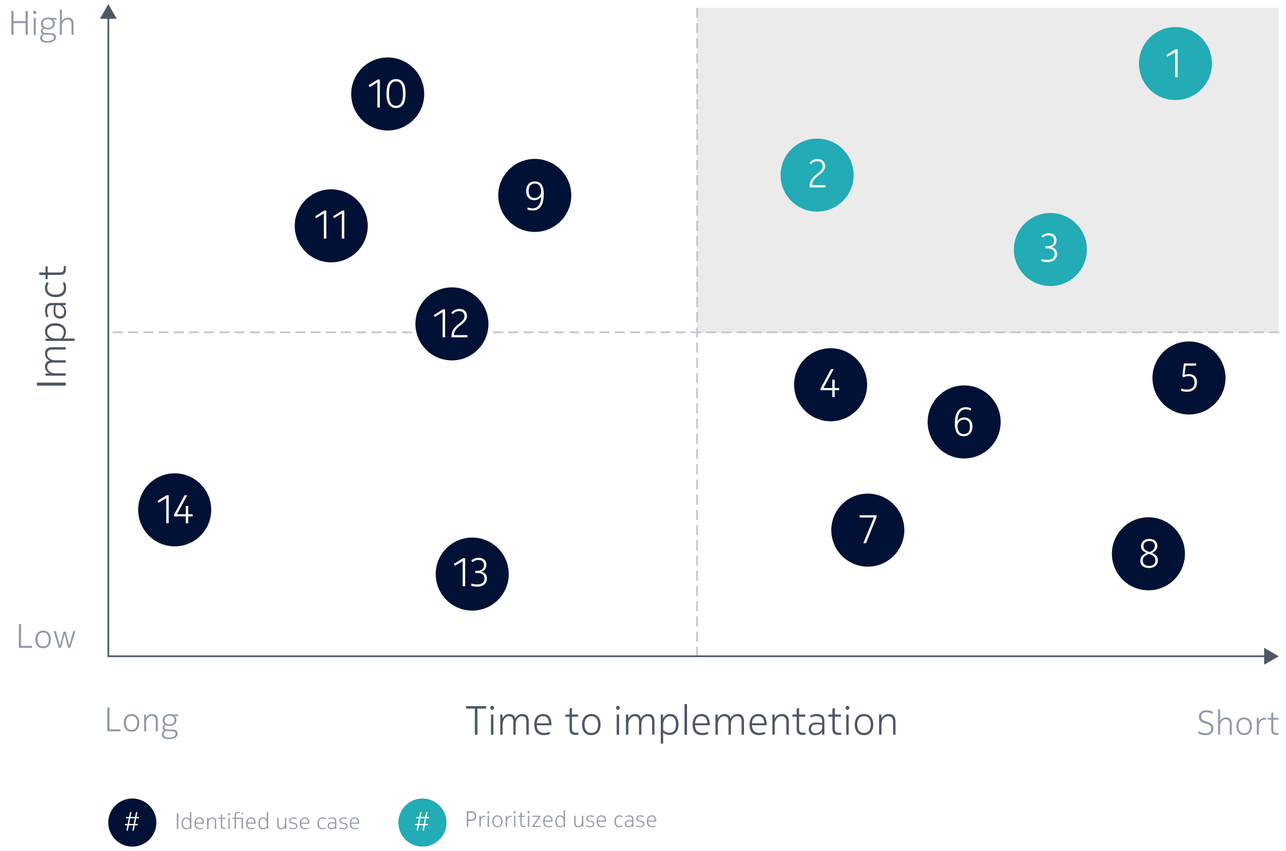
Save time and reduce risks at every step of the project



Assessing and prioritizing use cases

Not sure where to start with network automation?

An assessment of the effort you need to implement a use case and the benefits that use case brings can help you prioritize the “quick wins” that will have the biggest impact.



Solve real business challenges

Our use cases help you solve business challenges and achieve business outcomes that drive efficiency and profitability.

Business challenge	Key use cases	Business outcomes
Improve operational efficiency and productivity	• Network and service discovery • Service fulfilment • Network lifecycle management	• Service creation time reduced from 12 to 5 weeks • CSP saved €800k in OPEX for card swaps (4,300 cards) • Order pipeline sped up by two quarters
Lower MTTR and reduce churn	• IP-optical multilayer	• $US2.8M revenue loss avoidance through reduced truck rolls and churn*
Deferred or reduced CAPEX	• IP-optical multilayer • Path placement, optimization and simulation	• 4 month deployment cost payback 24% increase in path placement
Open new revenue streams	• Service fulfilment • Network and service assurance • Analytics enablement	• 8 to 9 times more revenue than present mode of operation

Network and IT buyers

Business buyers

* Appledore Research April 2020

Our catalog covers a wide range of use cases for automating all aspects of the network lifecycle.

Discover and visualize
Physical topology discovery
Brownfield service discovery
IGP topology discovery
Brownfield config. discovery
IP/MPLS (LSP path) topology discovery and visualization
Telemetry enablement
Prepackaged reports
Custom reports
IP-optical topology discovery

Slice
Transport slice enablement
Transport slice monitoring

Fulfill
E-Line
C-Line
E-LAN / EVPN
L3 VPN
Internet enhanced services
Composite services
Bandwidth on demand
NE provisioning - Day 0 (ZTP enabled Nodes)
pLTE provisioning - Day 0
NE provisioning - Day 1
NE provisioning - Day 2
400ZR point-to-point
ZR+ managed alien with ROADM
Optical service provisioning
Enterprise bundle

Plan and evolve
Mass scale NE upgrade
Mass scale NE backup
Service migration - port | Lag | card
Service migration - tunnels
Closed-loop automation / capacity growth
Coordinated maintenance
NE migration classic to MD

Optimize
Elastic IP/optical bandwidth
LSP path placement
LSP enhancement path control
LSP packet loss optimization
Optical aware IP routing enabl.

