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# Mainline CTS (MCTS)

Mainline Compatibility Test Suite (MCTS) aims to improve the Mainline compatibility testing experience. MCTS is a subset of [CTS](https://source.android.com/docs/compatibility/cts/) (<https://source.android.com/docs/compatibility/cts/>), and covers the CTS test cases that test Mainline. It combines CTS quarterly released tests with Mainline monthly released CTS tests in [Mainline Test Suite \(MTS\)](#) (/mainline/test/mts). This ensures that OEMs run correct versions of both CTS and CTS in MTS.

## Run MCTS

MCTS runs automatically when you [Run CTS](#) (<https://source.android.com/docs/compatibility/cts/run>).

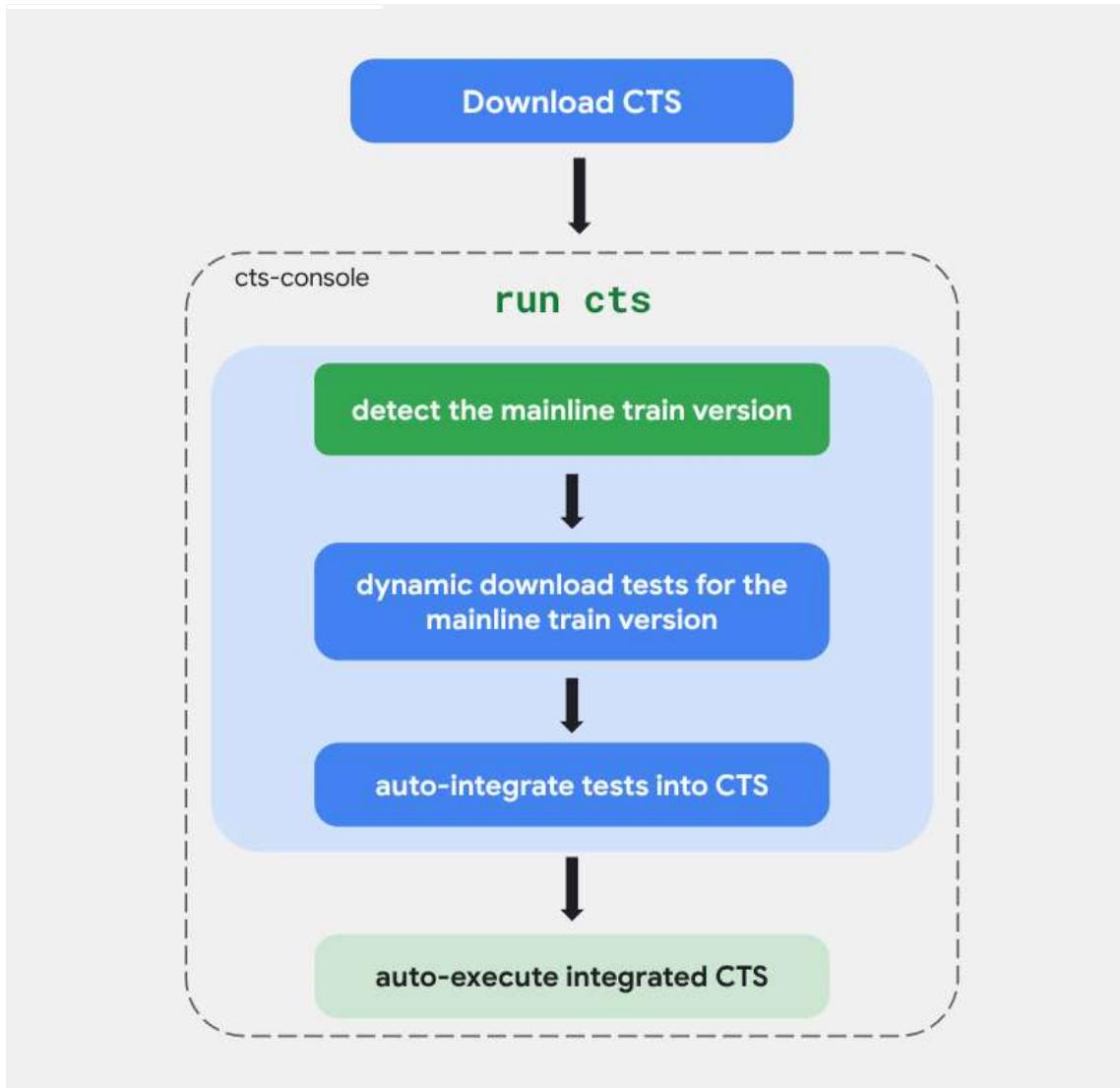
## MCTS dynamic download

The MCTS uses a dynamic download mechanism to verify the correct tests are run on a device. This is the process:

1. The CTS tool verifies the version of the preloaded Mainline modules on the device under test (DUT).
2. Based on this version, the CTS tool downloads the corresponding MCTS package and integrates it with the existing CTS package.
3. The standard CTS `run cts` command executes all tests within the combined CTS package, including the newly integrated MCTS tests.
4. Crucially, MCTS leverages the dynamic download framework within CTS tool to automatically download and integrate any necessary Mainline related tests without requiring additional action from the users.

**Note:** After the Mainline monthly MCTS release, MCTS isn't modified.

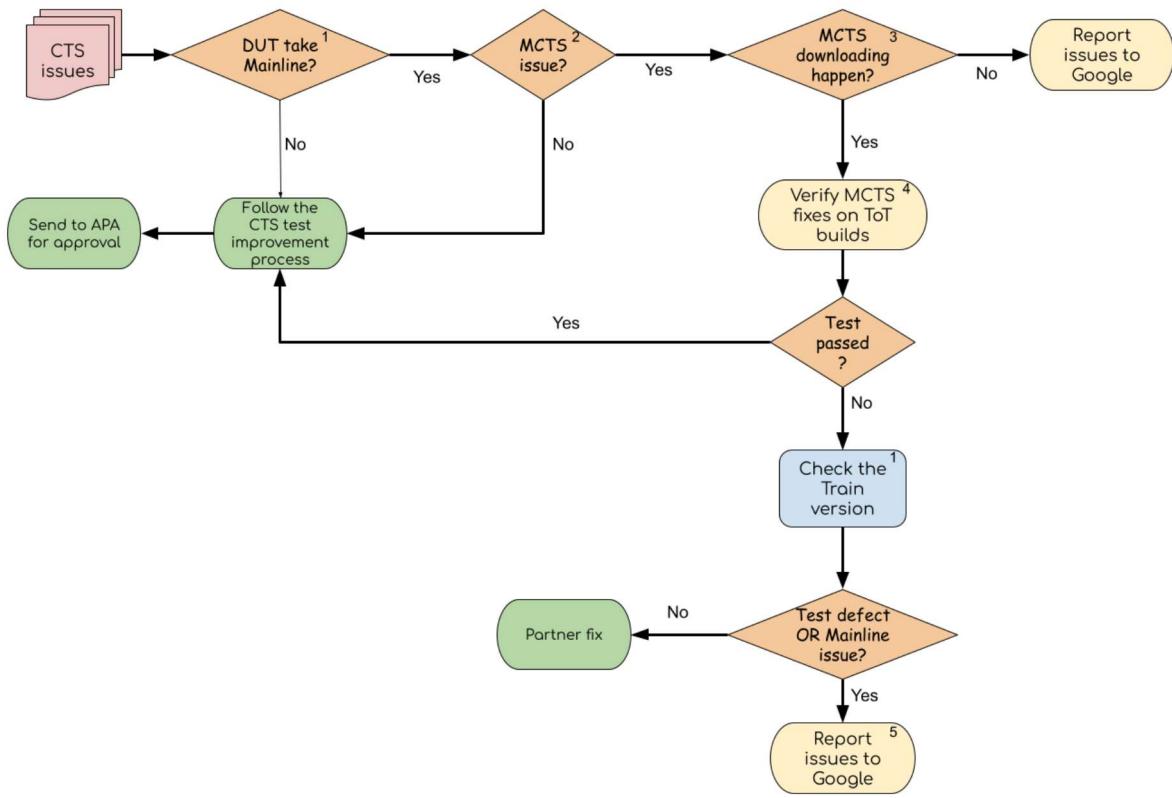
Figure 1 illustrates the MCTS dynamic download:



**Figure 1.** MCTS dynamic download.

## Debug MCTS issues

Follow the recommended steps in Figure 2 to debug and resolve any MCTS failures you encounter. This ensures that Google can efficiently handle your tickets. This section explains each of the steps.



