Nokia CI/CD services for the modern agile core

Transform your core network for limitless flexibility with Nokia continuous integration and continuous delivery services
Embracing software-driven networks

The evolution to 5G and a cloud-native core gives you operational flexibility and the ability to rapidly innovate and respond to market demand. It has also created a dynamic deployment environment with its own special challenges. To realize the benefits of DevOps-style, iterative software development in the telecommunications environment, Nokia has developed a specialized approach to achieve continuous integration and continuous delivery (CI/CD) that we call Delivery Operations or DelOps.

The high degree of complexity in connectivity services, with their multi-vendor and multi-domain supply chains for software, and multiple production environments, requires an additional level of process focused on delivery operations.

DelOps sits between DevOps-style software development and the delivery of new features and upgrades into your highly complex environment. Employing high levels of automation and integration, our DelOps approach enables you to harness the benefits of cloud-native, virtual networks and manage the complexity of your hybrid operations.

Beyond technology, DelOps also addresses organization challenges, especially around the transformation of people and processes. Our DelOps CI/CD services are part of an overall solution that helps you to break down traditional silos for faster time to market, reduced roll out cycle times, improved efficiency and reduced risk.
DevOps and DelOps

First originating in IT and webscale companies to assure continuous development and operations, DevOps is now used widely in telecom networks as well. However, implementing DevOps in the telecom environment is not straightforward. There is a great deal of more complexity than in IT and webscale networks — multiple domain environments, third-party software and hybrid cloud environments. In contrast to the one-to-many DevOps process more typical of an IT environment, achieving continuous integration and continuous delivery in the telecom environment requires a many-to-many delivery and operations process we refer to as DelOps.

In the telecom environment, there is the need for strict network reliability to achieve the KPI commitments you make to your customers. This is not a natural match for the highly changeable and adaptable nature of DevOps. Another challenge is that you have heterogeneous networks, in contrast to the more homogenous, wholly owned setups of IT and webscale companies, which are designed specifically for their SaaS offerings. Lastly and most importantly, DevOps in the telecom industry must deliver software to diverse, unique environments as compared to a single-owned service of web-scale companies.

DelOps uses a different integration process for each environment or platform, with design, deploy, test and operate phases. Like DevOps, DelOps uses agile processes to reduce time to market for new products and features and avoids waterfall releases and updates. It is also more flexible and scalable and adapts to the heterogenous and evolving nature of most operator environments.

With DelOps, you also enjoy early access to updates, new technology and features. DelOps continuous integration and delivery ensures better product quality, more reliable releases and overall productivity and efficiency improvements.

Figure 1. DevOps and DelOps

DevOps
(Development & Operations)
IT and Webscale

DelOps
(Delivery & Operations)
Telco vendors

Operators

Private

Public

Hybrid

One-to-many

Many-to-many
Nokia offers a suite of pre-integrated and pre-tested CI/CD solutions for the delivery and deployment of products and solutions for operator-specific environments. We also offer solutions for integrating with third-party ecosystems.

We partner with your delivery, operations and testing teams to understand your goals, network environment and development trajectories. We engage jointly with your delivery and operations teams to develop agile integration and delivery processes and automate testing and deployment.

Figure 2. The DelOps lifecycle

The DelOps lifecycle is composed of:

- **Software artifacts delivery**
  Automation of software release and delivery. This is a many-to-many process, as we automate the secure software release and delivery to the various hybrid systems in your on-premises production environment, including application software images, artifacts, service design and build artifacts, and test harness along with the right entitlements.

- **Network, services plan and design**
  Automation of application configuration, plan and design on your specific infrastructure and ecosystems.

- **Deploy, integrate, test, upgrade/update**
  Automation of deployment, integration, test and update of applications on the Nokia cloud or your converged cloud infrastructure including pre- and post-validations.

The operations stage automates applications, upgrades and feature enhancements during production and maintenance. The resilience of the DelOps approach is based on the constant feedback and continuous integration and delivery processes, as well as ensuring fast failback at any point to previous states for highly reliable operations.

Operations architecture focus
DelOps CI/CD services model

We have tailored our DelOps services approach to three broad segments of the CI/CD services market. Whichever best fits your situation, your CI/CD processes will undoubtedly also have their own unique features to which we will customize our CI/CD framework, partnering closely with your delivery and operations teams in the process.

