

# Interactive remote device management, testing and smart reservation using TURBO DTS



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# Abbreviations

Abbreviation	Definition
<b>DTS</b>	Device Testing Solution
<b>OEM</b>	Original Equipment Manufacturer
<b>IoT</b>	Internet of Things
<b>CSP</b>	Communication Service Provider
<b>RL</b>	Reinforcement learning
<b>KPI</b>	Key Performance Indicator
<b>CLI</b>	Command Level Interface
<b>IP</b>	Internet Protocol
<b>Gen AI</b>	Generative Artificial Intelligence
<b>IP</b>	Intellectual Property
<b>RAN</b>	Radio Access Network
<b>CAGR</b>	Compound Annual Growth Rate

# Introduction

In the telecom industry, the importance of remote device testing has grown significantly. Factors such as globalization and remote work impact the availability of real devices for testing due to challenges like procurement and shipping across various geographic locations, scalability of devices in the lab and more. In addition, allocating devices in a shared environment plays a crucial role.

We will now explore the experience of testing these devices using TURBO Device Testing Solution (DTS) and how it addresses these pressing challenges.

## Target audience

- Telecommunication service providers
- Telecom equipment manufacturers
- IP network device manufacturers
- Mobile device OEMs
- Service integrators

## Industry trends

The global mobile application testing solution market overview:

- In 2022, the mobile application testing solution market size was valued at \$4.2 billion.
- It is projected to grow from \$5 billion in 2023 to an astonishing \$21.9 billion by 2032.
- The CAGR during 2023 – 2032 is forecasted to be 20.20% .
- Key drivers for this expansion include:
  - Increased penetration of electronic devices and smartphone users
  - Growing demand for improved mobile applications

- The significant trend showcases propelling market growth, which can be attributed to quick updates and bug fixes for mobile apps, necessitating thorough testing after each update.

In summary, the device testing market is on a remarkable trajectory, driven by technological advancements and user demands.

## Problem statement

Device OEMs and application providers or developers conduct compliance, functional, system, load and performance tests using physical devices due to the lack of remote access and restrictions enabled by the device manufacturers. Although some applications are tested on simulated devices, there is a significant difference compared to testing on real devices. The major challenges of using real devices for testing include:

- Management of multi-vendor devices
- Physical access to the devices
- Scalability
- Monitoring of metrics

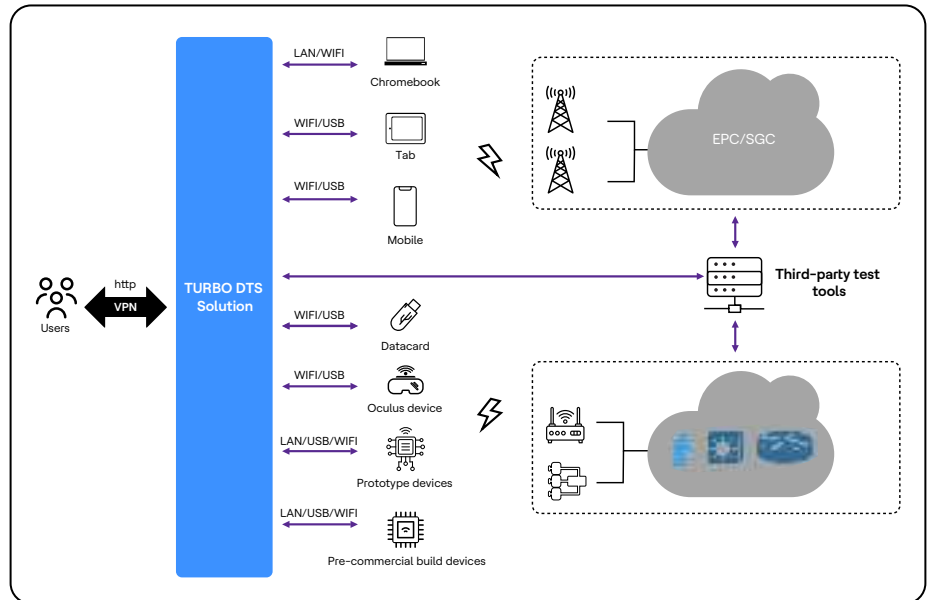
Other challenges include:

- Limitation in the availability of the devices for testing
- Sharing of devices between users

## Solution

HCLTech's TURBO DTS is a pioneering solution that addresses the challenges of real-time device testing. It offers a web-based remote enablement solution for mobile devices, including cell phones, tablets, laptops and servers. Leveraging HCLTech's TURBO User Equipment Controller's (UEC's) auto-discovery feature, this solution automatically discovers these devices, extending its capabilities to laptops, servers and other IP-based devices.

This solution enables users to manually operate mobile devices in the lab through screen connect, interactive shell access and other features. It also allows real-time monitoring of user-defined metrics. Additionally, our game-changing solution for device reservation uses a reinforcement learning algorithm to intelligently allocate devices, maximizing utilization and minimizing idle time by making smart decisions based on user demand.



# Salient feature of TURBO DTS

Key highlights of the solution include:

- Bundled with test profiles such as storage, browser, audio/video, YouTube, app installation or uninstallation and more
- The keyword-based approach accelerates the test automation development process
- Device reservation through reinforcement learning algorithm
- Gamut of inbuilt libraries to test native applications and device functionalities
- Debug log collection
- Enables interactive Command-Line Interfaces (CLIs) or shell access to the devices
- Parallel access to multiple users to multiple devices
- Automatic discovery of IP-based devices
- Device screen access enables an interactive display session with local mouse and keyboard control for the users to perform various operations

- It supports popular devices such as:
  - Android cell phones and tablets
  - Linux servers and laptops
  - Chromebooks
  - Switches and routers
  - Sensors
  - Android cell phones and tablets
  - Linux servers and laptops
  - Chromebooks
  - Switches and routers
  - Sensors
- Incessant monitoring of device metrics that support KPIs:
  - Battery levels
  - Battery degradation
  - Network signal strength
  - Temperature
  - Pressure
  - User-defined KPIs
- Live camera streaming of the connected devices
- User management module along with usage metrics dashboarding
- Executive engine, which enables parallel test executions and future scheduling of tests

# Key benefits

- Management of different vendors/variants of the device using the unified web interface
- 24\*7 monitoring of key parameters
- Maximized device utilization
- Devices in a centralized location and access from anywhere scalable, extensible and highly customizable

# Conclusion

To summarize, TURBO DTS facilitates managing various types of devices. Its unique features offer a way to reserve and utilize the devices to perform various operations and testing. The solution could be further enhanced to enable remote access and monitoring of IoT devices, sensors, semiconductor chips, medical devices and others.

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# Author information

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Jayaraman is a part of HCLTech's ERS PTS – Tech Solution – CoE and is a Solutions and Test Automation Architect with industry experience of 20 years spanning the Telecom industry and engineering services. Furthermore, he has delivery experience in the ideation, design and development of the TURBO test automation platform and in-depth expertise in developing unique solutions in testing and automation for CSP in 4G and 5G technology.

## Shahul Ijas Ali JamalMohamed



Shahul is currently working as a Senior Technical Architect at HCLTech for the Product Testing Division developing test automation solutions for transport, IP and enterprise networks. He has played a major part in delivery for major customers in the telecom and networking domains. His focus is on developing features and solutions for TURBO, TURBO UEC and TURBO DTS framework. He has a good understanding of Mobile devices, OpenStack, Docker, Kubernetes and Automation using Python. He also participates in solution proposal or blueprint preparation for customer problems and requirements.

## Saravanan Marimuthu



Saravanan graduated from Anna University with a Bachelor of Engineering in Electronics and Communication Engineering major. He is currently working as a Technical Architect for the Product Testing Division, developing test automation solutions for telecom and enterprise networks. He was involved in the development of solution TURBO DTS and led the enhancement of the solution. He is SME in the RAN domain and has worked on multiple telecom customer projects. He also participates in various customer discussions and the development of POCs and demonstrations.

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