

Unlocking Premium Apps Certification on RDK Video Devices

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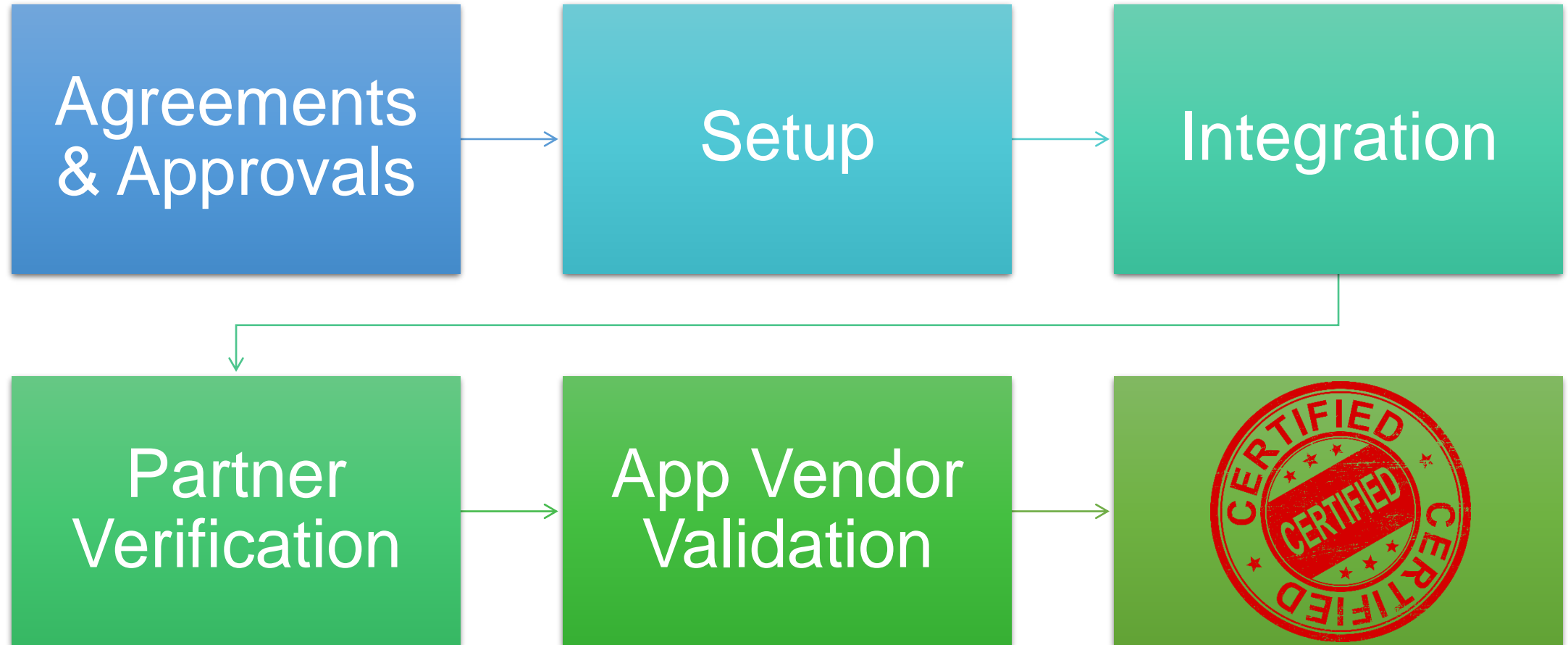
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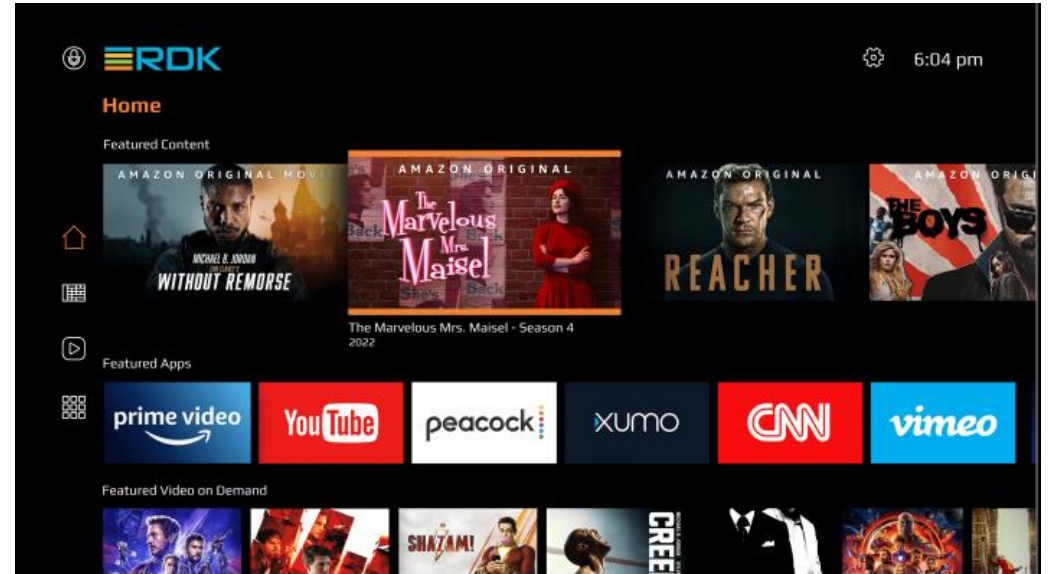


Premium Apps Certification Process



Premium Apps Certification Test Suites

1. Netflix – Netflix Test Studio (NTS)
<https://nts.prod.netflixpartners.com>
2. YouTube – YouTube Test Suite (YTS)
<https://ytlr-cert.appspot.com/latest/main.html>
3. Amazon Prime – Amazon Video Test Suite (AVTS)
<https://partnercentral.amazon.com/<project-id>/avts>

