

**Tech
Mahindra**

CI-Nxt

A New Age System Integrator

Connected World.
Connected Experiences.



5G continues to evolve at a rapid pace, and it is clear that its effect will be felt across industries. By adapting to changing technologies at this stage, businesses can make the most of what the new network system has to offer.

Moving forward, System Integration (SI) solutions will no longer meet requirements on their own because of their typically centralized nature. The obvious next step is to look at what Continuous Integration (CI) has to offer, although it is crucial that old and new elements work in tandem.

Powered by disruptive technologies, CI.NXT is Tech Mahindra's approach to strategic service transformation. It is built on Netops.ai, the company's next generation automation framework, and it is developed based on building blocks such as artifacts, release, and test management.

CI.NXT functions as a ready to deploy pre-integrated 5G platform solution. Upon its implementation, businesses may look forward to quickly and easily integrate, deploy, and test a range of technologies and features in a completely stable and secure environment.

Increasing efficiency, reducing operating costs, and improving customer experiences are part of the parcel.

Emergence of Digital Transformation

5G is transforming the role that telecommunication technologies play in our society. The hyper-connected society of tomorrow will be built on 5G, the network of the future. It will be fueled by technologies such as Cloud, Artificial Intelligence (AI), and Machine Learning (ML). Major telecom and business verticals will need to undergo digital transformation by embracing changes in networks.



The service-based 5G network is cloud native and built on network slicing principles to support diversified service requirements. Another important aspect of the cloud native 5G network is its Control and User Plane Separation (CUPS) functionality. This will enable independent scaling and evolution of various functions.

While Multi-access Edge Computing (MEC) serves the needs of latency-critical applications, DevOps is required to improve deployment and operational efficiency. In addition, the 5G network needs to be flexible, robust, programmable, automated, and agile to cope with varied service requirements.

A Needed Shift From SI to CI

Given the increasing level of complexity, along with the speed at which changes and innovations are taking place, System Integration (SI) efforts will grow manifold when building a distributed, flexible, and agile network. In order to expand the supply chain and broaden the base of stake holders, it becomes necessary for the old and the new elements to coexist.

SI activities are usually centralized. All functions such as network planning & design, development & validations, scaled deployment, and operational acceptance are conducted in a serial fashion. This results in many pitfalls including difficulty in component architecture governance, misalignment of technical architecture vs. business objectives, anti-affinity towards failure, as well as misalignment of business processes, operating models, and technology development. They just cannot cope with the volume and pace of business innovation.

This makes shifting from System Integration to Continuous Integration (CI) a necessity. CI combines integration and test functions. It focuses on integrating work from different teams into a secured and shared environment by using automated builds and tests. This ensures success, improves collaboration and quality, reduces risk, and fixes problems early in the development life cycle. It provides complete oversight and control, speeds up delivery and accuracy, and continuously improves quality and cost functions. With CI, we are essentially building an agile and production-ready product with minimum risks and precise functions.



Simply put, the benefits of CI include:

- Greater control over processes and quicker response to market demands
- Reduced repetitive work and inefficiencies
- Lesser time required to identify problems and causes
- Accelerated delivery of production-ready software

CI.Nxt – The New Age System Integrator

At Tech Mahindra, we have embraced the “connected world and connected experiences” philosophy. Tech Mahindra Next (TechMNxt) is our answer to the future. CI.NXT is our latest offering for strategic service transformation. It is powered by disruptive technologies with the aim of paving new paths for the future.



As a global innovator and continuous integration leader, Tech Mahindra has developed a CI solution portfolio. CI.NXT is an agile integration offering that leverages the company's core competency in integration services. It includes our comprehensive and automated test suite that is built based on our next generation automation framework, “Netops.ai”, and is developed based on the following building blocks:

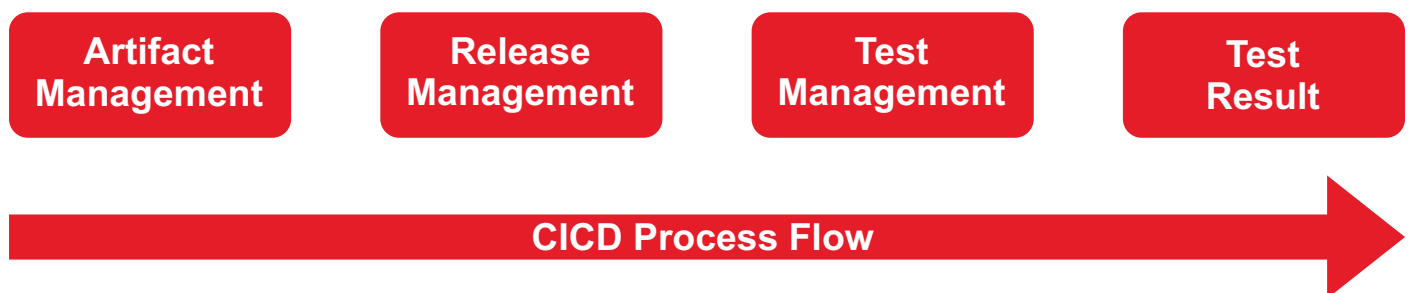


Figure 1: netOps.ai CI/CD process flow

Tech Mahindra Automation Framework “Netops.ai”



NetOps.ai framework provides significant acceleration of end-to-end validation cycles, as well as rapid deployment to production networks. It addresses two major domains:

- **Build and orchestration**
- **Automation**

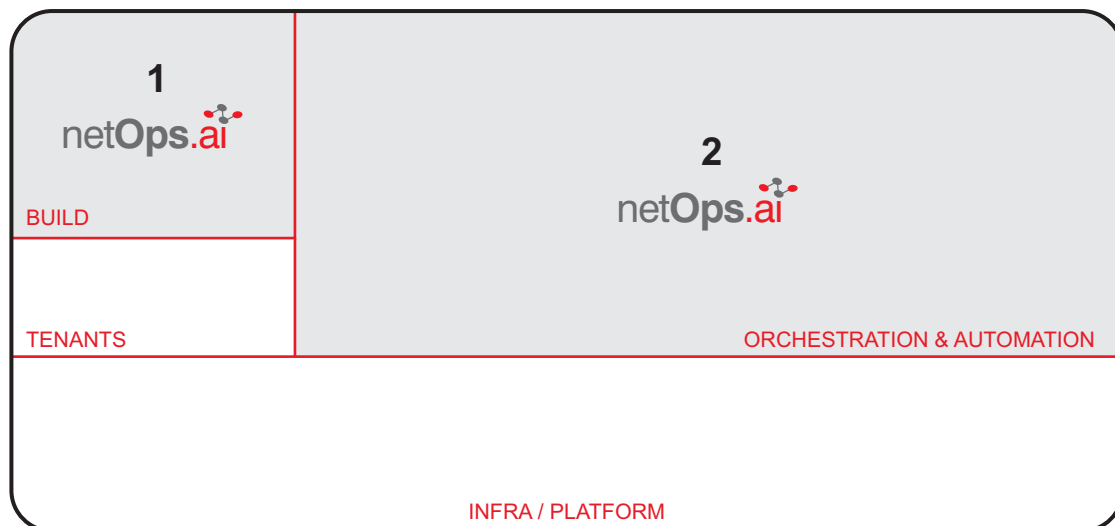


Figure 2: netOps.ai Logical Architecture

By embodying the continuous integration (CI) and continuous delivery (CD) culture and set of operating principles, the build domain is responsible for two main functions:

- **Design CI/CD (DCC)**
- **Continuous Test Assurance (CTA)**

DCC builds a CI/CD pipeline in a DevOps agile-based environment to ensure that no release, patch, or change goes into production without validation and certification. CTA, on the other hand, provides an automated and continuous testing framework for all solution components at various levels.

The other domain of Netops.ai covers orchestration and automation. It performs numerous functions, as listed below.

