Prodapt Chase Extraordinary

Move Broadband rollout to the fast lane, with enhanced quality

Credits

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DSPs and OEMs are challenged by evolving network technologies and frequent customer premises equipment (CPE) upgrades

Longer roll-out time of CPE devices due to

- Difficulties in adapting to rapidly changing technologies & complex networks
- Frequent upgrades on the network devices

Multiple testing tools and automation frameworks result in increased complexity and dependency on experts

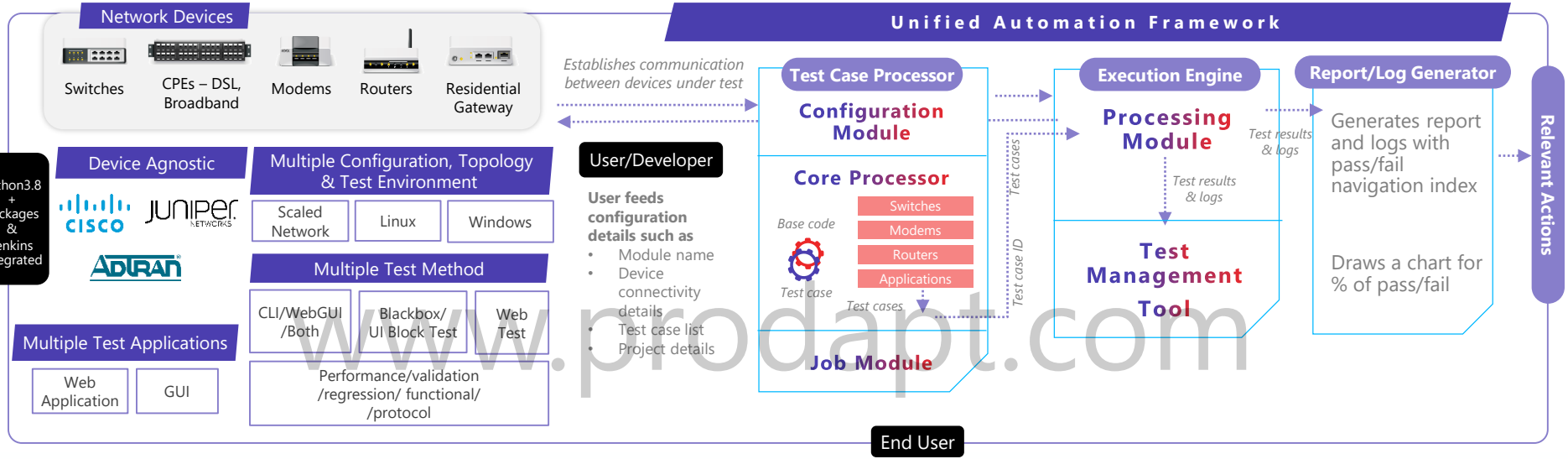
Increased time and resources to perform the manual test on all the features and services

Repeating 100s of manual tests to cover all features and services is a tedious and lengthy procedure. Also, human oversights often lead to QoS issues in a production environment

To improve customer experience & fast-track roll-out of broadband residential devices, DSPs and OEMs should embrace a **unified automation approach for device testing**

Move from vendor-dependent discrete test tools and frameworks to a **unified automation framework** for CPE testing

Integrate with the existing test environment, achieve automated seamless testing, and reduce time to market (TTM)



Top three considerations in building the **unified automation framework**

1. A framework that can auto-learn the configuration of various network devices
2. A customizable solution that accelerates development time with minimal effort
3. A framework that can seamlessly integrate with DSP's & OEM's test environment, test tools, and management systems to smoothly execute all test cases

This insight can help in addressing the following challenges faced by DSPs and OEMs

- Challenges with multiple testing tools and frameworks
- Lengthy testing cycle time and slow TTM

Build a **test case processor** to reduce test development time & effort by 50% for broadband devices

Enable auto-discovery mechanism to learn device configuration using open-source Python and Selenium web driver