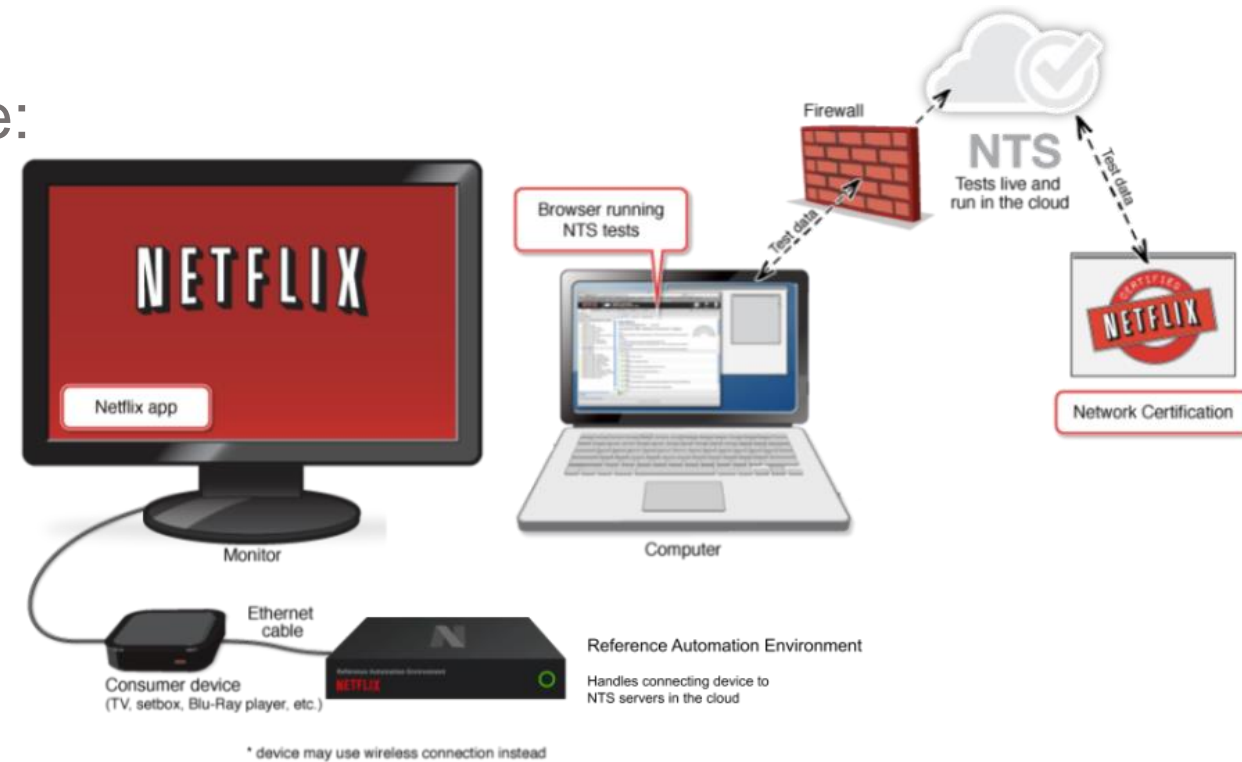




Netflix Pre-certification

Netflix Test Studio (NTS)

- Primary Netflix Certification Tool
- Provides standard set of tools to measure:
 - Responsiveness assessment
 - Overall experience quality
- Cloud-based automation framework
- Can remotely control Devices Under Test



