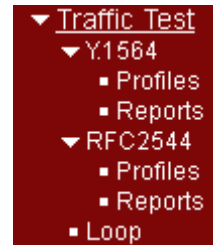# Traffic Test Configuration

From the **Configuration** > **Traffic Test** menu path you can configure:

- **Y.1564** Profiles and Reports,
- **RFC2544** Profiles and Reports, and
- **Loop** (TT-Loop) tests.

Configuration > Traffic Test > Y.1564

Y.1564 is an Ethernet service activation test methodology whose purpose is to test Ethernet Virtual Connections (EVCs). One single EVC is a collection of one or more ordered set of rules, known as ECEs. Each ECE describes matching criteria for traffic arriving at the UNI. The matching criteria configuration is very flexible, and can be made almost arbitrarily complex, but also very simple. For example, an Ethernet Virtual Private Line (EVPL) ECE simply matches on a particular VLAN ID.

Besides UNI matching criteria, the ECE defines a set of actions. In relation to Y.1564, the most important action is the policer it maps to. Policers are configured separately, and multiple ECEs may point to the same physical policer, thus sharing the bandwidth set aside by the policer. Policers can also be attached to an EVC, and the ECE can be configured to use the EVC policer rather than its own.

In order to execute a Y.1564 test, a set of Y.1564-specific configuration along with information about which EVC/ECE to test is needed. The Y.1564-specific configuration is independent of the EVC/ECE to test, and is called a 'profile'. The profile can be persisted to flash and used over and over again as input configuration to test EVCs/ECEs as they are created. The result of executing a profile is called a 'report'. Up to 16 profiles and 10 reports can be stored on the switch.

Test of an EVC/ECE is initiated via the **Configuration** > **Traffic Test** > **Y.1564** > **Reports** page.
When executing, the switch takes the EVC under test out of service and generates frames on behalf of the customer at rates defined by the selected Y.1564 subtests and the individual ECEs' policer configurations. The frames will undergo the same mechanisms as has the frames arrived on the UNI, and therefore be subject to policing and switching in the NNI domain.

In the current release, the switch will generate Y.1731 OAM frames as background traffic, and it expects these frames to be looped in the remote end (DST; destination). The near end will need to know whether the remote end is Y.1731 OAM aware, and if so, it will generate Y.1731 LBM frames and expects the remote end to reply with Y.1731 LBR frames. If the remote end is not Y.1731 OAM aware, the near end transmits Y.1731 TST frames and expects these frames to be looped back with DMAC and SMAC addresses swapped.

For delay measurements, the switch will transmit Y.1731 DMM if the remote end is OAM aware and Y.1731 1DM frames if not.

Upon subtest completion, the switch will assess the measured performance against the policer configuration (SLA), while observing the Service Acceptance Criteria (SAC) embedded in the profile. The result of a subtest is either PASS or FAIL. If a subtest fails, execution stops and the whole test is considered failing.

This page provides an overview of the defined profiles along with options for editing and deleting them and creating new.

Navigate to the **Configuration** > **Traffic Test** > **Y.1564** > **Profiles** menu path.

If no profiles are currently defined, the table contains one line stating "<No profiles>".
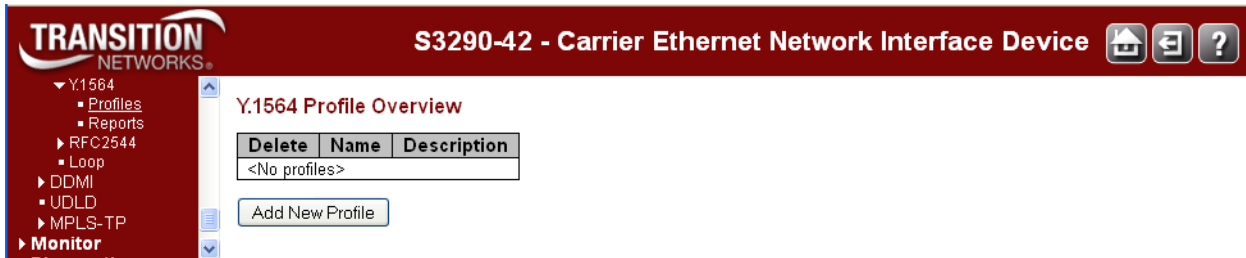
Each parameter is defined below.

Delete

Click the **Delete** button to delete the profile in question.

Name

A unique name identifying the profile. Click the name to edit the profile.

Description

The profile's description as entered in the profile editor, which is activated by clicking the name of the profile.

Buttons

Add New Profile: Create a new profile. This button is grayed out if the maximum number of profiles is already defined.

At the Y.1564 Profile Configuration page, configure the Y.1564 Common Parameters, Service Acceptance Criteria, CIR and EIR Configuration Test Parameters, Traffic Policing Test Parameters, and Performance Test Parameters as described below.

Configuration > Traffic Test > Y.1564 > Profiles

A "profile" defines key parameters and subtests to be executed as part of the Y.1564 service activation testing.

The Y.1564 profile configuration is divided into a Common Parameters section, a Service Acceptance Criteria section, and a section for each of the four subtests that can be selected. At least one subtest must be enabled, and the enabled tests are executed in the order listed on the page.

Once a profile is created, use it to test one or more ECEs on the Y.1564 Test Start page, reachable by clicking "**Start New Test**" on the **Configuration** > **Traffic Test** > **Y.1564** > **Reports** page.

Common Parameters

Profile Name

Each profile must have a name that uniquely identifies it, since it is this name that is used in the process of executing a profile. The length must be from 1 - 32 characters with each ASCII character being in the range of 33 -126.

Description

This field lets you provide a textual description of the profile (up to 128 characters).

Dual-ended

For future use. In this revision of the software, this checkbox <u>must be unchecked</u>, meaning that this switch expects all generated traffic to be looped at the remote end (single-ended). Reporting and assessing of PASS/FAIL is therefore done by the S3290.

DST is OAM-aware

When checked, this switch transmits Y.1731 DMM frames for delay measurements and Y.1731 1DM frames when unchecked. This is the default (checked).

When Traffic Type is 'Y.1731 OAM', this switch transmits Y.1731 LBM frames as background traffic when DST is configured as OAM-aware, and Y.1731 TST frames when not OAM-aware.

Traffic Type

Y.1731 OAM: this switch transmits Y.1731 OAM PDUs as background traffic, and DST is OAM-aware determines the PDU type. In the current version of the software, only one ECE can be tested at a time in this mode. This is the default.