Assure
Fault and network assurance
Service assurance
Network perf. monitoring

Heal
IP-optical diversity analysis
1:N floating port restoration
Wavence interference detection

Predict
Custom alarm correlation
LSP network simulation
What-if analysis

Network and service discovery

Issues

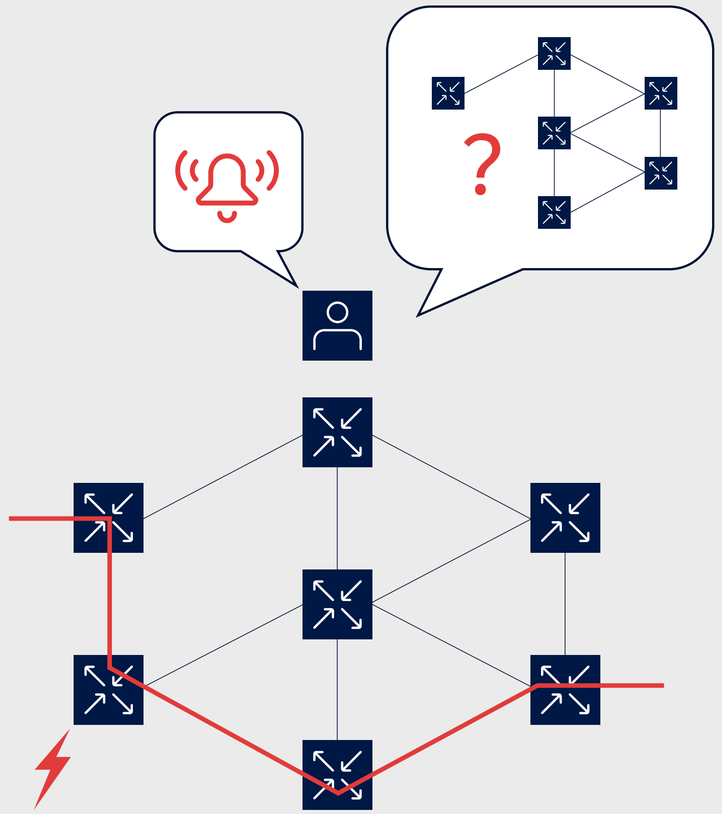
- Incomplete or inaccurate visibility of the network topology and services can lead to operational problems and inefficiencies and hinder end-user quality of experience (QoE)

Solution

- Use an automated and deterministic approach to reliably discover and visualize the network elements, physical topology and existing services

Benefits

- Accelerate adoption of automation and carrier SDN practices on existing services while maintaining FCAPS operations
- Maximize operational efficiency
- Reduce OPEX



Service fulfilment

Issues

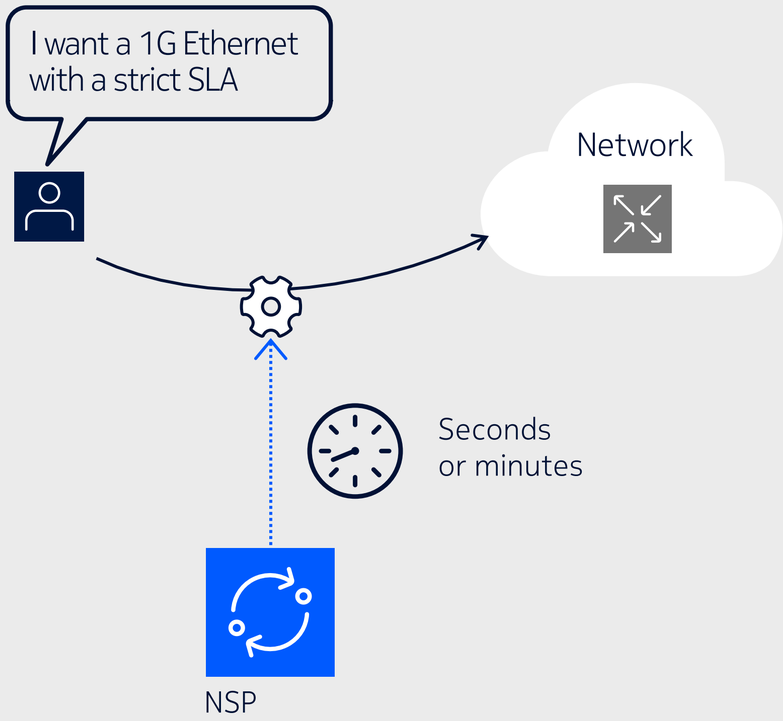
- Long lead time and high-touch, low-accuracy service provisioning environment
- High cost of maintaining disjointed legacy provisioning tools and processes
- Limited coordination between provisioning and other lifecycle management processes

Solution

- Automate business service provisioning and enhance service-level monitoring and visibility

Benefits

- Save time (hours per day)
- Free up time for other high-value tasks
- Shorten time to revenue by 88%
- Reduce provisioning errors
- Improve service reliability
- Reduce operational cost by 86%



CASE STUDY

Bell Canada

- Incumbent communication service provider in Canada
- More than 19 Million total subscribers

Customer challenges

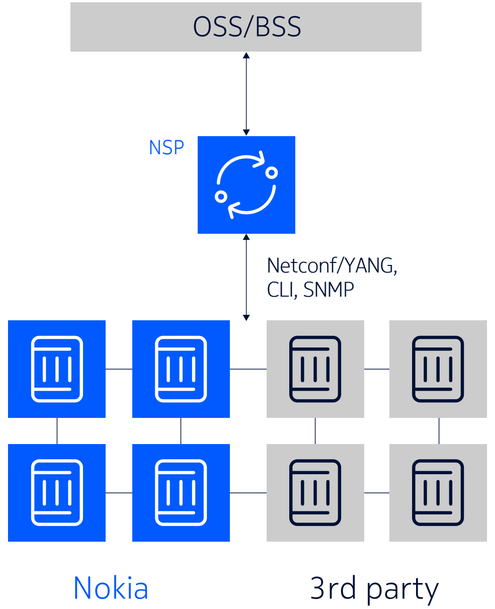
- High costs of maintaining existing provisioning tool due to custom development effort
- Inconsistent vendor-siloed tools are increasing day-to-day operational efforts
- Existing systems do not provide adequate support for DevOps and open-source development

Solution

Automating IP services delivery over a multivendor network

Cross-domain automation and control

- **Model-driven automation** for service/network fulfillment and assurance (includes GUIs and REST APIs)
- **Workflow management** tools for programming automation tasks and triggers
- Scripting for provisioning and health checks, as well as interfaces with third-party CLI
- Extensible model-driven mediation **adapters** including multi-vendor NETCONF/YANG support (including SDK)
- Opens up to **ONAP-NSP integration support** and co-operative development