NTS – Test Environment

DUT Types

Sink

- Smart TV
- Normal TV

Source

- Set Top Box
- HDMI Sticks
- BlueRay Disk Player

Test Equipments

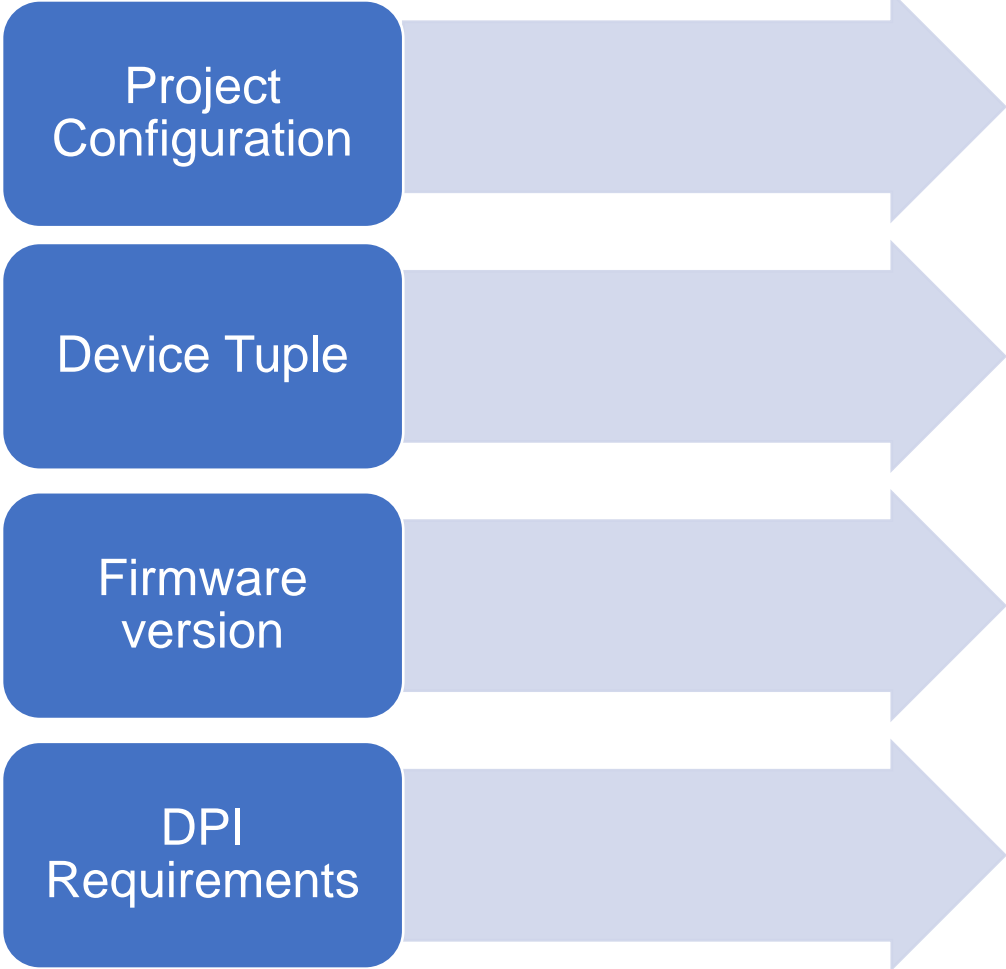
RAE

- Connects NTS servers with DUT

Eyepatch

- Monitor playback problems using A/V sensors

NTS – Pre-requisites



Projects / [redacted] ARM RealTek 4K 5.1

Created on May 6, 2020 - MVPD Standard - CMCSTX1006

Setup

- Model Group
- Partnership

Specs

- Device Models
- NRD Features
- User Interactions
- Remote Controls

Integration

- Checklist
- ESN Requests
- Device Shipments
- Security Review
- Device Info Review

Certification

- Coverage
- Submissions
- Exemptions
- Bugs
- Help Tickets

Model Group Configuration

Status: **Approved** Assignee: Scott Twombly

Overview

Model group name: [redacted] ARM RealTek 4K

Market category: MVPD

Description: [redacted] ARM RealTek 4K Set Top Box

Deploy to field date: N/A

Settings

ESN starts with: [redacted] 006

Device Category: Set Top Box

Chipset: Realtek RTD1319

Dependencies

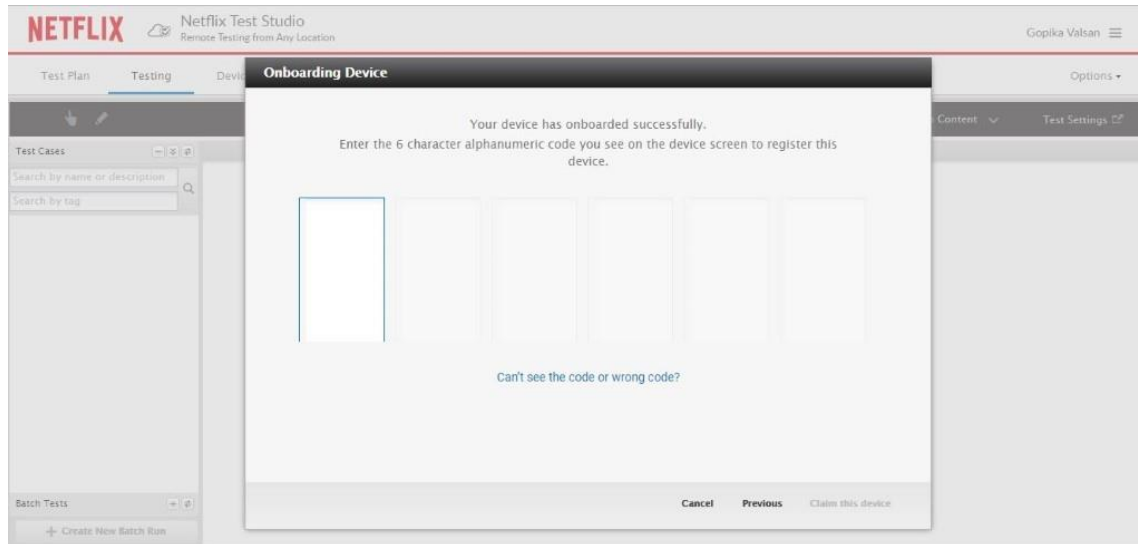
Based on SRI	No
Based on Scaling Platform	No
Is an SRI	No
Is a Scaling Platform	No



New Device Configuration in NTS

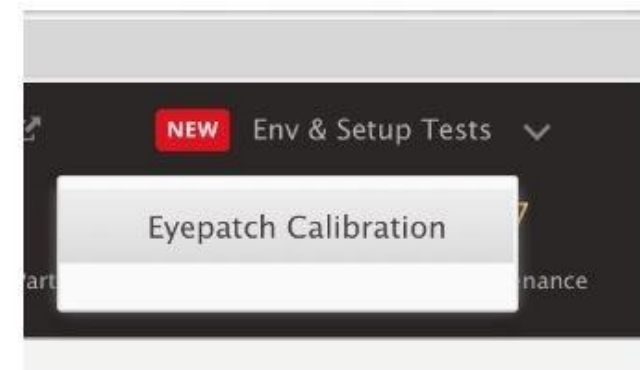
Device Claiming using RAE

- Connect the device to the RAE through ethernet.
- Launch Netflix app on the DUT.
- On the Netflix Partner Portal, confirm claim code when prompted.
- NTS Portal indicates that device is connected successfully.



EyePatch Calibration

- Onboard the DUT to NTS portal using RAE.
- Attach EyePatch device to DUT
- Start Calibration test from NTS portal
- On completion, NTS UI indicates pass or fail through a pop-up message



NTS Test Execution

The device specific test plan automatically gets selected during on-boarding process.

Partners can select, view, & run test plans in Certification tab.