Simulated Customer: the software will generate a pattern per ECE that will hit the ECE, and use the counters to determine PASS/FAIL criteria. Besides supporting simultaneous test of multiple ECEs, 'Simulated Customer' has the advantage that the tester can see directly from the report if they have configured ECEs incorrectly, since the report will show per-ECE counters and fail if an ECE under test is not hit as expected by the traffic pattern.

MEG Level

The MEG level (**0-7**) used in generated Y.1731 OAM frames.

Frame Size

Selects the frame size of the background traffic. Besides the standard frame sizes (**64**, **128**, **256**, **1024**, **1280**, and **1518 bytes**) there are two custom selections:

MTU. The UNI's MTU will be used for the background traffic.
User-defined. Selecting this will un-grey the 'User-defined Frame Size' field, allowing for custom specification of a frame size of the background traffic.

User-defined Frame Size

When Frame Size is set to 'User-defined', this field will un-grey, allowing for a custom specification of a frame size of the background traffic. Valid range is 64 to 10236 bytes.

Dwell Time

When a trial is executed, background traffic is transmitted for a certain period of time. When that period has elapsed, the Dwell Time determines how long to wait before reading hardware counters and status in order to asses the status of the trial. The required dwell time must be at least the worst-case roundtrip time, and therefore a.o. depends on the physical distance between the near and far ends.

The valid range is **100** - **10000** in steps of **100** milliseconds with a default of **500** milliseconds.

Service Acceptance Criteria (SAC)

After each test trial, the trial's measurements are evaluated with respect to a set of Service Acceptance Criteria parameters. If the trial fails, test execution is aborted, and the whole test is considered failing. Otherwise, execution proceeds to the next subtest.

Acceptable FLR

Defines the acceptable Frame Loss Ratio. The Acceptable FLR is measured in permille. Setting this to **1000** effectively disables this check.

The number is used for each of the enabled tests. If the policer belonging to the ECE under test is non-color-aware and the test is injecting traffic above CIR (which can occur in the EIR configuration and the Traffic policing tests), **Method 1** is used when calculating the PASS/FAIL criterion. Otherwise **Method 2** is used.

The FLR number is used in all enabled subtests. Only delay measurement PDUs and green background traffic undergoes FLR check. If the number of looped green frames differs from the number of transmitted green frames by more than the 'Acceptable FLR', the test is considered failing, otherwise passing.

If the EVC contains multiple ECEs that matches on the same VLAN ID (UNI ingress) and the EVC uses 'Tx Lookup' equal to 'VID-PCP', the NNI ingress rules count looped traffic per NNI outer tag's PCP, and therefore provide more detailed information about which ECE is failing, than if the EVC uses 'Tx Lookup' equal to 'VID', where all looped traffic arriving on NNI is counted on the same ECE. The disadvantage of the 'VID-PCP' method is that it uses more chip resources than does the 'VID' method.

Valid range is from **0** to **1000** with a default of **0**‰.

Acceptable FTD

Defines the acceptable Frame Transfer Delay, measured in milliseconds. If the highest observed frame transfer delay exceeds this, the test fails.

The valid range is **0 - 10000** with a default of **0** milliseconds. A value of **0** disables this check.

Acceptable FDV

Defines the acceptable Frame Delay Variation, measured in milliseconds. If the highest observed frame delay variation exceeds this, the test fails.

The valid range is **0 - 10000** with a default of **0** milliseconds. A value of **0** disables this check.

CIR Configuration Test Parameters

In the CIR configuration test, green frames are transmitted in steps of the policer's configured CIR.
The 'Step Count' parameter determines the number of steps (trials) it takes to reach CIR.

The trial will be skipped if the sum of all ECEs under test's green and yellow frames exceed the UNI's link speed.

The trial execution steps are outlined below.

Trial Execution: For each trial, green and possibly yellow frames are transmitted for '(Step) Duration' seconds, after which the profile's Dwell Time is observed, before counters are read and the green traffic counters are evaluated against the SAC's Acceptable FLR. During a trial, delay measurements (DM) are performed and evaluated according to the description in DM Interval.

Enable

Check this to enable the CIR configuration test.

Step Duration

Each step in the CIR configuration test applies background traffic for this number of seconds.

The valid range is **1** - **3600** with a default of **10** seconds.

DM Interval

A Y.1731 1DM or DMM frame (depending on type of test) is transmitted every so many milliseconds, in order to perform delay measurements (DM). The number should be selected so that at least three DM frames are transmitted during a trial in order to obtain delay variation results. After each trial the measured FTD and FDV are compared against the SAC's Acceptable FTD and FDV.

The valid range is **100** - **10000** in steps of **100** milliseconds with a default of **500** milliseconds.

A value of **0** effectively disables transmission of DM frames, which thereby indirectly disables the check against the SAC.

Step Count

The number of steps (trials) used to reach CIR. If, for example, Step Count is set to **4**, four trials are executed. The first runs at 25% of CIR, the second at 50%, then 75%, and finally 100%.

A step count of **1** corresponds to executing the Y.1564 A.1 test (Simple CIR Validation Test).
A step count greater than **1** corresponds to executing the Y.1564 A.2 test (Step Load CIR Test).

Valid range is **1** - **1000** with a default of **4** steps.

EIR Configuration Test Parameters

A Y.1564 test may be started with a particular DEI value per ECE. If this DEI value is set to "Auto", the software will generate two frame flows per ECE if - at the same time - the frame flow is tagged and the policer is color aware (Type set to 'MEF' and Mode not set to 'Blind').

If the policer is not color-aware or the frame flow is untagged, the software will only generate one single (green) flow.

If the frame flow is tagged and the test is started with a particular DEI (0 or 1), then only one frame flow with a DEI of that value will be generated. The frame flow is considered green when DEI is 0 and yellow when DEI is 1. Some tests may not be started when DEI is 1 unless the policer is configured as "Coupled", which allows yellow traffic to utilize green bandwidth. Also, when DEI is configured to 1, the generated traffic uses CIR rates, not EIR.

If the policer's Mode is not set to 'MEF', not only will the test be executed non-color-aware, but EIR will be considered to be 0.

Now, if two frame flows are generated, the Y.1564 "Color-Aware EIR Configuration Test" (B.1) will be executed. Otherwise, the Y.1564 "Non-Color-Aware EIR Configuration Test" (B.2) will be executed.

In B.1, green frames are transmitted at this ECE's share of CIR and yellow frames are transmitted at this ECE's share of EIR.

In B.2. green frames (or yellow if DEI == 1) are transmitted at this ECE's share of the policer's CIR + EIR.

The subtest execution follows the description in Trial Execution.

Enable

Check this to enable the EIR configuration test.

Duration

The EIR configuration test is executed in one single trial, whose duration is configured with this parameter. Valid range is **1** - **3600** with a default of **10** seconds.