Test Case Processor | Execution Engine | Report / Log Generator | A B C

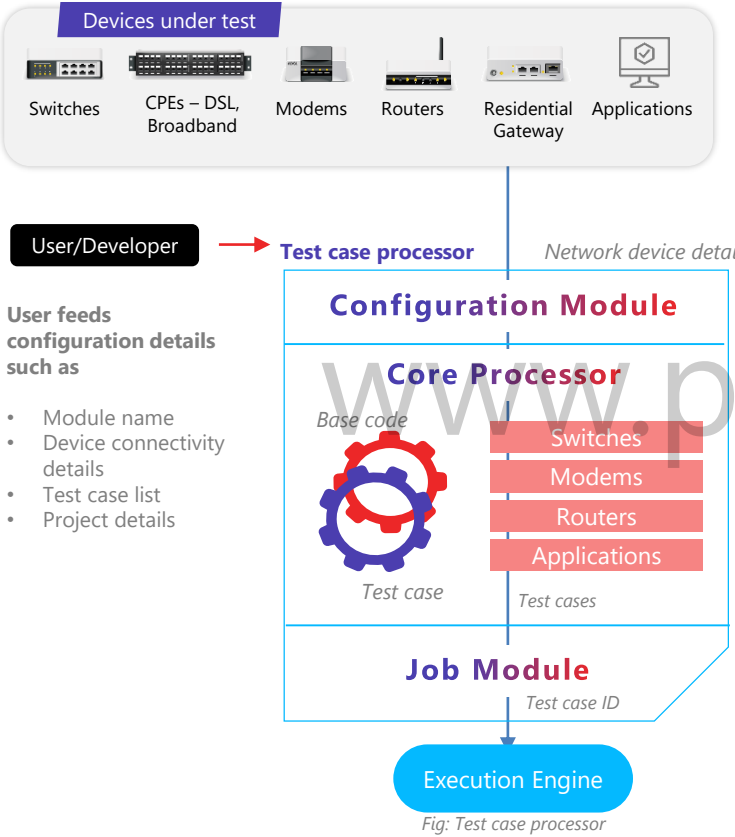


Fig: Test case processor

User feeds configuration details such as

- Module name
- Device connectivity details
- Test case list
- Project details

Recommendations

1

Build auto-discovery function to reduce configuration time and efforts

Enable testing based on profile like live deployment, number of sessions, and time interval of BGP (border gateway protocol), etc.

2

Create easy integration APIs in the telco lab environment to collect test logs for

- Traffic generators such as IPERF, Ixia, and Spirent
- Device simulators like GNS
- Packet analyzers like Wireshark

3

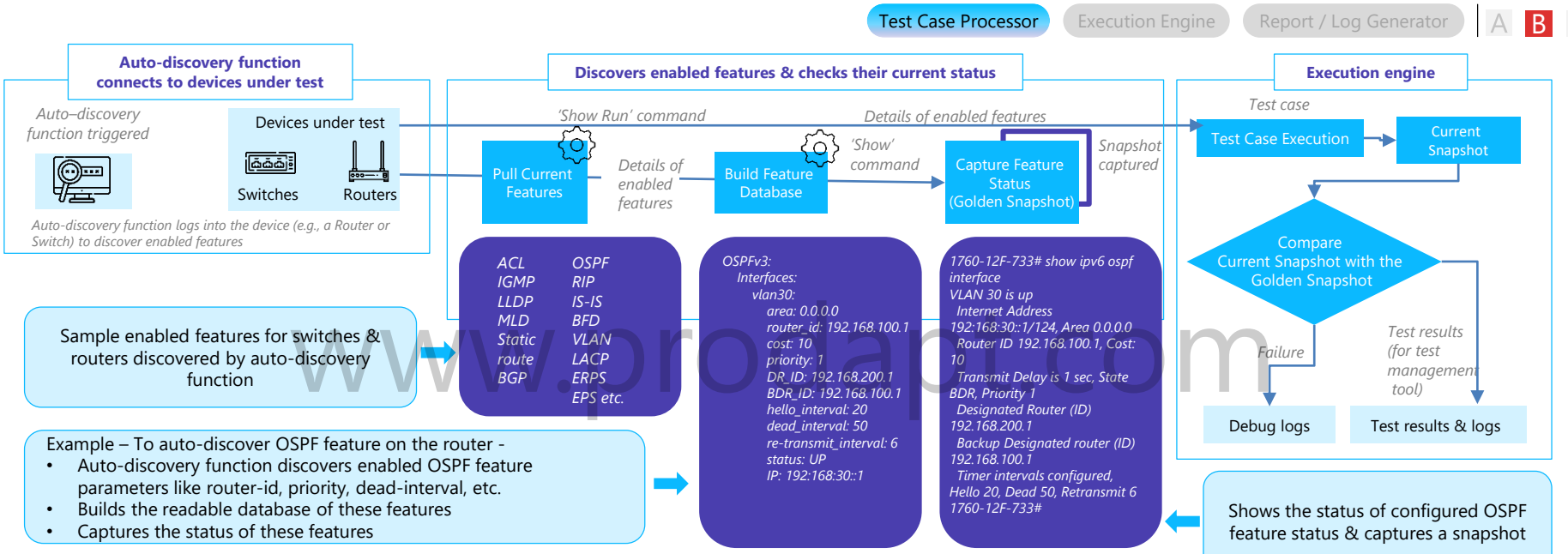
Create a core processor with pre-built base code for various devices under test.