- Test plan contains both automated and manual test cases

Automated test cases will be executed, and results updated in partner portal

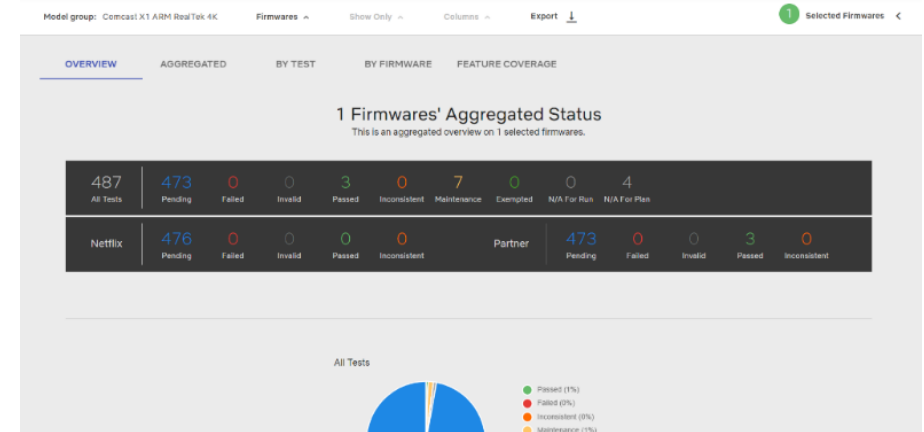
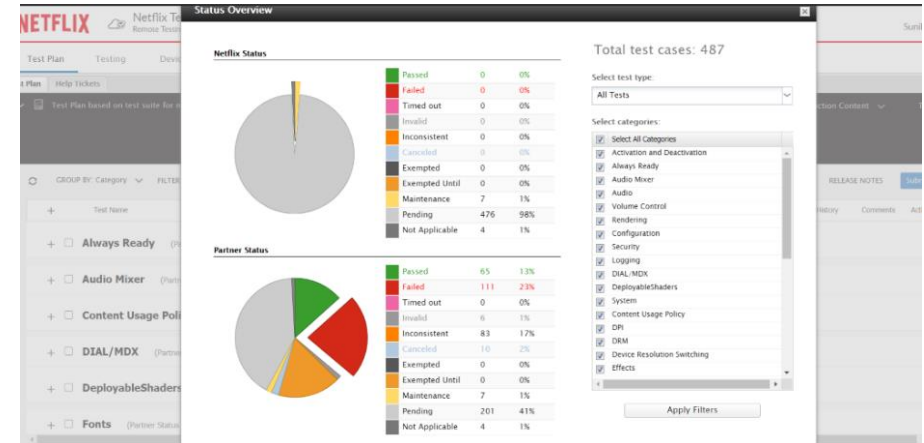
- For Manual test cases, results need to be updated manually on the portal after execution.

Test Name	Feature	Estimated Time	Test State	Partner Result	Netlix Final Result	Issues	History	Comments	Actions
ACT-004-Activation P	base.AVPlayback	00:01:30		Passed					...
ALWAYS-F Always Fres	AlwaysFresh	00:01:00		Passed					...
AUDIO-01 audioBuffer	base.Configuration	00:01:00		Passed					...
AUDIO-02 Alternate A Tracks	base.AVPlayback	00:03:00	Maintenance						...
AUDIO-02 Alternate A Between Tr	SI Audio	00:03:00	Maintenance						...
AUDIO-02 Alternate A Tracks	DolbyAtmos	00:01:00	Maintenance						...
AUDIO-02 Alternate Audio - Dolby Atmos - Switching audio while in pause state - HEVC	DolbyAtmos, HEVCM...	00:03:00		Failed					...
AUDIO-025-TC13 Alternate Audio - Dolby Atmos - Switching audio while in pause state - HDR10	DolbyAtmos, HDR10	00:03:00		Failed					...

Test Results Verification

NTS Execution Results

- Test results will be available in partner portal.
- Portal provides facility to view and compare results.
- All test cases in the test plan should pass to achieve device readiness/precertification completion.
- After precertification completion, device needs to be shipped to Netflix team for certification.
- Netflix team runs certification suite on the device at their end.
 - Issues reported (if any) need to be fixed and resubmitted.
- On completion of certification, Netflix management approves distribution of Netflix application.



Learnings from Netflix Integration

• Challenges

- Integration of new set of features introduced by Netflix app
 - On-the-fly Audio Switch
 - Native Frame Rate
- NTS support for validation of new features
- Some test cases/features were not verifiable due to external constraints

• Solutions

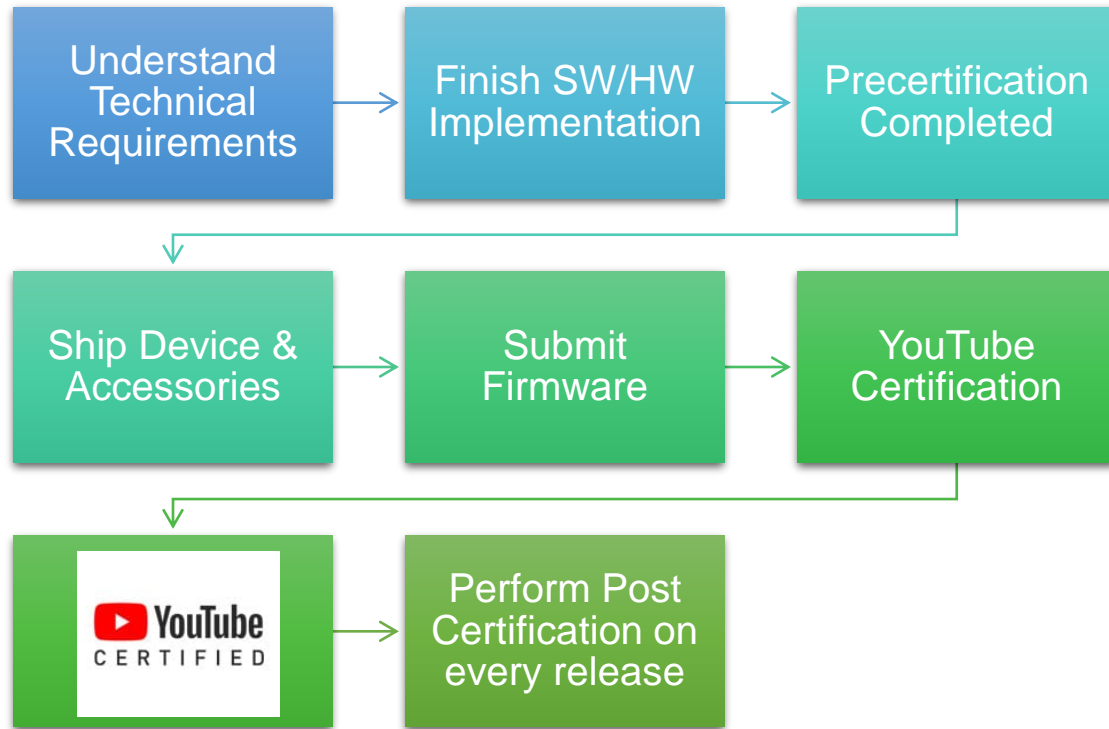
- Closely worked with SoC vendor to enable support for these features.
- Supported SoC vendor to fix issues reported during validation of new features.
- Supported SoC vendor to identify such scenarios and get waivers.