DM Interval

A Y.1731 1DM or DMM frame (depending on type of test) is transmitted every x milliseconds in order to perform delay measurements (DM).

The number (x) should be selected so that at least three DM frames are transmitted during a trial in order to obtain delay variation results.

After each trial the measured FTD and FDV is compared against the SAC's Acceptable FTD and FDV.

Valid range is **100** - **10000** in steps of 100 milliseconds with a default of **500** milliseconds. A value of **0** effectively disables transmission of DM frames, which thereby indirectly disables the check against the SAC.

Messages

'Acceptable FLR' must be an integer value between 0 and 1000

'DM Interval' must be an integer value between 100 and 10000

'DM Interval' must have a granularity of 100 msecs

Traffic Policing Test Parameters

One or two frame flows will be generated per ECE in this test. Refer to EIR Configuration Test for a description of the conditions on when to generate one and when to generate two frame flows.

If two frame flows are generated, Y.1564's "Color-Aware Traffic Policing Test" (C.1) will be executed. Otherwise, Y.1564's "Non-Color-Aware Traffic Policing Test" (C.2) will be executed.

In C.1, green frames are transmitted at CIR. Simultaneously, yellow frames are transmitted at 125% EIR if EIR is greater than or equal to 20% of CIR. Otherwise yellow frames are transmitted at 25% CIR + 100% EIR.

In C.2, if the chosen DEI is 0, only green frames will be transmitted. If the chosen DEI is 1, only yellow frames will be transmitted. If EIR is greater than or equal to 20% of CIR, green frames are transmitted at CIR + 125% EIR. Otherwise green frames are transmitted at 125% CIR + EIR.

Now, if green + yellow (converted to line rate) exceeds the actual line rate on the customer-facing (UNI) port, the test is skipped, and execution proceeds to the performance test.

Otherwise the test follows the description in Trial Execution.

Enable

Check this to enable the traffic policing test.

Duration

The Traffic Policing test is executed in one single trial, whose duration is configured with this parameter. Valid range is **1 - 3600** with a default of **10** seconds.

DM Interval

A Y.1731 1DM or DMM frame (depending on type of test) is transmitted every so many milliseconds, in order to perform delay measurements (DM).

The number should be selected so that at least three DM frames are transmitted during a trial in order to obtain delay variation results.

After each trial the measured FTD and FDV is compared against the SAC's Acceptable FTD and FDV.

Valid range is **100 - 10000** in steps of **100** milliseconds with a default of **500** milliseconds.

A value of **0** effectively disables transmission of DM frames, which thereby indirectly disables the check against the SAC.

Performance Test Parameters

In the Performance Test, green frames are transmitted at CIR, usually for a longer period of time (configured with Duration below) to validate the quality of service.

Execution of the test follows the description in "Trial Execution" above.

Enable

Check this to enable the performance test.

Duration

The performance test is executed in one single trial, whose duration is configured   with this parameter.

The Y.1564-specified standard durations are **15 minutes**, **2 hours**, and **24 hours**.   The drop-down box lets you select Y.1564-specified standard durations and a custom, "**User-defined**" duration and specifying the duration in the "**User-defined**" duration field below the drop-down box.
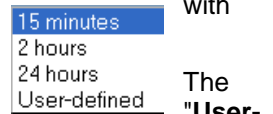
User-defined Duration

When the "Duration" drop-down box is set to "User-defined", this field provides the desired duration. The valid range is **1** - **86400** with a default of **900** seconds.

DM Interval

A Y.1731 1DM or DMM frame (depending on type of test) is transmitted every **x** milliseconds in order to perform delay measurements (DM).

The number (**x**) should be selected so that at least three DM frames are transmitted during a trial in order to obtain delay variation results.

After each trial the measured FTD and FDV is compared against the SAC's Acceptable FTD and FDV.

The valid range is **100** - **10000** in steps of **100** milliseconds with a default of **500** milliseconds.

A value of **0** effectively disables transmission of DM frames, which thereby indirectly disables the check against the SAC.

Buttons

Save: If all input parameters are valid, the profile will be part of the running config and you will be returned to the Y.1564 Profile Overview page.

Reset: Click to undo any changes made locally and revert to previously saved or default values.

Cancel: Return to the Y.1564 Profile Overview page without creating a new profile.

Example

The example below shows three profiles that have been created and saved. You can click the linked text in the Name column (e.g., NewProfile-1) to display the profiles's parameters for viewing or editing.


When a profile is created, use it to test one or more ECEs on the Y.1564 Test Start page by clicking "**Start New Test**" on the **Configuration** > **Traffic Test** > **Y.1564** > **Reports** page as described below.

Configuration > Traffic Test > Y.1564 > Reports

After a profile is created, use it to test one or more ECEs on the Y.1564 Test Start page by clicking "**Start New Test**" on the **Configuration** > **Traffic Test** > **Y.1564** > **Reports** page. The default "Y.1564 Report Overview" page is shown below.
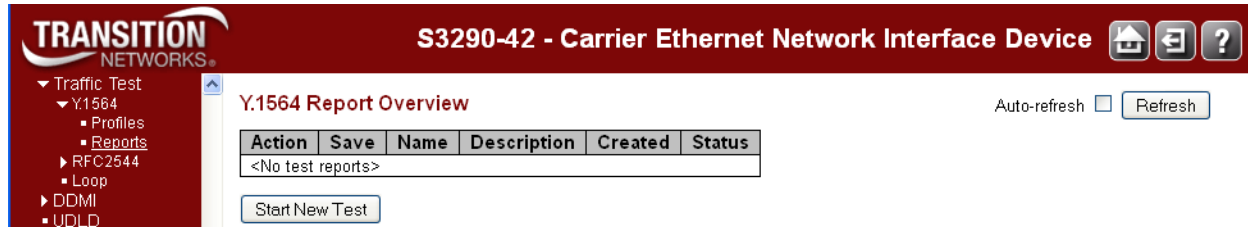
If no reports are currently stored, the table contains one line stating "<No test reports>". Otherwise there is a table row for each test report, each containing these elements:

Action

If a test is currently being executed, a **Stop** button displays. Clicking the **Stop** button will cause a request to be sent to gracefully cancel the execution. During this cancellation, the button will be disabled. At most one test can execute at a time.

After execution of a test is complete, successfully or not, the resulting report is persisted to non-volatile memory. Up to 10 reports can be persisted. The newest report will replace the oldest.

Only reports stored in non-volatile memory can be erased. This is done with the **Delete** button.

Save

Test reports can be downloaded and stored on the local computer with the use of the **Save** button. The suggested file name will be the report name concatenated with ".txt".