Benefits

- Fast TTM for network/service delivery
- Maximize operational efficiency
- Lower OPEX and development costs

Network lifecycle management

Issues

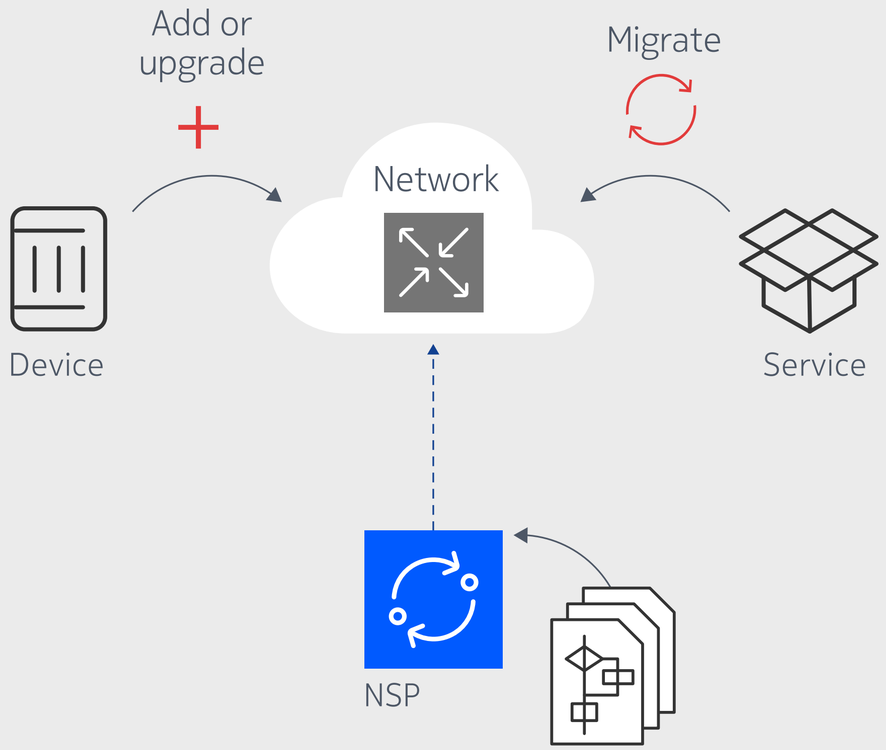
- Manual installation and commissioning of new devices require expertise and time
- Manual device software upgrades and service migration also require expertise and time, and can be error prone

Solution

- Automate repetitive manual tasks using pre-defined templates and workflows

Benefits

- Accelerate infrastructure deployment and service rollouts
- Eliminate human errors
- Reduce maintenance windows
- Lower operational costs by 65%



CASE STUDY

du Emirates

Du seeks to automate its network to enhance the customer experience and reduce time to market. The company is looking at automation beyond the service fulfillment perspective. It wants to automate activities within the operational environment, particularly frequently performed tasks that can become more complex as they extend deeper into the network.

Watch the video

Solution

Network lifecycle management

- Zero-touch provisioning of cell site gateways
- Migration and fulfillment for mobile and triple-play residential services after deployment of new network equipment

"Du and Nokia worked together to automate network service migration using NSP. This allowed us to reduce the time needed for pre-check/post-check from 4 hours to 1.5 hours while avoiding human errors."

Fatima AlDaghar - Director of transport network planning at du

CASE STUDY

metronet

Fiber-optic telco services for residential and business customers

Expect the network to grow x3 in the next 2-3 years

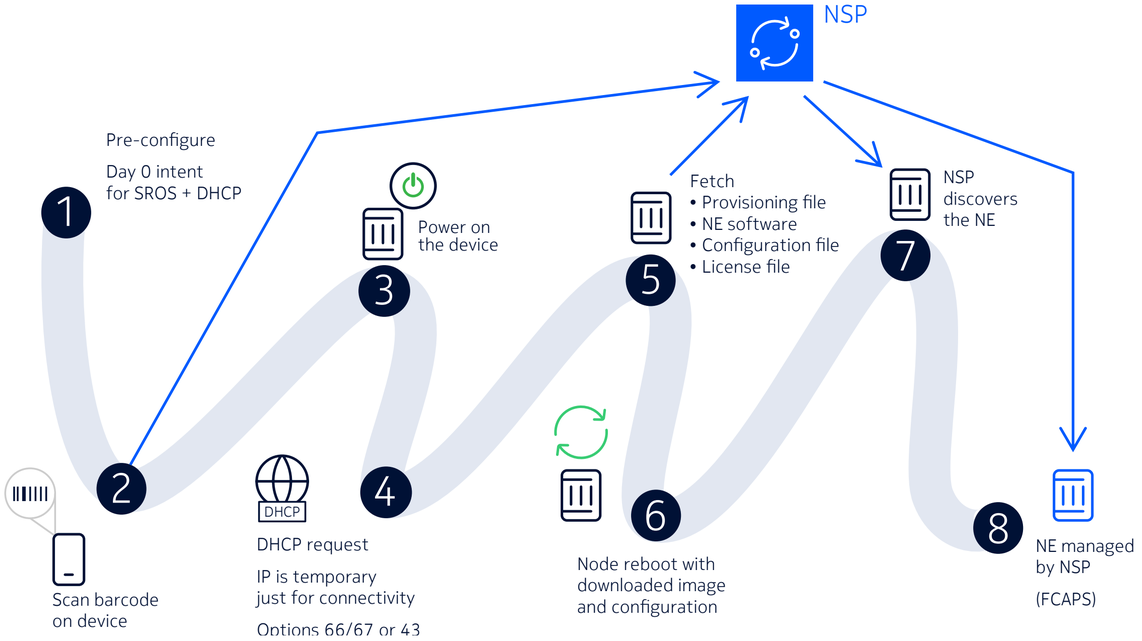
- Need to minimize cost involved with device commissioning
- Need a solution that can automate the on-boarding (‘Day 0’) and initial configuration (‘Day 1’) of the managed device

Solution

Network lifecycle management

Zero touch provisioning (ZTP)