This will give a jump-start for testing new releases

Base code setup: Create support (CLI/web GUI commands) for features such as QoS, DHCP, LACP, OSPF, STP, DNS, nCommand, WLAN, ERPS, VLAN, etc. related procedures of network devices like switches, modems, routers, etc.

Test case inventory: Identify all required test cases from the test plan

Implement **auto-discovery** function to auto-learn the DSP's live network configuration & reduce testing time and effort



1. Use the 'show run' CLI command to gather the configuration features enabled on a device
2. Use the 'show' CLI command to collect the status of each feature & capture the golden snapshot for comparison
3. Run test cases from the execution engine and compare the current snapshot with golden snapshot to identify issues (if any) and report the test results

Recommendations

- **Before triggering the test suite, ensure that the services under test are in a stable state**
- **Enable relevant user permission to run CLI on the device to avoid test execution failures**

Templatize test cases to reduce customization effort for broadband residential services

Enables simple, reusable, and customizable test cases with reduced coding effort and easy enhancements

```
TC1:
Title : Validate site blocker functionality
Descr : Validate the custom URL site blocker functionality in CPE device
Device : chn-965ac
TCs : ABC_CPE_SECURITY_FUNC_001
Type : Tststeps
Test_steps :
  step1 :
    test_proc : feature_lib.validate_func
    descr : validate the custom URL site blocker functionality in CPE device
    device : chn-965ac
    validate:
      access-url-1:
        webpage : tn.ntc.in
        role : row
        element : //table[@id='table2']//td[@class='arial_content']
        element_should_exists : yes
        value : "NIC TAMIL NADU STATE CENTRE"
        condition: Expected
        take_snapshot : yes
      click-exclude-option:
        role : click
        element : //button[@class="btn btn-sm btn-primary ng-binding"]
        element_should_exists : yes
        take_snapshot : yes
      click-add-button:
        role : click
        element : //a[@class= "btn btn-sm btn-primary ng-binding"]
        element_should_exists : yes
        take_snapshot : yes
Comments :
      validate the URL blocker functionality in CPE device
```

Event 1

Event 2

. . . .

Event n

Fig: Sample test case: validate URL blocking functionality on CPE device

Test Case Processor | Execution Engine | Report / Log Generator | A B C

Key considerations for efficient development of test cases

1

Provision test cases as events (pre-defined test or verification steps) to realize benefits such as

- Flexibility in adding any number of events for sequential execution
- Simplicity in managing/enhancing/ modifying/adding/removing/re-ordering

Test case template should consist of finer details of the events like

Title of test case	Description of test case	Device name	Test procedure or action
Description of the procedure	Test case ID	Device username & password	Type – test case/ test steps

2

Test case processor should provide a comprehensive output that is fed to execution engine