Name

A unique name identifying the report. Click the name to view the report.

Description

The description assigned to the report as entered on the test execution page, invoked with the **Start New Test** button.

Created

The date and time at which execution started.

Status

The current status of executing a test:

Inactive: Test just initiated, but not started. This is a transitional state that is unlikely to be noticed.

Executing: Test is currently executing. At most one test can execute at a time.

Cancelling: Test has just been stopped by the user. This is a transitional state that is unlikely to be noticed.

Cancelled: Test was stopped by the user and report is stored in non-volatile memory.

Passed: Test passed successfully and reports is stored in non-volatile memory.

Failed: Test failed execution and report is stored in non-volatile memory. Details as to why the test failed are embedded in the report.

Buttons

Start New Test: Initiate execution of a profile. This button is grayed out if a test is already in progress.

Auto-refresh: Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.

Cancel: Click to refresh the page immediately.

Y.1564 Test Start

This page allows for initiating execution of a profile while naming and describing the resulting report. Once a test is started, a snap-shot of the chosen profile is made, so that subsequent profile changes won't be reflected in the running test.

Clicking the "**Start New Test**" button on the **Configuration** > **Traffic Test** > **Y.1564** > **Reports** page displays the Y.1564 Test Start page.

This page provides an overview of the currently stored reports along with options to delete, download, and view them. Also, initiation of execution of an EVC is handled on this page.

General Parameters

Report Name

Each test report must have a name that uniquely identifies it, since it is this name that identifies it in the non-volatile file system. The length must be from 1 to 32 characters with each ASCII character being in the range 33-126.

Description

This field allows for providing a textual description of the report. Up to 128 characters can be entered.

Profile

Select the profile to execute. The drop-down box is populated with the names of the currently defined Y.1564 profiles. If no profiles are defined, the text "<No Profiles>" is displayed and a test cannot commence.

Peer MAC

This field determines the destination MAC address used in generation of the background and delay measurement frames. This must be a non-zero unicast MAC address. If the remote end (DST) is configured as a facility loop, this should be the MAC address of the DST's NNI port for the EVC under test. If, on the other hand, DST is configured as a terminal loop, this should be the MAC address of the

DST's UNI port for the EVC under test. Note that it is important that the remote end at least swaps DMAC and SMAC while looping the frame.

As for the source MAC address in the generated background and delay measurement frames, the selected UNI port's native MAC address will be used.

To help quickly get to re-test an EVC, the Peer MAC is preserved from test-start to test-start, but not across boots.

EVC ID

This drop-down box lists the IDs of all currently defined EVCs. If no EVCs are defined, the text "<No EVCs>" is displayed.

When selecting an EVC ID, the list of ECEs in the table below is automatically updated to reflect the ECEs carried in the newly selected EVC. Note that when you change EVC ID with this drop-down box, any changes you may have made to the ECE parameters in the ECE table below will be lost.

ECE Parameters

The purpose of the ECE table is to allow for specifying which ECEs to test and optionally select per-ECE parameters used during the testing. Both an EVC and its ECEs must obey a number of rules before they are considered testable.

If an EVC is not testable, a single line in the table displays why, and no ECEs are displayed in that case. If an ECE is not testable, that ECE's input fields are removed and instead a description of why is displayed (see "messages" below).

Possible misconfigurations fall into two categories: 1) Those that can be checked prior to starting the test (pre-checks), and 2) those that can only be checked when the profile and ECE parameters are selected (post-checks). The latter category of misconfigurations is shown in a dialog box after the user hits the "Run"-button. In that case, all information entered on the Test Start page will be lost.

In the bulleted lists below, text in parentheses refers to the corresponding field on the QoS, ECE, EVC, or Bandwidth Profiles configuration pages.

Reasons why an EVC is not testable (pre-checks):

- The EVC is not installed due to a hardware conflict
- The EVC carries no ECEs
- The EVC carries more than 16 ECEs
- The EVC has no NNI ports (EVC. NNI Ports)
- All ECEs on the EVC must use same Tx Lookup (ECE.Actions.TX Lookup)
- All ECEs on the same CoS must use same policer (ECE.Actions.Class and ECE.Actions.Policer ID Value)
- All ECEs on the same CoS must map to the same NNI outer tag PCP when Tx Lookup is 'VID-PCP' (ECE.Actions.Class and ECE.Egress Outer Tag.PCP)
- All ECEs with the same NNI outer tag PCP must map to the same CoS when Tx Lookup is 'VID-PCP' (ECE.Egress Outer Tag.PCP and ECE.Actions.Class)

Reasons why an ECE is not testable (pre-checks):

- The ECE is not installed due to a hardware conflict
- The ECE must use basic lookup (ECE.Ingress Matching.Lookup)
- The ECE must have 'L2CP Mode' set to 'Forward' (ECE.Actions.L2CP Mode)
- The ECE has no policer attached (ECE.Actions.Policer ID Value)
- The ECE's policer (whether that's an ECE or EVC policer) is not enabled (Bandwidth Profiles.State)
- The ECE must use 'VID-PCP' or 'VID' Tx Lookup (ECE.Actions.TX Lookup)
- The ECE is not installed on any UNI ports (ECE.UNI Ports)
- The ECE is not bi-directional (ECE.Actions.Direction)
- The ECE does not map to a particular CoS (ECE.Actions.Class)
- The ECE must either have Tx Lookup set to 'VID-PCP' or 'VID' (ECE.Actions.TX Lookup)

- The ECE must have NNI outer tag PCP mode set to 'Fixed' when Tx Lookup is set to 'VID-PCP' (ECE.Actions.TX Lookup and ECE.Egress Outer Tag.PCP Mode)
- The ECE must not have NNI outer tag PCP mode set to 'Fixed' when Tx Lookup is set to 'VID' (ECE.Actions.TX Lookup and ECE.Egress Outer Tag.PCP Mode)
- The ECE must not have classified Drop Precedence enabled to a fixed value (ECE.Actions.Drop Precedence must be 'Disabled')
- The ECE must have NNI outer tag's DEI mode set to 'Drop Precedence' (ECE.Egress Outer Tag.DEI Mode)

Reasons why an ECE is not testable (post-checks):