- Out of the box ‘Day 0’ and ‘Day 1’ intents for ZTP enabled Nokia routers (7750 SR-2s, 7250 IXR-X1, 7210 SAS)
- Supports both classic and model-driven interfaces
- ZTP configuration export for automating DHCP configuration
- Seamless ZTP view under NSP device management
- Templatized solution for easy customizations
- Automated NE discovery



Benefits

- OPEX savings
- Reduces the time it takes to deploy a new device

Network and service assurance

Issues

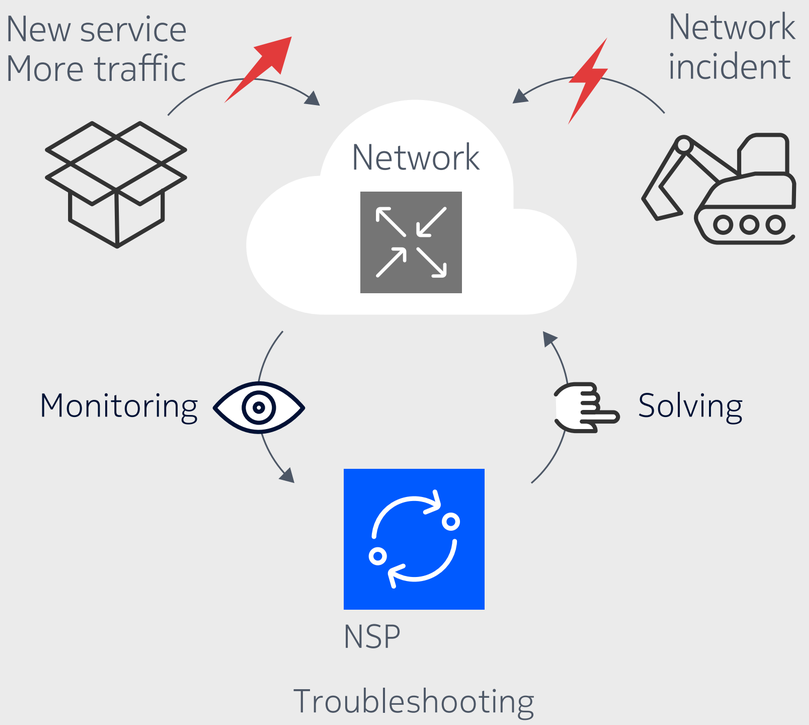
- Operations teams find it challenging to monitor and maintain services split across many groups and tools
- Limited correlation of root causes makes it hard to resolve service issues
- Problem diagnosis tools and procedures are difficult and time consuming
- Customers perceive poor quality of service

Solution

- Harmonize operational visibility and enhance proactive resolution capabilities

Benefits

- Lower operational costs by 50%
- Improve ability to spot problems before they become visible to customers
- Reduce MTTR by 71%
- Reduce error processing time by 85%



CASE STUDY

Tier 2 operator Australia

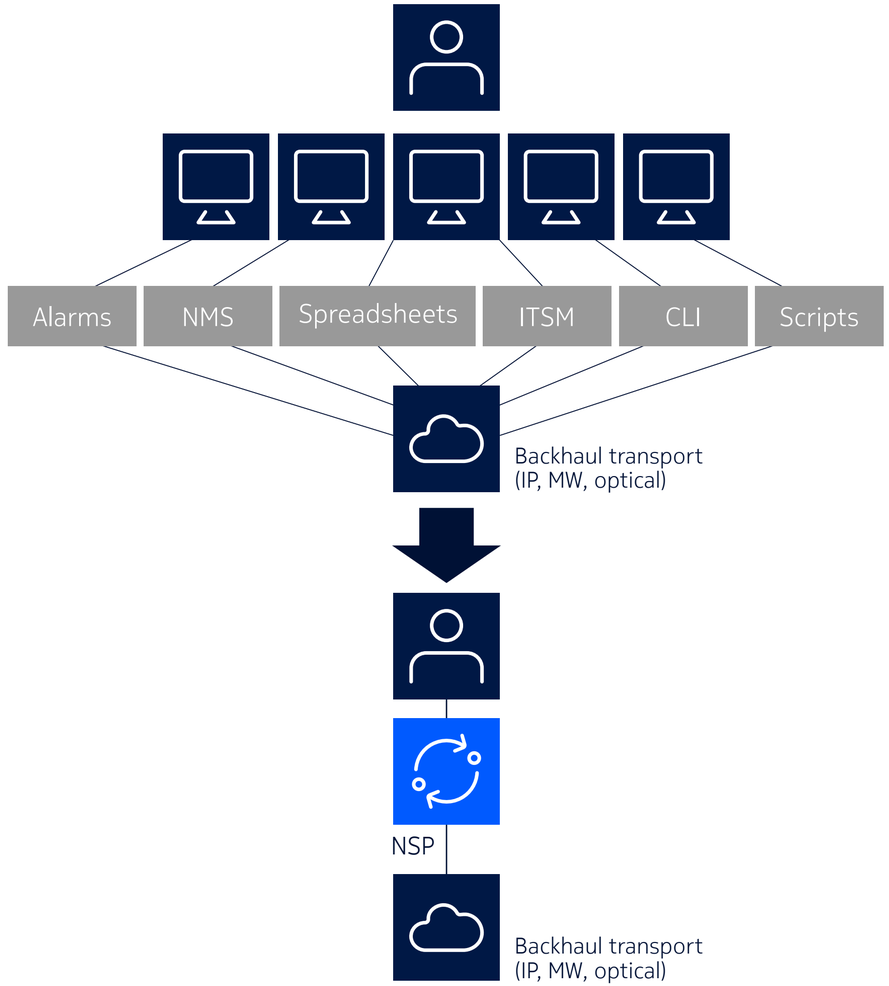
A leading full-service telecommunications provider is currently rolling out a 5G network in selected areas of Australia.

To ensure a superior user experience, the operator needs a simple, unified solution for troubleshooting its completely new transport solution, which covers IP, optical and microwave.

