

# **TURBO 5G** for intelligent, end-to-end testing

Test automation gets faster, smarter and better



# Test automation process at its new digital best

As much as telco networks welcome new technologies such as 5G and O-RAN, they need to brace themselves for the complexities ahead—including multitudinal nodes and conformance to different standards and regulations. To help them tide over the adoption of new technologies as well as migration from physical to virtual to cloud native environment, telcos need fail-safe methods of software development practices. Continuous integration and testing demands a set of robust test and automation processes and tools to thoroughly test and deliver results while helping unlock the full potential of 5G amidst growing challenges from development to deployment of features.

Leveraging years of engineering experience and deep domain expertise, we have developed an intelligent test automation framework we call TURBO 5G. As the name suggests, this framework enables fast and efficient lifecycle management of Network Function (NF) certification including on-boarding, deployment and end-to-end testing of software releases in pre-deployment scenarios.

## Highlights of TURBO 5G

HCLTech TURBO 5G has a well-integrated solution for continuous integration (CI), continuous delivery (CD) and continuous testing (CT) of 5G NF blueprints for telco and wireless OEM customer environments.

It covers the testing not only from a network perspective, but also caters to the conformance, functional and performance testing needs of devices that span across mobiles and data cards, smart wearables and IOT platforms.

Following are some of TURBO 5G's highlights:



Bare metal, virtual, containerized (Kubernetes, OpenShift), cloud-native (AWS, Azure and GCP)



Ready-to-use conformance test suites for NF validation



Real and simulated nodes in both 4G and 5G domains



Test orchestrator, test artifact management, resource reservation and scheduler modules



Dual connectivity mode (SA and NSA)



Protocol analyzer/parser for 5G protocols



Integration with real and simulated nodes for 4G (MME, SGW, PGW, HSS, PCRF, OCS, OFCS), 5G SBA core nodes (AMF, AUSF, UDM, SMF, NSSF, UPF, NEF, NRF, PCF, and AF)



Intelligent log processing and troubleshooting



Integration with real and simulated eNodeB and gNodeB with large number of subscribers



Near real-time test result dashboards (Prometheus, Power BI, Grafana, Kibana, Google charts, Tableau)



Adherence to 3GPP and O-RAN standards - disaggregated RAN testing with DU and CU nodes (both real and simulated)



Test engineering

- Performance tuning using test execution metrics
- Test debug accelerator
- Auto-filing of defects
- Duplicate defects reduction

# TURBO 5G Offerings

## Fully integrated solution for E2E testing

- TURBO 5G utilizes HCLTech's RAPID framework for NF on-boarding and deployment
- Conformance, functional and performance test cases (700 test cases)
- Device Testing Solution for IoT, AR/VR and Medical devices
- Pre-integrated libraries for
  - 4G and 5G RAN and core network nodes
  - Traffic generators (Spirent, IXIA, TRex)
  - UEs (5G) and UE simulators (TM500)
  - RF switches and attenuators (Ducommun, Aeroflex, JFW and Mini-Circuits)
- Load testing of telco networks using real UEs and data cards

## AI/ML-based test execution and analytics

- AI-driven test analytics solution with relevant KPIs and data insights
- Anomaly detection and error prediction powered by iLA (Intelligent Log Analyzer)
- KPI-driven performance monitoring of network and applications

## Domain-agnostic solution

- Delivers test automation solutions across verticals – Telco, networking (wired and wireless) OEMs, smart wearables, medical devices, embedded SIMs, connected cars, etc.