- More than 8 ECEs are marked for testing
- The ECE must have TX Lookup set to 'VID' when using Y.1731 OAM as background traffic (ECE.Actions.TX Lookup)
- The ECE must match any DMAC or unicast DMACs when using simulated customer traffic as background traffic (ECE.MAC Parameters.DMAC)
- The ECE must not restrict the value of the DMAC when using simulated customer traffic as background traffic (ECE.MAC Parameters.DMAC Value)
- The ECE must not restrict the value of the SMAC when using simulated customer traffic as background traffic (ECE.MAC Parameters.SMAC Value)
- The ECE must not match untagged traffic when using simulated customer traffic as background traffic (ECE.Ingress Matching.Tag Type)
- The ECE must not match L2CP frame types when using simulated customer traffic as background traffic (ECE.Ingress Matching.Frame Type)
- The specified VLAN ID is not part of the ECE's range of VLAN IDs (ECE.Ingress Matching.VLAN ID Value or ECE.Ingress Matching.VLAN ID Range)
- The ECE matches on specific DEI, which is not the same as specified on the test start page (ECE.Ingress Matching.DEI)
- The user has specified to test DEI = 1, but the policer is not coupled (Bandwidth Profiles.Policer Mode)
- For tagged background traffic, the selected UNI must have tag classification enabled (QoS.Port Classification.Tag Classification.Enabled)
- The selected UNI must have a one-to-one DEI-to-DP mapping (Tagged frames: QoS.Port Classification.Tag Classification.DP level. Untagged frames: QoS.Port Classification.DPL/DEI)
- The selected frame size must be smaller than the selected UNI's MTU (Ports.Maximum Frame Size)
- The ECE maps to a policer with a committed burst size (CBS) smaller than the required burst size, which is 8 * the test frame size incl. possible tags (Bandwidth Profiles.CBS)
- For single-ended measurements, the EVC's NNI port(s) must have tag classification enabled (QoS.port Classification.Tag Classification.Enabled)
- For single-ended measurements, the EVC's NNI port(s) must have a one-to-one PCP-to-CoS mapping (QoS.port Classification.Tag Classification.QoS class)
- For single-ended measurements, the EVC's NNI port(s) must have a one-to-one DEI-to-DP mapping (QoS.port Classification.Tag Classification.DP level)

As mentioned, all ECEs on the EVC - whether under test or not - are taken out of service during testing. Frames that may arrive on the UNI that match the ECEs taken out of service will therefore be discarded. During testing, the software will make a clone of each ECE on the EVC. The clone is exactly the same as the original, except for one thing: The outer tag matches on "the opposite" TPID so that simulated customer traffic will hit this ECE by using an S-tag when the original matches a C-tag and by using a C-tag when the original ECE matches an S-tag. This fact will be reflected in the generated report, which lists the first 64 and last 16 bytes of the frame. This will ensure that possible real customer traffic will not affect the testing.

Policer ID

All testable ECEs map to a policer whose ID is shown here. Displays "N/A" if not acceptable.

ECE ID

The ID of the ECE belonging to the selected EVC. The ECEs are grouped per policer they map to. Within each group, the ECEs are listed in the same order as they are applied to hardware.
The software only supports testing of one ECE per policer.

Enable

When checked, the corresponding ECE is selected for test.

The ECEs are grouped by the policer they map to. Only one ECE in each policer group can be tested at a time. By default, the first testable ECE in a policer group is marked for testing.

When using Y.1731 OAM as background traffic, only <u>one</u> ECE can be tested at a time. Otherwise <u>eight</u> ECEs can be tested simultaneously. Notice that due to hardware limitations, some combinations of rates are not possible, and may result in a lower rate than what is actually requested by software. This is detected by software <u>after</u> the test has been executed and is flagged as a failure. In this case, it is recommended to break the test into two or more and test fewer ECEs at a time.

The checkbox is only available if the ECE is testable.

UNI Port

In cases where the selected ECE is installed on two or more UNI ports, a particular port on which the test traffic is applied can be chosen with this drop-down box.
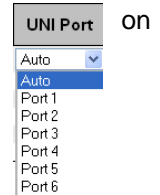
The default is '**Auto**', which causes the lowest port number in the set of ports to be chosen automatically.

The drop-down box is populated only with the UNIs that the ECE is installed on.

Tagging

Auto: causes the software to automatically find a VLAN ID that will match the ECE. The VLAN ID will be the lowest in the range of matching VLAN IDs (except 0 (priority-tagged), unless the ECE only matches priority tagged traffic). If the ECE only matches untagged traffic, no tag will be inserted in the generated traffic.
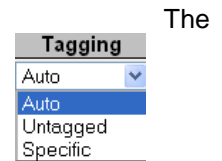
Untagged: no tag will be inserted in the generated traffic.

Specific: the 'VLAN ID' will ungrey, and a VLAN ID can be entered.
Note that untagged traffic only is supported for Y.1731 OAM as background traffic.

VLAN ID

When 'Tagging' is set to **Specific**, this field is open for input of a VLAN ID used in the generated frames' outer tag. Enter a value of '**0**' to priority-tag the frames.

PCP

When a VLAN tag is required in the background traffic frames, this field defines the PCP to use.
Setting PCP to **Auto** causes the software to choose the lowest PCP value that the ECE matches on.
Setting PCP to any other value (**0**-**7**) will cause the software to use that value.

DEI

When a VLAN tag is required in the background traffic frames, this field determines the DEI or DEIs to use.
Setting DEI to **Auto** causes the software to generate both a green and a yellow frame flow whenever needed.
Setting DEI to **0** causes the software to generate a green frame flow only.
Setting DEI to **1** causes the software to generate a yellow frame flow only.
Refer to the EIR Configuration Test Parameters above for a description of the use of DEI.

DSCP

This field is only available when the Frame Type the ECE matches is IPv4 or IPv6. In other cases, the field will show **N/A**.

Setting DSCP to **Auto** causes the software to select the lowest DSCP value the ECE matches.

Setting DSCP to any other value (**0**-**63**) causes the software to use that value in the generated background traffic. The DSCP value is only used if using simulated customer traffic as background traffic.

Buttons

Run: If all input parameters are valid, the test will attempt to start executing the test. If a post-check fails, an error dialog box will appear and you will stay on the page. Otherwise you will be forwarded to the Y.1564 Report View page to see the progress of the test.

Cancel: Return to the Y.1564 Report Overview page without initiating a new test.

Messages

Message: *Dual-ended measurements not supported yet*

ECE does not map to a particular CoS.

ECE must map to a particular CoS (Class)

ECE must use basic lookup (not advanced)

ECE not bidirectional

EVC carries no ECEs

ECE's actions' Drop Precedence must be disabled, that is, not forced into a particular DP

All ECEs in an EVC must have the same Tx Lookup action

Meaning: Both an EVC and its ECEs must obey a number of rules before they are considered testable.

Recovery: See the "ECE Parameters" section above for the config rules involved.

Message: *Link State Tracking cannot be enabled as either CC or CC-TLV is not enabled*

NNI ports must have PCP/DEI-to-CoS/DP mapping enabled.