Solution

Network and service assurance

- Single system and interface replaces multiple troubleshooting systems and tools
- Correlated and unified source of actionable network insights
- Automatic triage
- NSP acts as aggregator/correlator



Benefits

- Cut the number of steps required to solve a problem by at least 50%
- Reduce resolution time by 75%

CASE STUDY

du

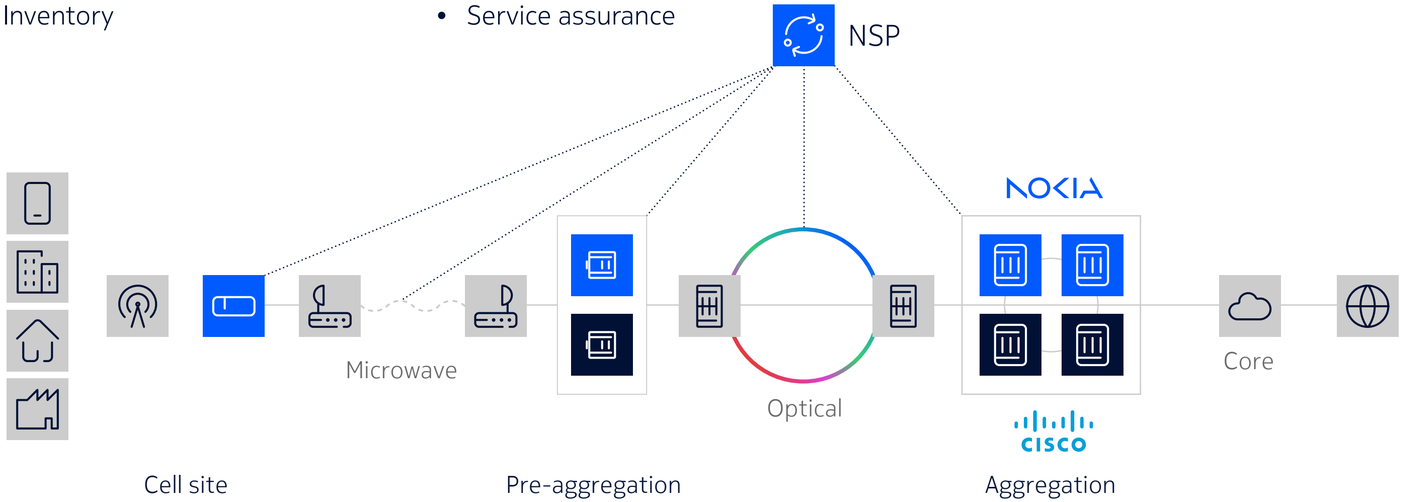
- Du in the Emirates has a large backhaul network for mobile and enterprise services
- Complex network with multiple stages of aggregation and routers from multiple vendors
- Du want to limit the number of systems and tools, but use a single platform for assurance across multiple IP domains

Solution

Multi-vendor, multi-technology assurance

NSP assurance for IP, optical and microwave

- Topology discovery
- Physical Inventory
- Fault management
- Performance management (OAM)
- Service assurance



Benefits

- NSP acts as an aggregator/correlator, and provides a single system and interface that enabled du to replace multiple tools for vendor and technology silos

Path placement, optimization and simulation

Issues

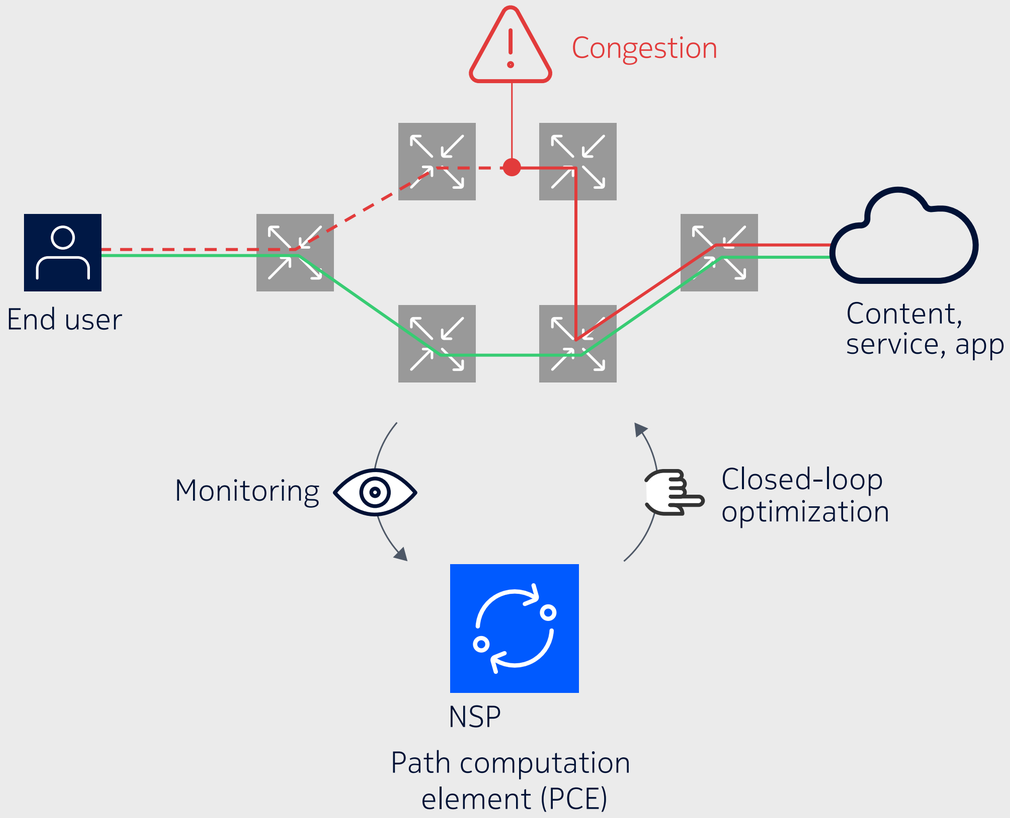
- Lack of network control impacts resources and end-user QoE
- 5G services have stringent network performance requirements for latency and bandwidth
- Network capacity is wasted because operators leave headroom for traffic spikes

Solution

- Centralized, instant network resource control with real-time visibility

Benefits

- Increase network utilization
- Avoid congestion
- Improve service performance (e.g. latency, packet loss, jitter)
- Reduce cost