- Device type such as modems/switches/ routers, etc.
- Device IP address for the connectivity
- Device username & password
- Test case ID

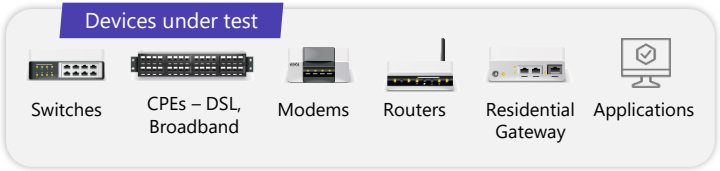
3

Use **rapidly scalable logic** to build an automated **execution engine**

Enable auto-dumper mechanism to reduce the turnaround time for the broadband residential devices

Use processing module to effectively execute the test cases and generate test results for reporting & log generation

Test Case Processor | Execution Engine | Report / Log Generator | A | B



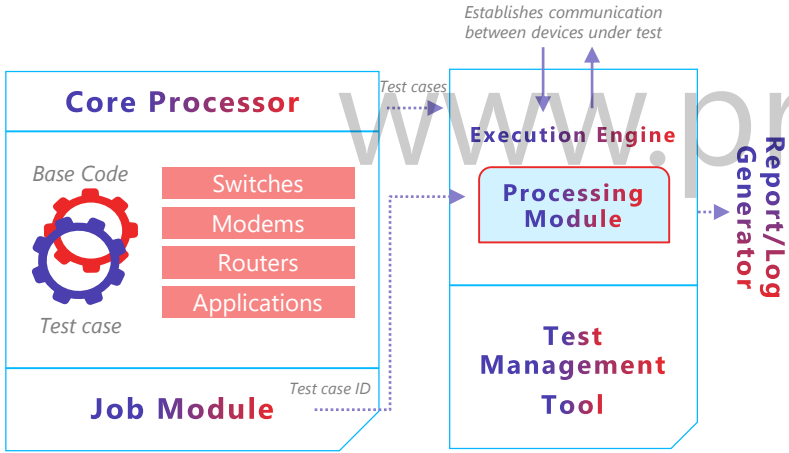


Fig: Execution Engine

Recommendations

Develop an efficient execution engine to enable faster processing with

1

- Open-source Python packages to consume information from the core processor
- SSH (Secure Shell Protocol) & Telnet logic to connect the devices, establish communication between devices/applications under test and test case parsing
- Test step, test snap, and test case (traditional) methods for test case execution

To ensure consistent results, the device server connectivity of running network devices must be up and running

2

Add test case results automatically in the test management tool (e.g., qTest) for managerial review

3

- Eliminate the need for a separate repository to manage/store test results
- Provide detailed logs and test case results for review and analysis

Build an auto-dumper feature to enable failure debugging with reduced TAT (Turnaround Time)

Auto-dumper to generate logs for failed cases to facilitate further analysis

Easily adapt to dynamic topologies using rapidly scalable logic

4

Same test case for different topologies in the broadband residential gateway

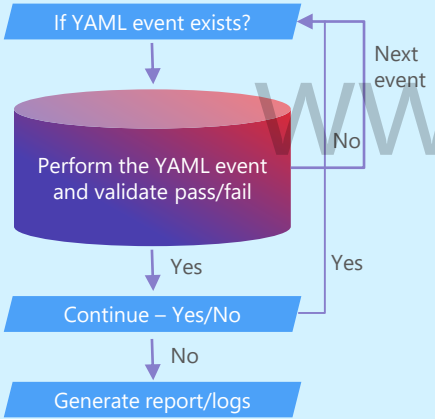
Execute test cases effectively using **test step, test snap & test case (traditional)** methods

A hybrid model to execute test cases

Recommendations

Expedite test case execution using YAML events

- Select events and execute them in a sequential manner
- Generate reports and logs based on pass/fail results
- Criteria based failure event handling which leads to either continued execution or exit



Test Case Processor | **Execution Engine** | Report / Log Generator | A | B

Leverage test step, test snap & test case (traditional) methods for test case execution