The MEP must be configured on a NNI port

TST and LBM cannot be enabled at the same time

Meaning: Y.1564 messages related to MEP config.

Recovery: See the "Configuration > MEP > Configuration" section on page **Error! Bookmark not defined.**.

# Examples

Configuration > Traffic Test > RFC2544

An RFC 2544 profile defines key parameters and sub-tests to be executed as part of the RFC2544 benchmark testing. The profile configuration is divided into a common section, which contains parameters shared by the four tests that can be defined for a profile.

All rates configured in a profile are measured in *permille* (per thousand or ‰) of the line rate. The reason for not using bits per second or other units is that egress ports may be configured at various speeds, so in order to have a link-speed independent way of configuring rates, *permille* of the line rate is chosen.

All rates configured in a profile are interpreted as requested rates on the customer-facing side of the switch. The egress port on which the tests are conducted is considered the network-facing side. If the switch adds a VLAN tag to frames (see Type), the rate on the network-facing side will therefore be higher than the requested customer-facing side's rate, with the exception that the rate, of course, cannot exceed the line rate.

Configuration > RFC2544 > Profiles

Select the **Configuration** > **RFC2544** > **Profiles** menu path to display the default RFC2544 Profile Overview page.
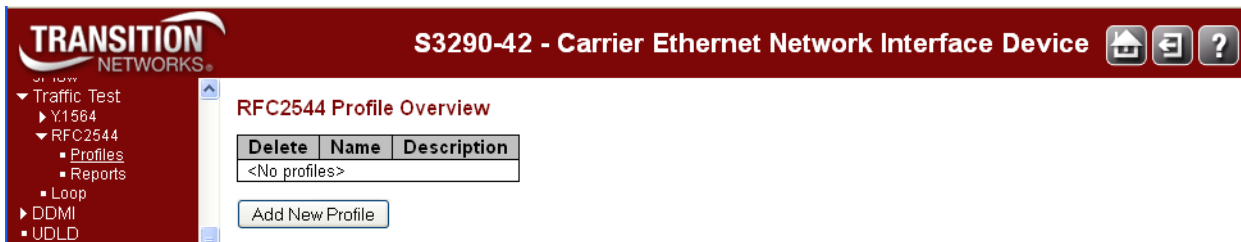
Click the **Add New Profile** button to display the RFC2544 Profile Configuration page.

By default, only the Throughput and Latency tests display. The screen below shows all of the four tests in the **Tests to Run** section.

RFC2544 Profile Configuration

Common Parameters	
Profile Name	NewProfile
Description	
MEG Level	7
Egress Port	Port 1
Sequence Number Check	☐
Dwell Time	2 secs
Type	Port Down-MEP
VLAN ID	1
PCP	0
DEI	0
DMAC	00-00-00-00-00-01

Frame Sizes

☑ 64 ☑ 128 ☑ 256 ☑ 512 ☑ 1024
☑ 1280 ☑ 1518 ☑ 2000 ☐ 9600

Tests to Run

☑ Throughput ☑ Latency ☑ Frame Loss ☑ Back-to-Back

Throughput Test Parameters		
Trial Duration	60	secs
Minimum Rate	800	‰
Maximum Rate	1000	‰
Accuracy	2	‰
Allowed Frame Loss	0	‰

Latency Test Parameters		
Trial Duration	120	secs
Delay Meas. Interval	10	secs
Allowed Frame Loss	0	‰

Frame Loss Test Parameters		
Trial Duration	60	secs
Minimum Rate	800	‰
Maximum Rate	1000	‰
Rate Step	5	‰

Back-to-Back Test Parameters		
Trial Duration	2000	msecs
Trial Count	50	

[Save] [Reset] [Cancel]

Enter the RFC2544 Profile parameters as described below.

Common Parameters

Profile Name

Each profile must have a name that uniquely identifies it, since it is this name that is used in the process of executing a profile.
The length must be from 1 to 32 characters with each ASCII character being in the range 33-126.

Description

This field allows for providing a textual description of the profile. Up to 128 characters can be entered.

MEG Level

The frame types used in the various tests are Y.1731 TST and 1DM frames, both of which contain a MEG Level (MEL) field, which can be controlled with the value entered in this select box, which ranges from **0** to **7** with 7 being the default.

Egress Port

The port on which the generated frames are transmitted **and** are expected to be received.

Sequence Number Check

When checked, looped Y.1731 TST frames are tested for out-of-order upon reception. Out-of-order frames are frames received in a different order than they were transmitted.
If an out-of-order sequence is detected, the sub-test or trial is considered failing.

Dwell Time

When a trial is executed, Y.1731 TST frames are transmitted for a certain period of time. When that period has elapsed, the Dwell Time determines how long to wait before reading hardware counters and status in order to asses the status of the trial. The required dwell time must be at least the worstcase roundtrip time, and therefore the a.o. (alpha/omega) depends on the physical distance between the near and far ends. The valid range is **1** - **10** with a default of **2** seconds.

Type

The RFC2544 test suite supports to types of tagging of frames on egress:

- `Port Down-MEP`, where all frames are transmitted untagged.
- `VLAN-based Down-MEP`, where all frames are transmitted with a VLAN tag. In order for this to work, the following manual VLAN configuration of the egress port is required:
    - The VLAN Port Mode must be Trunk or Hybrid in order to get frames tagged upon transmission.
    - The VLAN Port Type must be either of C-, S-, or S-Custom.
    - VLAN Egress Tagging must be set to either tag all or untag Port VLAN. In the latter case the chosen VLAN ID for the profile must be different from the configured VLAN Port VLAN ID.
    - The port must be member of the chosen VLAN ID.

Whether one or the other type is selected, frames are generated as close to the egress port as possible (hence the "Down-MEP" term) and therefore not sent through the queueing system, due to lack of integration with EVCs in this version of the software.
When VLAN-based Down-MEP is selected, the VLAN tag's ID, PCP, and DEI values are selected with the subsequent fields.

VLAN ID

When Type is set to VLAN-based Down-MEP, this field determines the VLAN ID used in the tag.
Valid values are in the range **1** to **4094**.

PCP

When Type is set to VLAN-based Down-MEP, this field determines the PCP value used in the VLAN tag.

DEI

When Type is set to VLAN-based Down-MEP, this field determines the DEI value used in the VLAN tag.

DMAC

This field determines the destination MAC address used in generation of the Y.1731 TST and 1DM frames.
The source MAC address will automatically become the egress port's native MAC address.
Note that it is important that the remote end swaps DMAC and SMAC while looping the frame.

Frame Sizes

Frame Sizes

Each sub-test is repeated for every selected frame size. At least one frame size must be checked. By default, all but the jumbo frame size are selected.