- **Central Assurance and Analytics (CAA)**
- **Tenant and SVC Life Cycle Management (TLM)**
- **Infrastructure Automation Framework (IAF)**
- **Platform Readiness (PRD)**
- **Platform Orchestration and Operation - Engineering Core (PEC)**
- **Orchestration and Policy Framework (OPF)**
- **Self Service Portal (SSP)**
- **Platform Security Management (PSM)**
- **Asset Management and Audit (AMA)**
- **Tenant On-Boarding (TOB)**

NetOps.ai is our next-generation Automation and Managed Services Framework. It is geared to accelerate 5G adoption by intelligently automating all the key network life cycle stages in a continuous fashion to include integration, deployment, testing, service assurance, and AI-based operations.

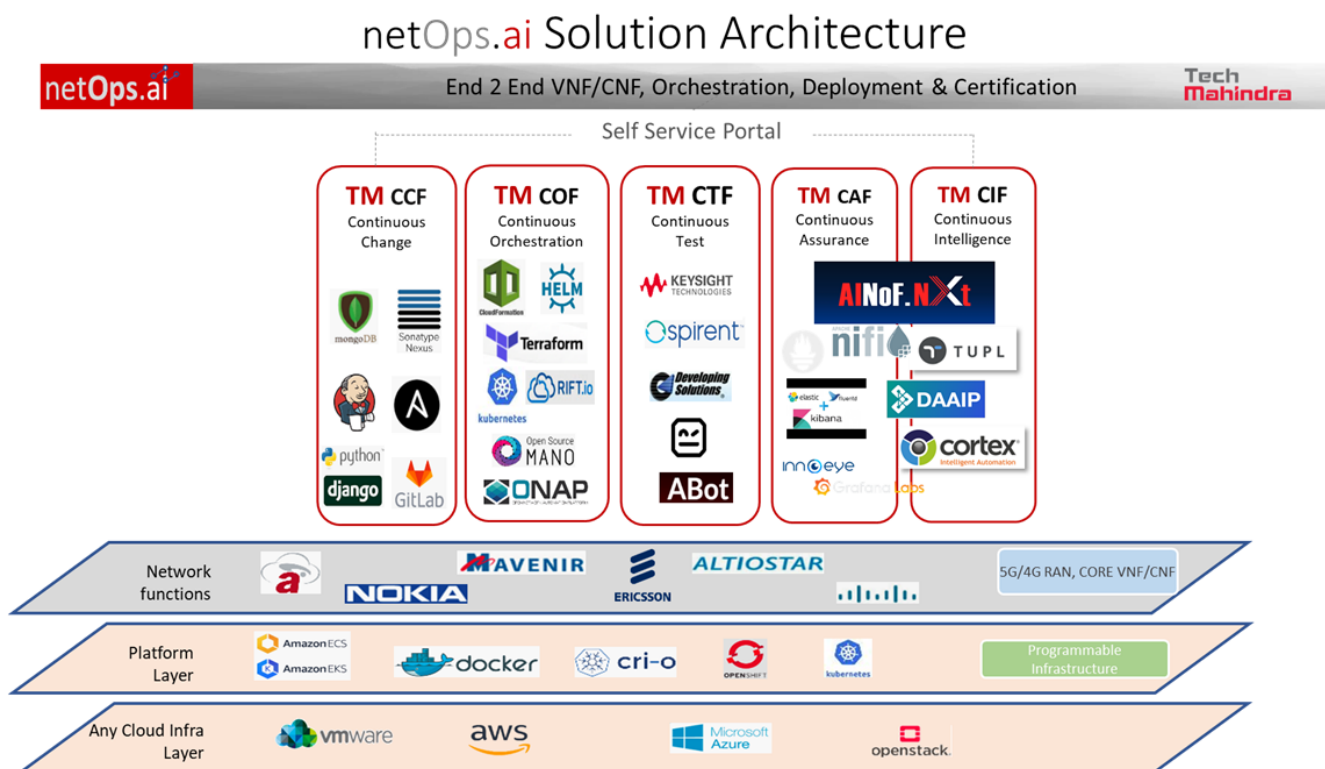


Figure 3: Five Functions of NetOps.ai

The framework functions as a binding factor across multiple open source technologies and other vendor/standard bodies-provided OSS/BSS systems. The components' key functions include:



Continuous Change Framework (TM CCF)

- Upload artifacts (images, VNFD files, and Helm charts)
- Auto-release creation
- Auto-validation of parallel releases on multiple test beds and lab line-ups
- Integrated with e2e slice life cycle management