Test step: Execute the test case step by step

- Use YAML events and actions-based validation commands

Test snap: Capture snapshot of the session, pre- and-post-execution trigger to validate changes and device stability

- Enable health-check of the network devices
- Verify uptime, admin shut down, and feature validation

Test case (traditional): Automate traditional way of coding style of test cases to support backward compatibility

Use Jenkins to schedule the test execution based on user requirement

- Ability for unattended scheduling: time-based or day-based
- Execute automatically if any release is available or posted

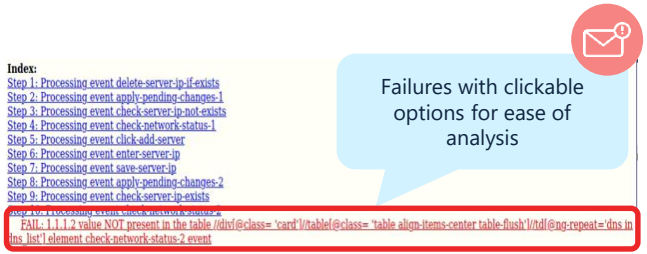
Execution engine should provide test results (pass/fail) or logs to report/log generator to build customized reports

Contextual **auto-dumping** enables quicker troubleshooting & an 80% reduction in time to locate the failure

Test Case Processor | Execution Engine | Report/Log Generator

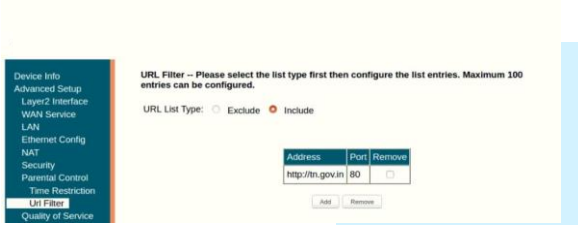
Indexing feature to debug test result log

- Configure test results in the form of logs with navigation links
- Highlight failures with clickable options for ease of analysis
- Capture device condition in failure state with device log snapshot feature
- Auto-dumper debugs failures with ease and reduces turnaround time
- Archive logs to save the disk space



Integrate with a test management tool for high-level analysis

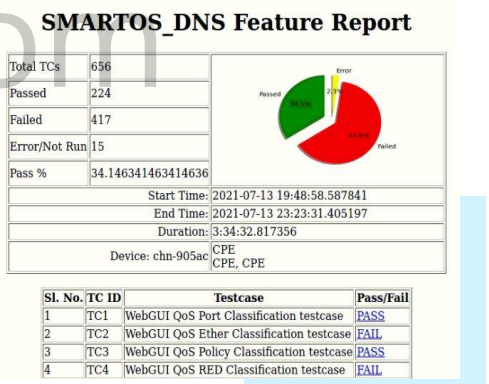
Upload test result logs automatically into the test management tool for easy tracking/debugging



Report summary

Customize reports as per user requirements such as:

- Number of test cases executed
- Number of test cases passed/failed
- Time taken to complete test
- Pass and fail percentages
- Features tested, etc.



SMARTOS_DNS Feature Report

Total TCs	656
Passed	224
Failed	417
Error/Not Run	15
Pass %	34.146341463414636
Start Time:	2021-07-13 19:48:58.587841
End Time:	2021-07-13 23:23:31.405197
Duration:	3:34:32.817356
Device: chn-905ac	CPE CPE, CPE

Sl. No.	TC ID	Testcase	Pass/Fail
1	TC1	WebGUI QoS Port Classification testcase	PASS
2	TC2	WebGUI QoS Ether Classification testcase	FAIL
3	TC3	WebGUI QoS Policy Classification testcase	PASS
4	TC4	WebGUI QoS RED Classification testcase	FAIL

Business benefits achieved by a leading DSP in North America, that leveraged unified automation framework

Microsoft Excel Worksheet

Implementing the recommended framework as discussed in this insight resulted in the following benefits

Reduced

34%

in time to market

28%

savings in development time

60%

of test cases were automated and that had saved around

35%

manhours per release

Saved

33%

in execution time

THANKS!

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THANK YOU!