Frame Sizes				
☑64	☑128	☑256	☑512	☑1024
☑1280	☑1518	☑2000	☐9600	

Tests to Run

One or more of the four sub-tests may be executed through the same profile.

Throughput Test

The throughput test searches for the maximum rate at which at most a certain percentage of the frames are lost. The Throughput test starts at the maximum configured rate and uses a dichotomist algorithm (binary search) to find the optimum rate. The trials continue until the difference between a faling and succeeding rate is smaller than the configured accuracy.

Latency Test

The latency test measures the round-trip time of frames leaving the near-end until they get back to the near-end. Y.1731 TST frames are transmitted at the maximum rate determined by the throughput test less 200 Kbps. Every so many seconds, a Y.1731 1DM frame is transmitted and the time from this frame leaves the switch until it comes back is measured. If more than two 1DM frames are transmitted during a trial, also the delay variation will be part of the generated report. Selecting the Latency test causes the Througput test to be selected automatically.

Frame Loss Test

The frame loss test measures frame loss at configurable transmission rates. It starts at the configured maximum rate and steps down by the configured step size and stops when two consecutive trials have zero frame loss (test succeeded in that case) or the minimum rate is reached (test failed in that case). For each trial, the report displays the frame loss ratio.

Back-to-Back Test

The back-to-back test aims to measure the network's ability to absorb bursty traffic. The test runs at line rate less 200 Kbps, and bursts of Y.1731 TST frames are generated a configurable number of times. The duration of a burst is configured in milliseconds, and the time from one burst ends until the next starts is configured through the Dwell Time.

The tables that define parameters for the individual sub-tests appear and disappear depending on whether the test is selected or not.

Throughput Test Parameters

Trial Duration

The time - in seconds - to transmit Y.1731 TST frames at one given rate and frame size. This is known as a "trial". The valid range is **1** - **1800** with a default of **60** seconds.

Minimum Rate

The minimum rate - in ‰ of the egress port's line rate - to transmit Y.1731 TST frames at. If a trial fails at this rate, the test fails. The valid range is **1** - **1000** with a default of **800** ‰ of the line rate.

Maximum Rate

The maximum rate - in ‰ of the egress port's line rate - transmit Y.1731 TST frames at while searching for maximum throughput. This is the rate that the search starts at.
The valid range is **1** - **1000** with a default of **1000** ‰ of the line rate.

Accuracy

This specifies the stop criterion for the search for a maximum throughput rate. When the difference between a failing and succeeding rate is smaller than the accuracy, the search stops and the succeeding rate becomes the result. The valid range is **1** - **1000** with a default of **2** ‰ of the line rate.

Allowed Frame Loss

In some cases, it may be acceptable to have loss on a connection. The allowed loss can be specified with this parameter. The loss is measured in ‰ of the number of transmitted frames during a trial, so if allowed loss is set to; for example, if 1 ‰ is selected and 1000 frames are transmitted during a trial, the trial will be considered successful if 999 or 1000 frames return to the transmitter.
The valid range is **0** - **100** with a default of **0** ‰ of the number of transmitted frames.

Latency Test Parameters

Trial Duration

The time - in seconds - to transmit Y.1731 TST frames at a given rate and frame size. This is known as a "trial". The valid range is **10** - **1800** with a default of **120** seconds.

Delay Measurement Interval

This controls the period - in seconds - at which Y.1731 1DM frames are transmitted. The first 1DM frame is transmitted this number of seconds after the trial has started. The total number of transmitted 1DM frames in one trial therefore depends on the configured trial duration.
The valid range is **1** - **60** with a default of **10** seconds.

Allowed Frame Loss

In some cases, it may be acceptable to have loss on a connection. The allowed loss can be specified with this parameter. A trial is considered failing if more than this percentage of frames are lost. The valid range is **0** - **100** with a default of **0** ‰ of the number of transmitted frames.

Frame Loss Test Parameters

Trial Duration

The time - in seconds - to transmit Y.1731 TST frames at a given rate and frame size. This is known as a "trial". The valid range is from **1** - **1800** with a default of **60** seconds.

Minimum Rate

The minimum rate - in ‰ of the egress port's line rate - to transmit Y.1731 TST frames at.
The valid range is **1** - **1000** with a default of **800** ‰ of the line rate.

Maximum Rate

The highest (and first) rate - in ‰ of the egress port's line rate - to transmit Y.1731 TST frames at. The valid range is **1** - **1000** with a default of **1000** ‰ of the line rate.

Rate Step

The rate decrement - in ‰ of the egress port's line rate - per trial. The valid range is **1** - **1000** with a default of **5** ‰ of the line rate.

Back-to-Back Test Parameters

Trial Duration

The time - in milliseconds - to transmit a burst of Y.1731 TST frames at line rate and frame size. This is known as a "trial". The valid range is **100** - **10000** with a default of **2000** milliseconds.

Trial Count

The number of times to repeat the burst. The valid range is **1** - **100** with a default of **50** times.

Buttons

Save: If all input parameters are valid, the profile will be saved to non-volatile memory and you will be returned to the RFC2544 Profile Overview page.

Reset: Click to undo any changes made locally and revert to previously saved or default values.

Cancel: Return to the RFC2544 Profile Overview page without creating a new profile.

RFC 2544 Example

A saved new profile is shown below.
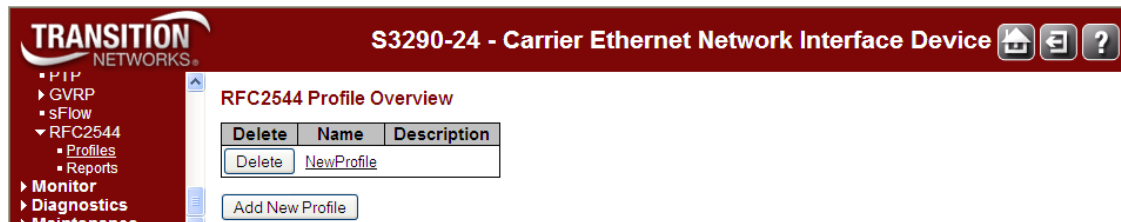
When you click the linked Name (**NewProfile** above), the RFC2544 Profile Configuration page displays for the newly-created profile. Here you can edit the new profile's parameter settings.

For additional RFC2544 information see "Appendix F - Additional RFC2544 Information " on page **Error! Bookmark not defined.**.

## Configuration > RFC2544 > Reports

Navigate to the **Configuration** > **RFC2544** > **Reports** menu path to display the default RFC2544 Report Overview page. This page provides an overview of the currently stored reports along with options for deleting, downloading, and viewing them. Initiation of execution of a profile is also handled on this page.