**Nokia CI/CD framework**
For those customers that have adopted the Nokia CI/CD framework for their network, we leverage that framework to integrate our core network functions into your environment.

**Operator developed CI/CD frameworks**
Some of our largest customers have an entire, or portions of a, CI/CD framework, in which case we adapt our own CI/CD framework seamlessly with your appropriate integration points, in a modular fashion.

**Third-party CI/CD frameworks**
There exist a few CI/CD frameworks that are provided by third-party system integrators in the industry. In these cases, we harmonize our CI/CD service with your third-party system.
## DelOps CI/CD services

### Standard CI/CD Services

**Pre-launch services**
- Planning, designing and deployment services for Nokia CI/CD framework
- Automated testing covering unit level testing and solution level testing (Test Automation Framework)
- Deployment of NF product/solution (implementation, integration)
- DelOps CI/CD mass provisioning

**Post-launch services**
- Care for CI/CD framework
- Change and release management (SUS) and NF software maintenance

### Enhanced CI/CD Services

**Pre-launch services**
- DelOps CI/CD readiness and assessment services (consultancy)
- Design customer-specific “design artifacts” creation for network function solution
- Customer-specific workflow adaptation for CI/CD
- Customer-specific test adaptation for CI/CD (additional test cases)

**Post-launch services**
- Design and create customer-specific artifacts for software maintenance (upgradation)
- Care services of customization workflows

### Specialized CI/CD Services

**Pre-launch services**
- Integration with foreign CI/CD pipeline
- Third-party repository integration with Nokia CI/CD pipeline
- Third-party NF integration to Nokia CI/CD pipeline
- Third-party test-harness integration to Nokia CI/CD pipeline
- Third-party cloud, e.g., Kubernetes, Virtual Machine Introspection (VMI), NFV orchestration (NFVO), security operations and ticketing system integration with the Nokia pipeline.

**Post-launch services**
- Care services of customization and integration
Our DelOps CI/CD services will help you to improve your **roll-out cycle times** for network function upgrades and updates from months to weeks. It will enable you to deploy features and patches more frequently. The flexibility and agility of our services will translate into increased revenue through on time and faster delivery of services and features to your subscribers.

Nokia DelOps will also **improve your efficiency** by reducing the effort of creating, executing and maintaining test cases. It will also reduce the effort of tracking and managing releases and features.

Finally, DelOps will **reduce the risk** of upgrades and updates in your production network thanks to the holistic automation offered by DelOps continuous integration and continuous delivery.

Developing your own CI/CD pipeline in-house by using **open-source components** poses the risk of overshooting timelines and budgets due to the **complexity** of interworking and integrations at multiple layers of automations. The Nokia DelOps CI/CD framework reduces this risk for you.
Why DelOps

We encourage all of our customers to look beyond the technology. To really harness the power of 5G will require you to invest in people and processes. This includes automating many of the more mechanical processes, opening lines of communication and creating a collaborative and creative environment for vendors and internal teams where openness will be critical for success.

Learn more about DelOps here >

10 reasons to go for DelOps

- Faster time to market
- New services & features
- 5G promises
- Less risk
- Efficiency
- Quality
- Fast feedback
- Availability
- Serviceability
- Collaboration
- Improved operational efficiency

Why Nokia

Our CI/CD services are well-defined and leverage proven solutions. We have a proven track record in managing complexity and our world-leading skills and expertise are directly available to our customers. Nokia is engaged with all of the top communications service providers globally for their DelOps CI/CD requirements. Our most recent engagements and consultations typically address how operators can adopt and deploy DelOps for their evolving 5G agile core networks. These engagements are multifaceted in scope and coverage, and they range from customer workshops, to RFP/RFI submissions and architecture discussions.

We would be happy to engage with your teams around the topic of making continuous integration and delivery part of your ongoing processes.

Contact us >
The Nokia suite of design, consult, deploy and operations services

DelOps CI/CD services are part of our full suite of software and cloud services. They are designed to help you evolve your network to the highest levels of performance and feature competitiveness. We partner with you to help deliver new services quickly, generate new revenues and ensure the best possible customer experience.
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.

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