CASE STUDY

LG U+ South Korea

Major provider of high-speed internet, VoIP, IPTV and data services now offers a wealth of innovative 5G services that put unprecedented requirements on its IP network

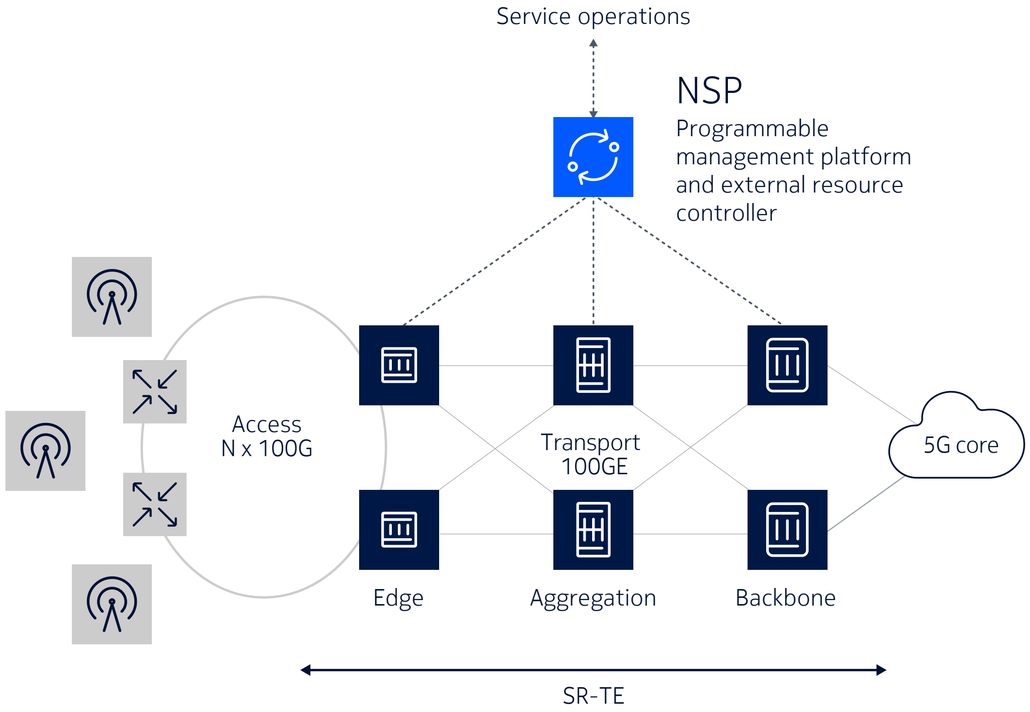
- 5G services need network resources to be quickly available on demand
- 5G eMBB use cases require high bandwidth
- 5G URLLC use cases have strong service speed and availability constraints

Read the online case study

Solution

Path placement, optimization and simulation

- Automate network operations and ease integration with orchestrators and OSS
- Meet service-level agreements (SLAs) by dynamically placing and maintaining network services on the best possible resource paths
- Monitor the network in real time to ensure that the actual performance of 5G services reflects the strict SLAs
- Open up to transport network slicing – automation, creation, assurance and optimization



Benefits

- Accelerate 5G service rollout
- Improve operational efficiency
- Increase agility and quality

CASE STUDY

cellnex

Europe's leading operator of wireless telecommunications infrastructures

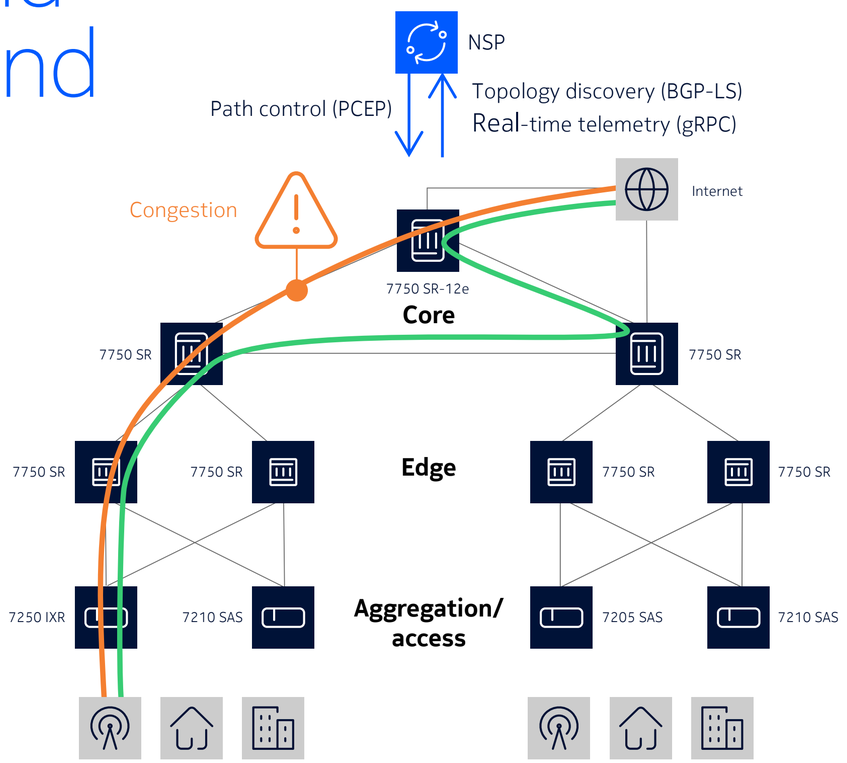
Acquired Polkomtel infrastructure in 2021,now Towerlink, covering ~14 million subscribers in Poland:

- New IP network with complex mesh topology
- Path selection based on utilization and latency
- Increased total network capacity by flexible usage of all available links

Solution

NSP path control and optimization in Poland

- Multi-constraint, telemetry-based optimization, even with complex mesh topology
  - Reroute traffic to avoid congestion while still meeting latency constraints
  - Periodic traffic flows optimization across whole network to prevent emerging congestions (freeing up links with load crossing predefined threshold of 80%)
- Intelligent use of spare network capacity to reroute LSP from broken links
  - Automated split of 'fat' LSP to enable more elastic LSP rerouting
- Capacity planning
  - Derive demand matrix and growth trend from observed utilization
  - Worst-case failure analysis