YouTube

YouTube Pre-certification

YouTube Certification Procedure



- YouTube Test Studio (YTS) suite provides predefined tests for YouTube certification
- Execution Approaches:
 - Execution of Tests from UI
 - Execution using YTS CLI
 - Execution using YTAS

Approach #1: YTS Execution through UI

- Update Cobalt plugin config file with [test suite URL](#) and reboot the device

<https://ytlr-cert.appspot.com/latest/main.html>

- Load cobalt plugin from Browser UI or through curl command to launch test menu page
- Select test suite to start test execution on DUT.
- Verify results by analyzing failure logs displayed in Cobalt browser
 - Green rectangle shown against each passed test case.. Red indicates failed test cases,

[2021] MSE Conformance Tests (v 20240125)
MSE Spec Version: Current Editor's Draft | webkit prefix: false | Default Timeout: 60000ms
Use ⌘+⬅️/⌘+➡️ to move around, use ENTER to select.

[MSE Conformance Tests](#) [MSE Codec Tests](#) [EME Conformance Tests](#) [Cobalt Spherical Tests](#) [Progressive Tests](#) [VP9 SFR Tests](#) [H264 SFR Tests](#) [AV1 SFR Tests](#) [HFR Tests](#) [VP9 Widevine](#)
[H264 Widevine SFR Tests](#) [Widevine HFR Tests](#) [High Bitrate Tests](#) [High Bitrate Widevine Tests](#) [Type Support Tests](#) [Functional Tests](#) [CSS Conformance Tests](#) [HTML DOM Element Tests](#) [DOM C](#)
[DOM Document Tests](#) [DOM charData, window & Miscellaneous Tests](#) [Format Support Tests](#) [Manual Tests](#)

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Media Element Core	MSE Core	39. SFRAccuracy
1. InitialMediaDuration	19. MediaSourceEvents	40. HFRAccuracy
2. InitialMediaVideoWidth	20. VideoBufferSize	41. SFRSpecAccuracy
3. InitialMediaVideoHeight	21. VideoBufferSpeed	42. HFRSpecAccuracy
4. InitialMediaReadyState	22. StartPlayWithoutData	43. SFRPausedAccuracy32ms
5. InitialMediaSrc	23. InBufferSeek	44.
6. InitialMediaCurrentSrc	24. StartPlayAtTimeGt0H264+AAC	45. Test the currentTime granularity when pause.
	25. StartPlayAtTimeGt0VP9+Opus	46. HFRPausedAccuracy100ms
XHR	26. EventTimestamp	
7. XHRUint8Array	27. SeekTimeUpdate	MSE Formats
8. XHRAbort	28. AppendWindowStart	47. AACSupport
9. XHROpenState	29. AppendWindowEnd	48. H264Support
	30. ChangeType.H264.VP9	49. VP9Support
MSE Core	31. ChangeType.H264.AV1	50. OpusSupport
10. Presence	32. ChangeType.VP9.H264	51. AV1Support
11. Attach	33. ChangeType.VP9.AV1	
12. AddSourceBuffer	34. ChangeType.AV1.H264	Media
13. AddSBEException	35. ChangeType.AV1.VP9	52. H264FrameGaps
14. RemoveSourceBuffer	36. AVSync.AAC	53. H264FrameOverlaps
15. InitialMSDuration	37. AVSync.Opus	54. HE-AAC/ExplicitSBR
16. InitialMSReadyState	38. PlaybackRateChange	55. HE-AAC/ImplicitSBR
17. Duration		
18. MediaElementEvents	MSE currentTime	

Approach #2: YTS Command Line Interface (CLI)

- YTS CLI automates the test process and makes it more scalable
- Installed on the same network as that of Device Under Test (DUT).
- Discovers DUT and starts YTS execution.
- Capable of executing:
 - a single test case,
 - test cases of a specific category
 - the whole test suite.

Sample Test Execution using YTS CLI

```
root@Ubuntu22:~$ yts discover
Searching for devices...
(58) AH212_320d020500000000a0e400419105600,
Rdkcommonport AH212 (192.168.1.2)
root@Ubuntu22:~$
root@Ubuntu22:~$ yts test 58 "Functional Tests User
Agent Firmware Version"

16:38:22.687 YTS CLI: 1.0.20231225
A new version is available! Run 'yts update' to
install.
16:38:30.560 Version of tests: 20240125
16:38:35.526 Functional Tests
16:38:35.527   User Agent
16:38:35.527   Firmware Version
16:38:35.815   TestExecutor: Test 73:Firmware
Version STARTED with timeout 60000
16:38:35.821   TestExecutor: Test 73:Firmware
Version PASSED.
16:38:35.827   ✓ PASSED
16:38:35.837
16:38:36.112 Executed 1 of 1 test SUCCESS.
root@Ubuntu22:~$
```


YTS CLI - Test Results Verification

- Results displayed on console along with logs
- Failure results includes a short summary of failure reason.
 - Additional logs can be enabled for detailed analysis