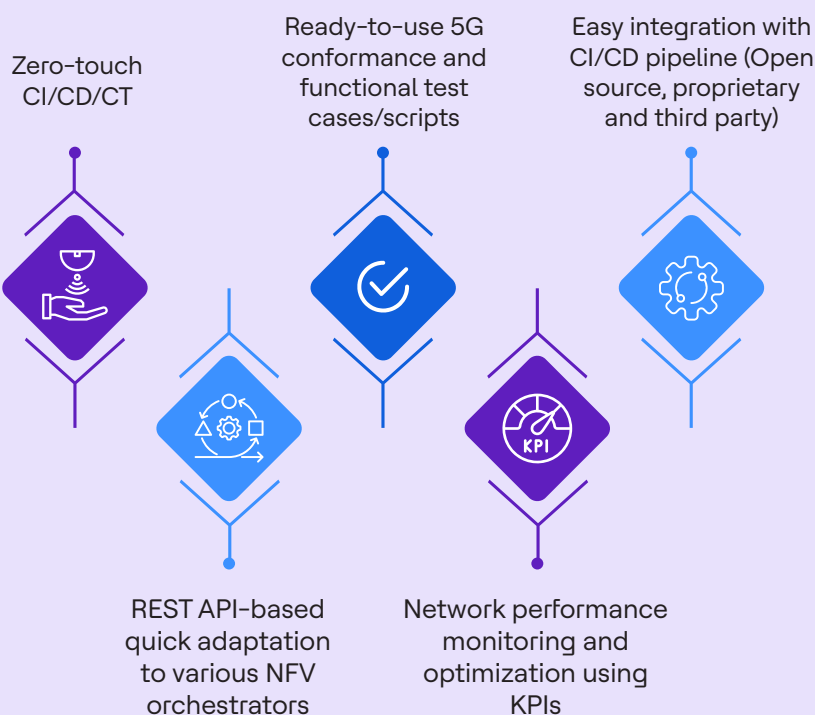
## End-to-end automation framework

- Master Test Orchestrator with versatile dashboards
- Conformance testing of 3GPP and O-RAN standards
- Functional, regression, interoperability, system and acceptance testing
- Load testing of 5G SA/NSA RAN and core network nodes
- Continuous integration and testing (Jenkins) and test assurance

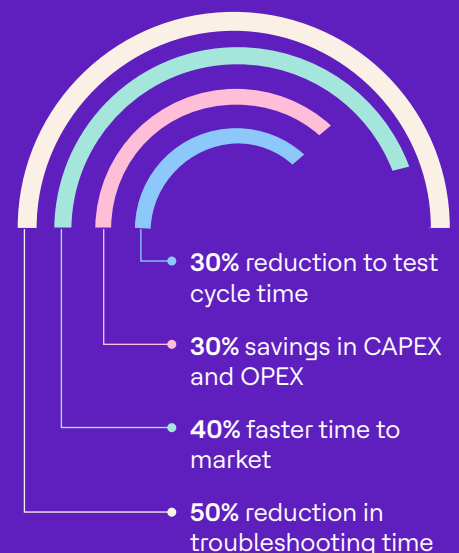
## Easy integration and maintenance of test artifacts

- Configuration of test data and rapid addition of new test cases
- Quick integration of Northbound and Southbound applications using REST API

## What makes TURBO 5G stand out from the competition?



## Unleash business benefits with TURBO 5G



## Success story



### End-to-end network test automation for a telecom service provider in the US

HCLTech developed test automation framework and end-to-end test automation of RAN and core network, transport layer and real-time services test cases for the client. We leveraged the customer's lab environment, delivering significant savings in OPEX, 30 percent reduction in cycle time reduction and 40 percent faster time to market.

## Unleashing the power of 5G with HCLTech TURBO 5G

HCLTech's TURBO 5G service offers a comprehensive solution for the testing and automation of 5G networks and devices. It's focus on innovation, expertise and speed, aims to help companies stay ahead of the curve in the rapidly evolving 5G market. Whether you are an operator, vendor or enterprise, our TURBO 5G service provides you with a reliable and efficient way to validate your 5G deployments and ensure the performance and security of your 5G networks and devices.

Maximize the benefits of 5G and realize the full potential of the technology by partnering with HCLTech.

# HCLTech | Supercharging Progress™

HCLTech is a global technology company, home to 222,000+ people across 60 countries, delivering industry-leading capabilities centered around Digital, Engineering and Cloud powered by a broad portfolio of technology services and software. The company generated consolidated revenues of \$12.3 billion over the 12 months ended December 2022. To learn how we can supercharge progress for you, visit [hcltech.com](https://hcltech.com).

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