Benefits

- CAPEX savings through efficient and balanced use of existing network resources
- Network healing based on free resources not available for traditional routing algorithms

IP-optical multilayer

Issues

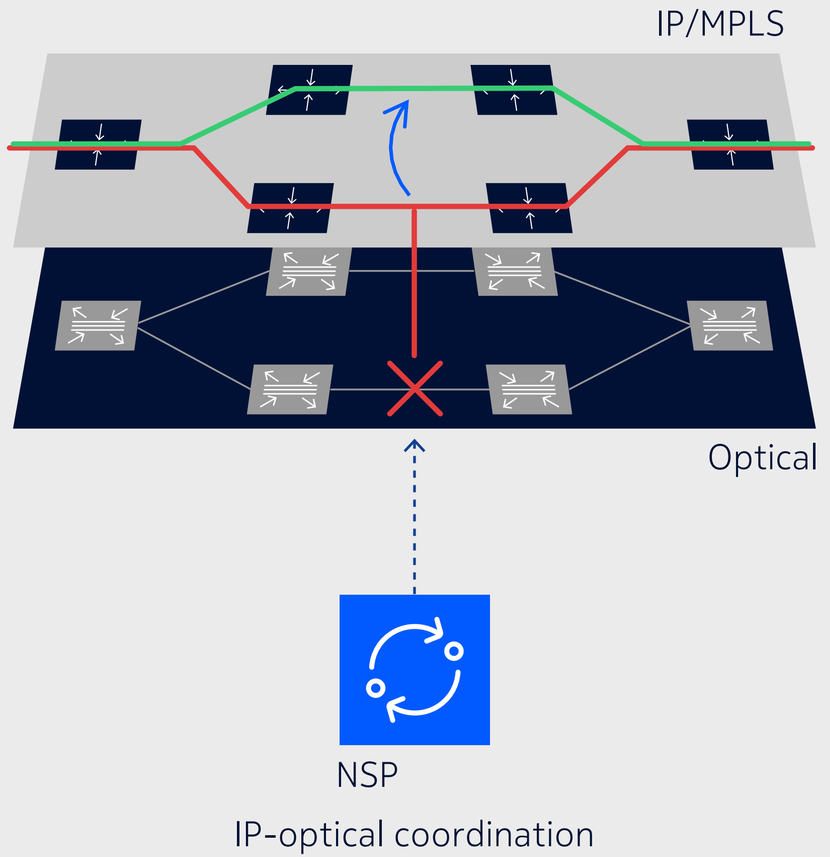
- Lack of real-time IP-optical cross-layer insights can lead to severe operational issues, including unpredictable failure impacts and suboptimal performance
- Impact of optical layer operations (maintenance, restoration and protection) on IP layer

Solution

- Gain full control over the optical topology
- Use shared risk link group (SRLG) constraints and optical latency for network optimization

Benefits

- Improve network resiliency
- Enable latency-sensitive IP services
- Enhance troubleshooting through alarm correlation



CASE STUDY

SDN Communications

SDN Communications operates a 50,000-mile fiber-optic network in South Dakota, North Dakota, Nebraska, Minnesota, Iowa, Montana, Wyoming and Colorado.

The company was planning to optimize its IP and optical networks to deliver business-to-business broadband service and improve its ability to respond to fast-changing customer demands, including an eventual 5G rollout.

Read the online case study

Solution

IP-optical multilayer

Topology discovery and visualization

Reduce OPEX by using a single, powerful management and control platform that supports common tools and practices across and between IP and optical network layers and network domains.

Optically aware IP routing

Use SRLG and latency information from the optical domain to improve resilience and QoS when computing IP paths.

Cross-layer navigation and fault correlation

Mitigate potential faults before they occur and rapidly resolve issues using root cause analysis.

Benefits

- **Greater operational efficiency and lower costs** for the control and maintenance of business broadband and 5G backhaul network infrastructure
- **Rapid service instantiation and efficient monitoring** to ensure correct operation throughout the network and service lifecycle

Analytics enablement

Issues

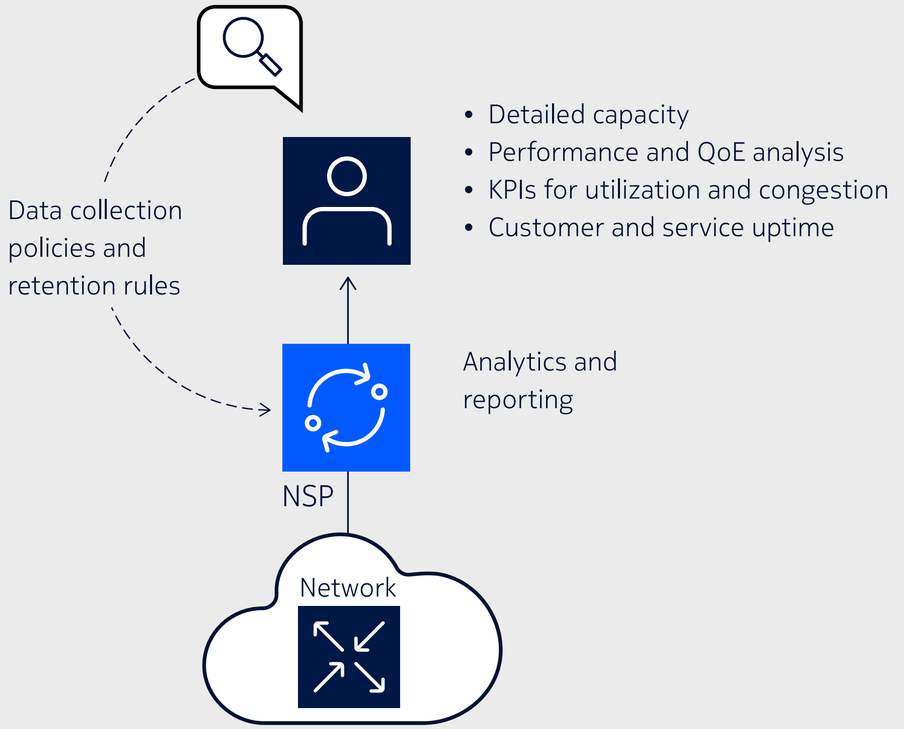
- Third-party or homegrown tools require lots of professional services, in-house development and integration time
- Extracting meaningful analysis can be cumbersome and time consuming