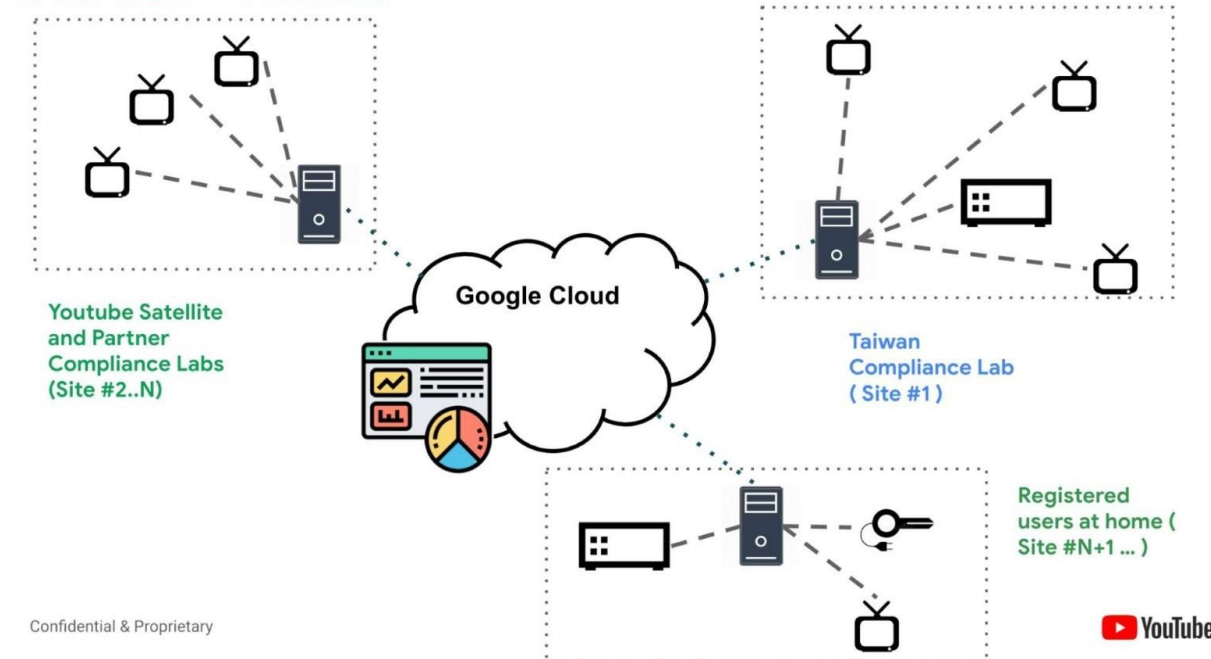
Failed Test Case Sample

```
madhavi@24160-madhaviVM:~/yts_22_cli/yts_server$ yts test 66 "Functional Tests IFA Has Advertising ID"
15:12:20.957 YTS CLI: 1.0.20221115e
A new version is available! Run 'yts update' to install.
15:12:24.490 Version of tests: 20230110
15:12:24.496
15:12:27.866 Functional Tests
15:12:27.867 IFA
15:12:27.867 Has Advertising ID
15:12:27.886 X FAILED
15:12:27.886 - advertising ID shouldn't be empty: Expected '' not to equal ''.
15:12:27.887 Debug this test:
https://yts.devicecertification.youtube/agent/agent.html?test_module=test_modules%2Fweb_
tests%2Fweb_tests.js&test_filter=Functional%20Tests%20IFA%20Has%20Advertising%20ID
15:12:27.889
15:12:27.916 *****
15:12:27.919 * Failures *
15:12:27.919 *****
15:12:27.920
15:12:27.920 Functional Tests IFA Has Advertising ID
15:12:27.920 - advertising ID shouldn't be empty: Expected '' not to equal ''.
15:12:27.920
15:12:27.920 Executed 1 of 1 test (1 FAILED).
```

Approach #3: Execution using YTAS

- YouTube Test Automation System (YTAS) - designed for integration with the partner's automation CI/CD pipeline
- Includes Restful API, database, multiple device control, and Google Cloud Platform integration.
- Partners can choose any device, run the selected automatic test cases, and upload the test results to the portal.
- Uses YTS CLI and python commands for connecting to DUT, downloading test suite and test cases execution

Overview - YTAS 2.0



YTAS Test Execution Procedure

- Discover connected devices and retrieve details (through YTS CLI)
 - Command for getting connected devices list:
yts discover
- Retrieve YTS test cases list to be executed
 - Download test case list directly from compliance lab's google drive link; Or
 - Generate test case list using following command:
yts list --json-output={filename}.json
- Run test cases list through Python commands.
 - Option 1: Testing and uploading using one command
python3 ytas_sl.py test [deviceid] [test-case.json] --upload
 - Option 2: Using Separate commands for testing and uploading
 - Command for test execution
python3 ytas_sl.py test [deviceid] [test-cases.json]
 - Command for uploading the test results.
python3 ytas_sl.py upload [test-result-path]
- Test results will be displayed in console with pass/fail status
- Detailed test results gets generated as a zip file and should be uploaded to Google Drive.