**Figure 2.** Debugging MCTS issues.

## Step 1: Check if the device takes Mainline, and the installed Mainline version

The Mainline train and MCTS versions have the same version number and are both released monthly. The version number format is YYYY-MM, where YYYY is the year and MM is the month. For example, 2024-01 represents January 2024. You can find the Mainline train version in the version code of the Train Version Provider (TVP) module (`com.google.android.modulemetadata`).

You can look up the Mainline train version in the APA portal by looking for `com.google.android.modulemetadata`.

OR

Use the following `adb` command to list the TVP and fetch the Mainline train version:

```
$ adb -s {SERIAL} shell pm list packages --show-versioncode | grep com.google.andr
```

Then use Module Versioning (/mainline/start/versioning) to parse the YYYY-MM format.

If the DUT is preloaded with the TVP module, then it takes Mainline. If the TVP module isn't preloaded on the DUT, then it doesn't take Mainline.

## Step 2: Check for MCTS failure

1. To check the corresponding MCTS list, download the MCTS list by going to

[https://dl.google.com/dl/android/xts/mcts/YYYY-MM/arm64/mcts\\_test\\_list.txt](https://dl.google.com/dl/android/xts/mcts/YYYY-MM/arm64/mcts_test_list.txt)

and replacing the YYYY-MM in the URL with the YYYY-MM format Mainline train version that you obtained in step 1.

2. You can also check the logs to see if the test runs completed successfully.

If the CTS test runs contain MCTS modules, then the file `android-cts/logs/{DATE}/inv_xxxx/XtsTradefedTest+test_xxxxx/mcts_test_list.txt` contains a full list of downloaded MCTS modules.

After you obtain the MCTS list, check if the name of the failed test module is present in the list. If it is, this indicates that the failure is due to an MCTS module.

## Step 3: Check if dynamic download happened

**Note:** Don't set the flag `ENABLE_XTS_DYNAMIC_DOWNLOADER=false` when running CTS. Use it only to verify MCTS fixes on tip of tree (ToT) builds.

To find the complete logs related to MCTS dynamic downloading, search for the keyword `MctsDynamicDownloadPlugin` in the file `android-cts/logs/{DATE}/olc_server_session_log/olc_server_session_log.txt`.

Several helpful logs are available when MCTS dynamic downloading occurs.

The log message `I/MctsDynamicDownloadPlugin: Finished MCTS test modules preparation.` indicates that MCTS dynamic download executed successfully.

Other key information is available in the logs:

- The log data in Figure 3 shows that the DUTs are preloaded with the 2024-01 Mainline train. So you should download the MCTS cases released together with the 2024-01 Mainline train:

```
03-14 21:05:46 PDT I/LocalFileUtil: File /usr/local/google/mobileharness/mh_res_files/devtools/mobileharness/infra/controller/test/util/xtsdownloader/conf
03-14 21:05:46 PDT I/ResUtil: Copy resource /devtools/mobileharness/infra/controller/test/util/xtsdownloader/configs/module_info_map.textpb to /usr/local/
03-14 21:05:47 PDT I/MctsDynamicDownloadPlugin: Get mainline train version(YYYY-MM): 2024-01 [CONTEXT device_id="28181FDH2006F3" test_id="0cbef877-6d10-42
03-14 21:05:47 PDT I/MctsDynamicDownloadPlugin: Start to download: https://dl.google.com/dl/android/xts/mcts/2024-01/arm64/android-mcts-networking.zip [0
03-14 21:05:47 PDT I/MctsDynamicDownloadPlugin: File https://dl.google.com/dl/android/xts/mcts/2024-01/arm64/android-mcts-networking.zip does not exist, n
```

**Figure 3.** MCTS log train version.

- You can also search for the words `Downloaded MCTS test modules` to view all the downloaded MCTS test modules and verify that these test modules are expected.

## Step 4: Verify MCTS fixes on ToT builds

To verify MCTS tests using the latest ToT build, use step 3c in [Verify failed tests using ToT builds](#) (/gms/testing/overview/test-improvement-request-guide#verify-tot-builds).

## Step 5: Report MCTS issues to Google

Submit tickets to Google if you encounter the following scenarios:

- Your DUT is taking Mainline and running MCTS modules, but MCTS downloading doesn't occur or fails due to an error during the process.
- You believe that the MCTS module failure is either a test defect or a Mainline issue.

When you submit a ticket to Google, include the Mainline train version, the files `mcts_list.txt` and `olc_server_session_log.txt`, and the general CTS log files.

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