Solution

- Use pre-integrated reporting with prepackaged or custom reports that are tailored to a specific need

Benefits

- Reduce TCO and time to market with a turnkey solution
- Make more effective decisions about your business and network with relevant insights and improved visibility



CASE STUDY

Large operator in Europe

Large communications service provider in Europe with ~21 million subscribers

Needed an efficient analytics and reporting tool, to solve their current challenges:

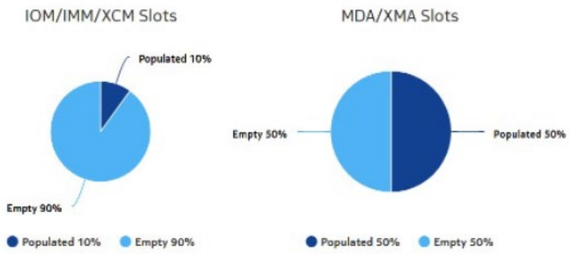
- Were using Excel reports and multiple DB queries for their planning and operational processes
- This process was cumbersome, slow and error prone

Solution

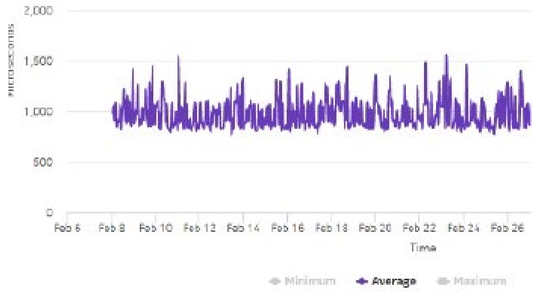
Performance management and inventory

- Monitor network performance (SAP and port report)
- Produce OAM reports to verify jitter and latency in the network
- Engineering team uses the Inventory reports to simplify planning of resource allocation and new hardware acquisition
- Operational team uses it for troubleshooting purposes

Card inventory



Jitter and latency



Benefits

- Planning efficiency, saves CAPEX and improves time to market
- Operational efficiency, saves OPEX and improves network availability & SLAs

CASE STUDY

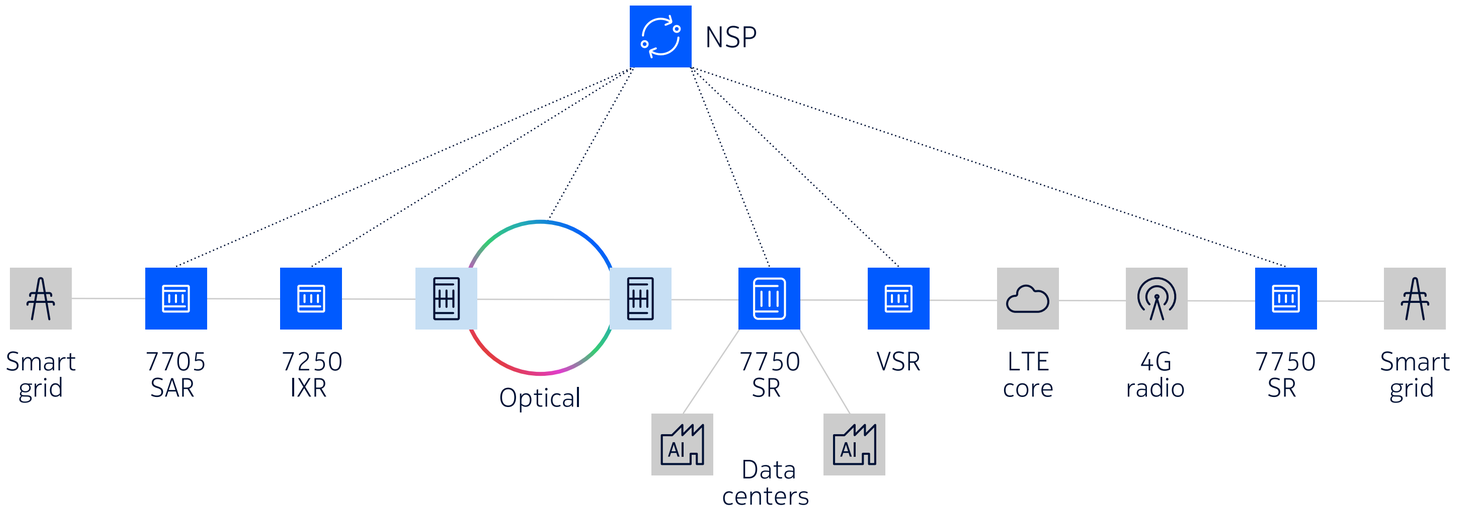
ACEA

Major Italian power utility serving over 3 million customers, planning to build Italy's largest smart-grid network, composed of an optical backbone, 2 data centers, core and aggregation networks with over 8000 Nokia access routers (7705-SAR Hm/c).

They need to modernize their communications network by leveraging Nokia's full portfolio for both fixed and wireless access, while adopting an IP/MPLS architecture.

IP and optical cross-domain integration with proactive deep network insights

- Unified automation platform for both IP and optical networks.
- Network insights and anomaly detection with closed-loop automation to proactively prevent issues that could severely impact end users.
- Using analytics to verify quality of LTE coverage for the SAR-Hm routers and the service availability of their smart grid.



Benefits

- Only automation platform offering an integrated management for IP and optical networks
- Streamlined user interface providing unified view across entire network

Automation use cases
Summary

1

Automation is happening NOW

Operators around the globe are actively automating their operations to reduce cost, improve quality, and turn up services faster

2

Deploying automation is COMPLEX

From running automation scripts to deploying a fully autonomous network, the road to automation is a long journey

3

NSP and our use case catalog makes it EASIER

Our pre-defined use cases enable faster deployment of automation at reduced risks and costs

Nokia OYJ
Karakaari 7
02610 Espoo
Finland

Tel. +358 (0) 10 44 88 000

CID: 210333 (January)

nokia.com

About Nokia

Nokia is a global leader in connectivity for the AI era. With expertise across fixed, mobile, and transport networks, we're advancing connectivity to secure a brighter world.