Sample Execution

```
root@Ubuntu22:~$ yts discover

Searching for devices...
(58) AH212_320d02050000000000a0e400419105600,
Rdkcommonport AH212 (192.168.1.2)

root@Ubuntu22:~$ python3 ytas_sl.py test 58
[test-cases.json]

..

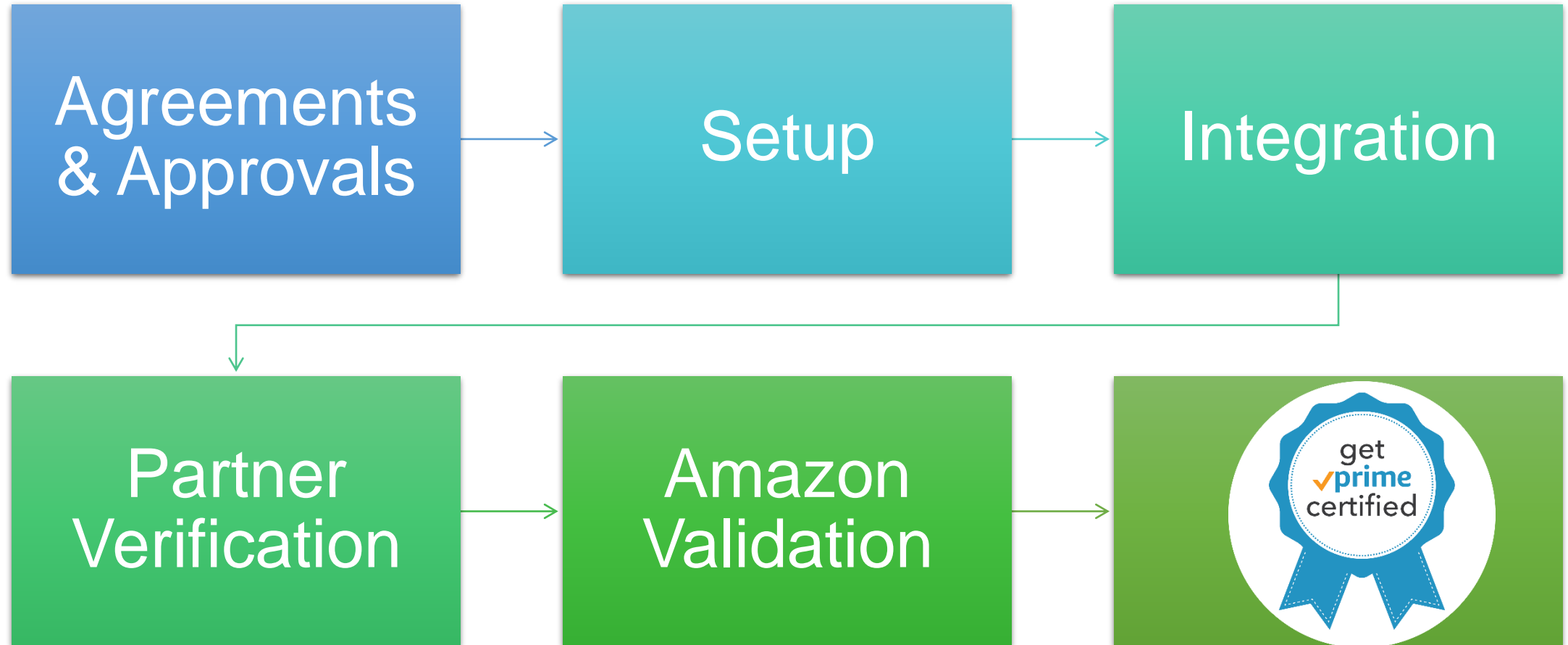
zip file /home/user/ytaa sl/0b7e863e-c56f-
4214-b0db-e9fa8d0c731c.zip created

root@Ubuntu22:~$ python3 ytas_sl.py upload
[test-result-path]
```



Amazon Prime Video Pre-certification

Amazon Prime Video Certification Process



Partner Project Configuration

- A new project should be created in Partner portal and configured with the details of DUT.
- Amazon team will verify the details and approve.
- A customized test plan gets created under Amazon Video Test Suite (AVTS) tab based on project configuration.

Partner Central

Your Projects

- Setup
 - Project & Device Information**
 - Project Access
 - Preliminary Security Assessment
 - Project History
- Integration
 - Device Security Assessment
 - OTD Onboarding
- Verification
 - AVTS Test Accounts
 - AVTS
 - Approval Status
- Operational Status
 - Operational Dashboard
 - HW-CL Dashboard
- Next Tools
 - Robots
 - Operational Dashboard
- Documentation
- ANNOUNCEMENTS

RealTek CHP 2021 Realtek RTD1319 Project & Device Information

Project & Device Information

There is information missing for this project, this is blocking the project from progressing forward. Please fill in Device Information for OTD Onboarding, Device Information for AVTS and App Porting sections. You will know they have been completed when the section is marked as Section Completed.

Project Information

These fields are not during present creation

Attribute	Value
Stage	Done
Project ID	RP-1347
Partner	RealTek
Project Type	Turnkey
Business Model	HWID
Device Type	Chromebook
Model Year	2021
Middleware Provider	RealTek
System Integrator	RealTek
Hardware SOC Vendor	

Activate Windows
Go to PC settings to activate Windows.

Was this page helpful?

Test Cycle Creation

- On AVTS tab, available test cycles will be listed on the right.
- AVTS tests contains both manual and automated test suites.
- Click on “Create Cycle” option to create a new test cycle.
- Select the list of test cases to be added.
- It takes 5 to 6 days to complete all the tests.

prime video | PARTNER CENTRAL

Partner Central

Your Projects

- Set-Up
 - Project & Device Information
 - Project Access
 - Preliminary Security Assessment
 - Project History
- Integration
 - Device Security Assessment
 - DTID Onboarding
- Verification
 - AVTS Test Accounts
 - Approval Status
- Operational Status
 - Operational Dashboard

RealTek CHP 2021 Realtek RTD1319 AVTS

Test Cycle History

Cycle #	Tester	Total Tests	Passed	Failed	Blocked	Pending	Known Service Issues	Not Applicable	Date Created
Cycle 5	RealTek	147	112 (76.2%)	6 (4.1%)	0 (0%)	26 (17.7%)	0 (0%)	3 (2.0%)	2022/11/28
Cycle 4	RealTek	142	117 (82.4%)	0 (0%)	0 (0%)	21 (14.8%)	0 (0%)	4 (2.8%)	2022/08/11
Cycle 3	RealTek	144	122 (84.7%)	0 (0%)	1 (0.7%)	19 (13.3%)	0 (0%)	11 (7.6%)	2021/11/30
Cycle 2	RealTek	144	81 (57.6%)	0 (0%)	4 (2.8%)	52 (36.1%)	0 (0%)	5 (3.5%)	2021/10/25
Cycle 1	RealTek	139	35 (25.2%)	0 (0%)	4 (2.9%)	100 (71.9%)	0 (0%)	0 (0%)	2021/09/20