Continuous Orchestration Framework (TM COF)

- Automated deployment of images on cloud and container platforms
- Auto-provisioning and execution of VNF/CNF life cycle management
- Integrated with e2e slice orchestration



Continuous Testing Framework (TM CTF)

- Integrated with continuous change
- Automated test execution and reporting
- Parallel multi-test bed execution management



Continuous Assurance Framework (TM CAF)

- E2e 5G network slice assurance
- Cloud and container platform, virtual infrastructure manager (VIM), network fabric and VNF/CNF monitoring, performance and alarm management
- Common messaging BUS to integrate any third-party monitoring tool
- Single dashboard to view FM and PM



Continuous Intelligence Framework (TM CIF)

- Predictive insight and early capacity planning
- Predictive analytics attempts to provide proactive analysis of data, perform RCA, and closed loop
- Identify patterns in event, resource, and performance trends using AI/ML

Tech Mahindra CI.Nxt Key Differentiators



Differentiators

- Fully Open Source based framework with OpenAPI support
- Automated framework for multi – vendor and multi CNF/VNF, monitoring, scaling and provisioning
- Agile based CI/CD solution, Test Automation & SSO based Self Service Portal
- Adapting the Business workflow to match with Customer's change management processes
- Fully Containerized Solution
- Platform deployed on Bare - metal 9 (preferred) or Virtual Infra (Private/Public) & on any HW



Revenue

- Revenue growth by faster production rollout & service enablement
- Faster Revenue inflows by meeting new feature demands by end customers with easy & automated release management procedure



Features

- Pre-integrated 5G Platform Solution – Ready to deploy
- Readiness and availability of NetOps.ai for the provisioning and configuration of 5G telco grade platform
- Reduces time in deployment of any vendor 5G SA solution in Customer and Production
- Co-create multi - vendor reusable assets, like CNFD (charts), 5G elements, tests scripts, test plans and methodology
- Create certified catalogue of 5G Core CNFs
- CNFs onboarding and testing capabilities for any vendor 5G functions
- Create optimized test suites to meet Telstra production requirements



Cost Saving

- Single Solution framework to control the e2e delivery of 5G network services through automated deployment & validation procedures in multi – testbed environment ensuring 99.999% uptime in production
- Real time assurance systems reduces services maintenance cost & saves time by providing accurate problem source & faster resolution

Innovation in Action: Rakuten and Tech Mahindra for Continuous Integration

Rakuten Mobile's network relies on a cloud-native and fully integrated DevOps chain. Its shift to CI was no longer a choice as it integrates different points across, both, technology and process domains. Rakuten Mobile and Tech Mahindra started work on CI.NXT around two years ago and it is now an inherent part of our operation and execution strategy.

Aligned with business objectives, CI addressed the challenges in setting up a network operating model without compromising on quality and speed. As we continue to build on 5G, CI, coupled with DevOps and automation, will be instrumental in reducing Rakuten's operating costs, improving customer experience, as well as accelerating test and integration cycles.

I have always been a big proponent of ease, and I believe that our core purpose is to simplify as technologists. When we set out to chart out the operating model, the base requirement was to be agile, nimble and light. I admit we did not have all the answers when we began, but as we worked with the team at Tech Mahindra, it became clearer that CI was indeed the way forward, and I am glad with how it has shaped over the last two years. I can say with confidence that we have created a best practice for the industry to learn from and emulate.

Tareq Amin, CTO Rakuten



[Read this blog](#) post by **Manish Vyas** to further understand how **CI.NXT** enables the Network of the Future.

On our path to build on 5G, we will make the most of our learning so far to bring in even more efficiencies across functions and processes.

In conclusion, CI.NXT will enable our customers to quickly test, integrate, and continuously deploy new features and technologies in a secured environment. This will eliminate the need for late night maintenance, reduce operating costs, accelerate time to market (TTM), and improve customer experience.

Tech Mahindra is ready to deliver CI.NXT to empower its customers so they may effectively and successfully deploy the network of future today, and be ready to face a decade that will thrive on digital transformation.

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