A man with a beard, wearing a dark blue blazer over a white t-shirt, is sitting at a desk in a modern office. He is looking down at a laptop, with his hand resting on his chin in a thoughtful pose. The desk has another laptop and some papers. In the background, there is a bookshelf and a window with a view of greenery. A large, semi-transparent orange and red circle is overlaid on the left side of the image, containing the text.

**Unified network test
automation framework**

Objectives

As telecom networks are moving from 4G to cloud-native 5G, OEM vendors are transforming their products/solutions from legacy to Virtualized Network Functions (VNF).

Because products are getting virtualized and delivered in agile mode, telco operators are being challenged with quicker time-to-market for their products. Globally, telco customers perform lab certification of their products/solutions before they are made available to all.

The big question, however, revolves around getting the entire test cycle automated.

The need of the hour for telco operators is to adapt/enhance a unified network test automation methodology/framework to reduce the lab certification cycle.

Challenges

Telco Operator Network is an integration of multiple OEM vendor products, some providing Physical Network Functions (PNF), and others, VNF. Hence, telco customers end up having multiple test tools and automation frameworks from the OEM vendors or tool partners, for their product certification. In the current telco test lab environment, discrete test tools and automation frameworks exist, specifically addressing multi-vendor products and network functions.

Contrary to earlier network functions delivery, OEM vendors and telco customers are adapting to agile delivery for both PNF and VNF. Therefore, plenty of regression testing happens in the lab

environment, consuming a lot of time and effort. Network test automation with an integrated framework has become a focused area to meet the new-age lab certification.

Proposed solution framework

Since there is tremendous pressure on ROI, telco customers are adopting open source based tools/automation frameworks. Because of the ease of integration with existing frameworks and readily available plug-ins, open source robot framework is the default tool used for test automation in many telco customer labs. The ideal solution for any telco operator would be a seamless automation framework which can integrate with PNF and VNF infrastructure as well as the test environment (test tools and simulators).

Typically, lab certification has four test phases, viz. onboarding, functional testing, performance testing and services testing from lab entry to lab exit.

In every phase of lab testing, multiple test automation tools exist independently. Telco customers need an integrated solution that can perform all the lab test automations seamlessly, providing a final test report for the lab exit.

Wipro's Unified Test Automation Framework - VEVATO - is positioned as one such tool for seamless network test automation. The tool integrates with the telco customer's test environment, test tools and test management systems, as shown below, and performs lab certification activities seamlessly.



Figure 1: Lab certification cycle

Onboard software build: The first step of lab entry is the onboarding of network function software build onto PNF or VNF. The unified network test automation framework will trigger the continuous integration tools to pick up the agile delivery builds from the version control server and execute onboarding scripts. Once the PNF or VNF is installed, the framework executes sanity test scripts verifying the basic functionality of the

network function before performing the detailed functional testing.

Functional testing: Post the onboarding sanity testing, the framework prepares the functional test environment with tools and simulators. The framework will trigger the scripts, based on the test tool type (PNF / VNF), by activating or spinning the test simulator required for functional testing, at the end of the functional test phase,

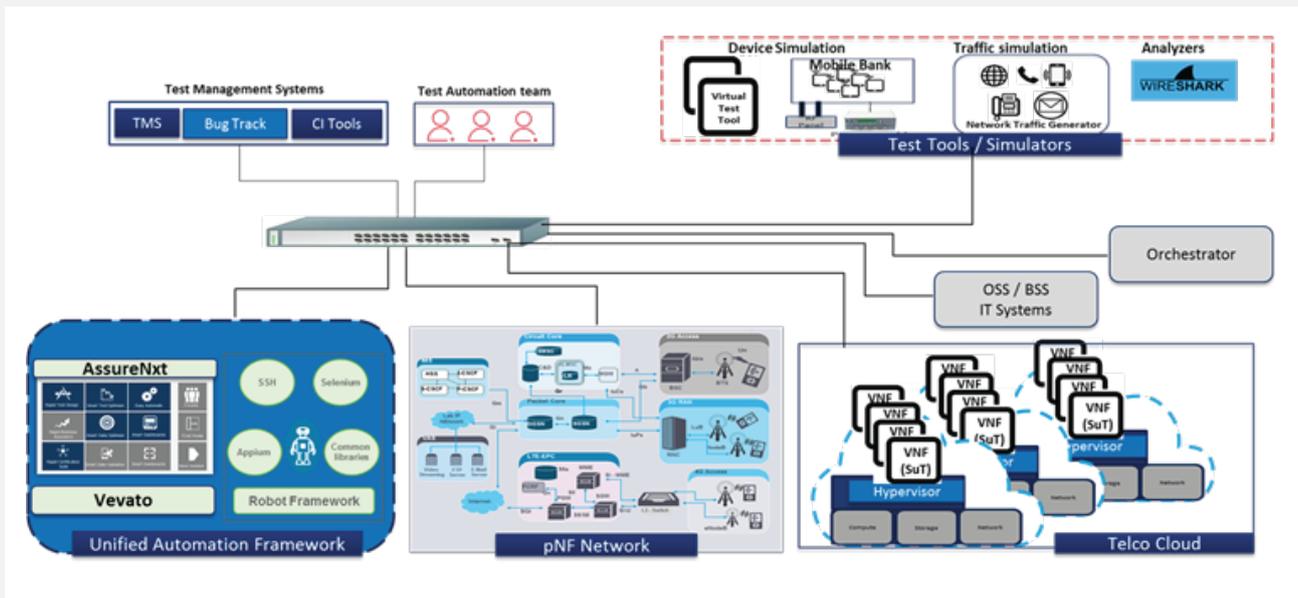


Figure 2: Connectivity view of Unified Network Test Automation framework

the centralized framework raises a defect with proper interface logs, Wireshark, and also submits the functional execution report.

Performance testing: As telco customers are measured on their network/services performance, the key ask from lab certification is performance testing of all services and network functions. The framework will be capable of spinning the required VNFs, triggering and controlling the existing traffic test tools (commercial test tools and any open source traffic tools) in the telco lab environment and collect test logs. The framework will collect, measure and provide test reports on various KPIs of the services, from the dashboard.

End-to-end services testing: In this phase, all end-user services like service provisioning, activation, call processing, backup/restore, etc., are tested. Hence, network and IT integration tests happen during this phase. The framework should prepare the end-to-end network topology/test environment and integrate VNF/PNF-based network functions with the rest of the network

ecosystem. The framework should trigger and control end-to-end services tests, collect the interface logs, analyze the messages and pass-on the test verdict based on call requirements. All the required plug-ins of the end-user devices, network devices and applications, need to be supported by the framework.

Test report dashboard: As multiple test phases are integrated for multiple agile releases, presenting a consolidated test report view is crucial. The framework should provide a detailed one-view test report for the overall release of Lab Exist and also to integrate with various communication channels of the customer, for test report notifications like e-mail/SMS/ customized application.

In days to come, telco operators will need to adopt agile network test automation methodologies for evolving network technologies for shorter lab certification cycle to be competitive in the market.

About the author

Ramesh Uppara

Ramesh Uppara is a Domain Consultant - Communications and has over 20 years of telecom network testing experience.

He has work experience with multiple OEM vendors and telco customers spanning lab integration to field acceptance. He has worked in wireless (2G, 3G, LTE, VoLTE, NFV) and wireline technology products/solutions. His core strength is in setting up test labs and performing functional acceptance testing.



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