Create Cycle

Create Cycle

Firmware Version

Ignition X version

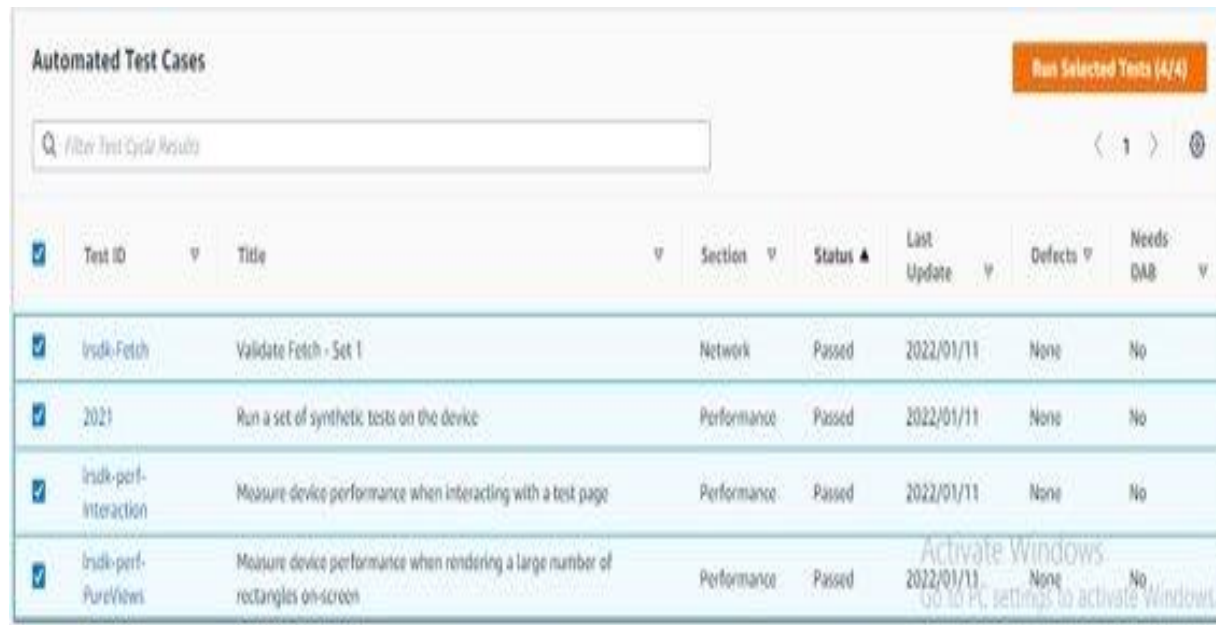
XP Player version

Cancel Submit

Automated Tests Execution

AVTS Automated Test Steps

- Select the tests to be executed on the device
- Select DUT from partner portal
- Restart DUT and open Prime Video application.
- The text cycle gets triggered, and progress can be seen in real time on Partner Central.
- Results can be found under the **Automated Test Cases** section in the portal.



Automated Test Cases

Run Selected Tests (4/4)

Filter Test Cycle Results

<input checked="" type="checkbox"/>	Test ID	Title	Section	Status	Last Update	Defects	Needs DAB
<input checked="" type="checkbox"/>	Indk-Fetch	Validate Fetch - Set 1	Network	Passed	2022/01/11	None	No
<input checked="" type="checkbox"/>	2021	Run a set of synthetic tests on the device	Performance	Passed	2022/01/11	None	No
<input checked="" type="checkbox"/>	Indk-perf-Interaction	Measure device performance when interacting with a test page	Performance	Passed	2022/01/11	None	No
<input checked="" type="checkbox"/>	Indk-perf-PureViews	Measure device performance when rendering a large number of rectangles on-screen	Performance	Passed	2022/01/11	None	No

Manual Tests Execution

AVTS Manual Tests

- Select test cases for manual execution.
- Ensure test cases preconditions are met.
- Execute test case manually
- On completion, update test results with status and comments.
- Repeat above steps for each manual test.
- Consolidated results can be found under **Manual Test Cases** section on AVTS Portal.

Test Cycle Properties				
Owner	AVTS Version	Creation Date	Firmware Version	Ignite Version
RealTek	v8.2	2021/11/30	Linux_4.9.119_armv7l_V2.3+rdk_reference_implementation	lrc-1.0.75357.0

Test Cycle Results Summary							
Total Tests	Passed	Failed	Blocked	Untested	In Progress	Known Service Issues	Not Applicable
144	122 (84.7%)	0 (0%)	1 (0.7%)	9 (6.3%)	1 (0.7%)	0 (0%)	11 (7.6%)

Manual Test Cases						
<input type="text" value="Filter Test Cycle Results"/>						
< 1 2 3 4 5 > 🔍						
Test ID	Title	Section	Status	Last Update	Defects	
494506	Exit button on the remote correctly shuts down the application from Home Menu	Device Operations	Passed	2022/01/25	None	
2730602	HFR H264 HD 50fps plays content successfully on UHD device	Player	Passed	2022/01/25	None	

Learnings from Amazon App Integration

- Challenges

- Unable to validate US region specific test cases from other regions
- Some of the test cases/features were not verifiable due to external constraints.

- Solutions

- DUT to be whitelisted by Amazon for accessing region-specific contents.
- Supported SoC vendor to identify such scenarios and get waivers

Conclusion

- Premium app pre-certification procedures are well defined
- Deploying RDK Video Accelerator devices integrated with Premium Apps will help operators succeed in the market.
- Tata Elxsi can support with the premium app pre-certification
- Tata Elxsi co-worked with SoC vendors to certify premium apps on their end customer's RDK-Video devices that are deployed globally.



Questions?



Thank You