If no reports are currently stored, the table contains one line stating "*<No test reports>*". Otherwise there is a table row for each test report, each containing these elements:
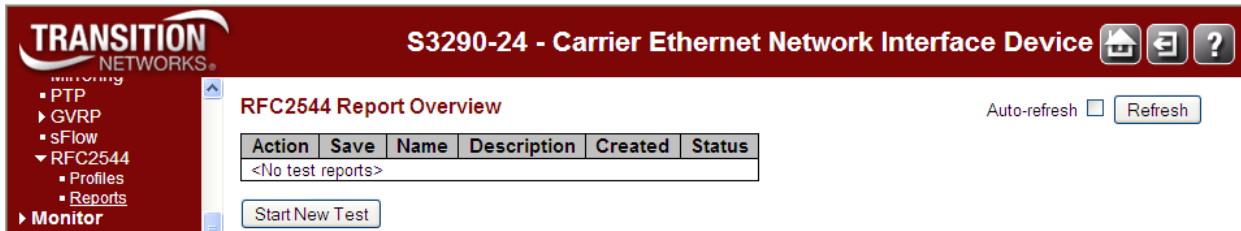
When you click the **Start New Test** button the RFC2544 Test Start page displays.
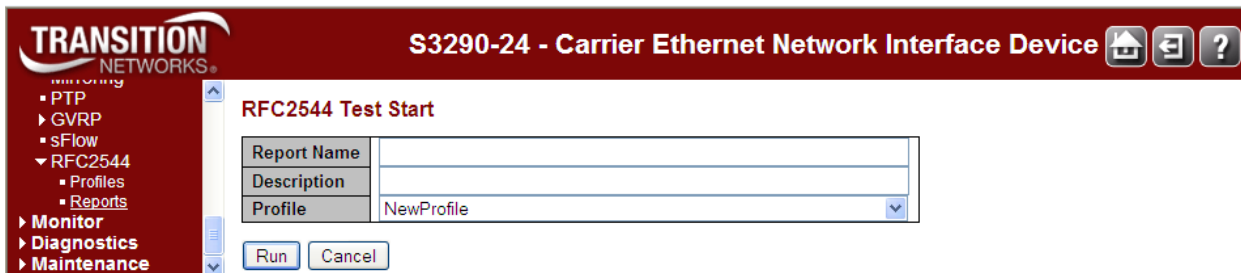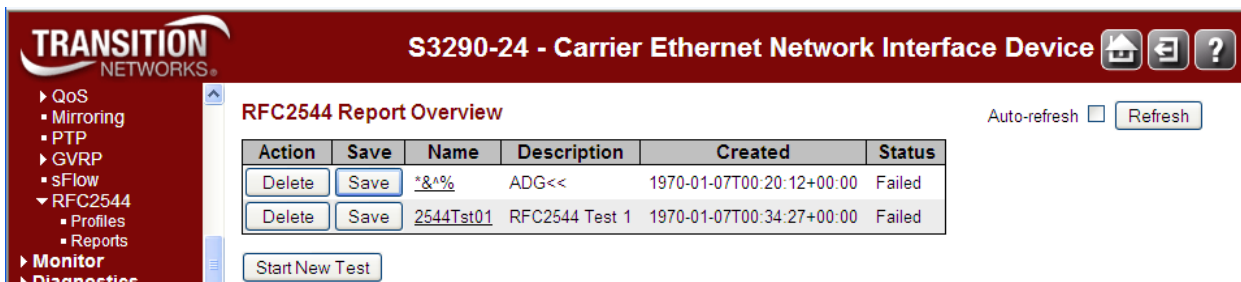

Enter the parameters below:

Report Name

Enter a unique name to identify the report (required).

Description

Enter the description to be assigned to the report (optional).

Profile

At the dropdown, select an existing profile (e.g., *New Profile*).

The report parameters are described below.

Action

If a test is currently being executed, a **Stop** button is shown. Clicking the **Stop** button will cause a request to be sent to gracefully cancel the execution. During this cancellation, the button will be disabled. At most one test can execute at a time.

Once execution of a test is complete, successfully or not, the resulting report is persisted to non-volatile memory. Up to 10 reports can be persisted. New reports will replace the oldest.

Only reports stored in non-volatile memory can be erased. This is done with the **Delete** button.

Save

Test reports can be downloaded and stored on the local computer with the use of the -button. The suggested file name will be the report name concatenated with ".txt".

Name

A unique name identifying the report. Click the name to view the report.

Description

The description assigned to the report as entered on the test execution page, invoked with the **Start New Test** button.

Created

The date and time at which execution started.

Status

The current status of executing a test:

- `Inactive`: Test just initiated, but not started. This is a transitional state that is unlikely to be noticed.
- `Executing`: Test is currently executing. At most one test can execute at a time.
- `Cancelling`: Test has just been stopped by the user. This is a transitional state that is unlikely to be noticed.
- `Cancelled`: Test was stopped by the user and report is stored in non-volatile memory.
- `Passed`: Test passed successfully and the report is stored in non-volatile memory.
- `Failed`: Test failed execution and report is stored in non-volatile memory. Details as to why the test failed are embedded in the report.

Buttons

Start New Test: Initiate execution of a profile. This button is grayed out if a test is already in progress.

Auto-refresh ☐ : Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
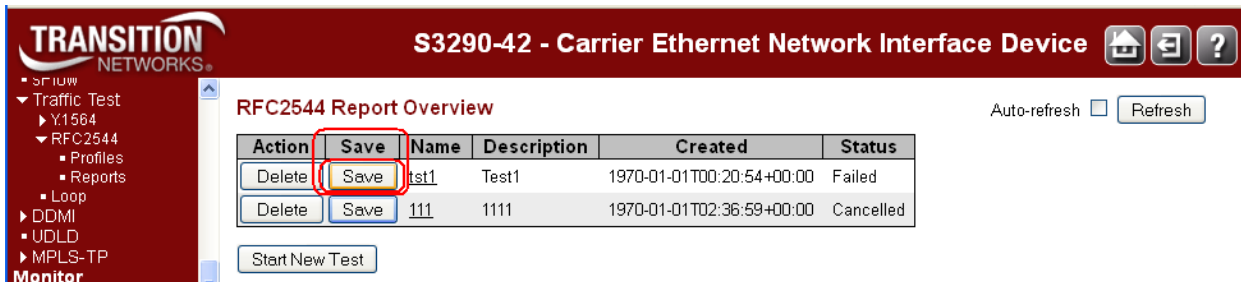
Refresh: Click to refresh the page immediately.

Messages

No such report.

No such report.#*%26%5E%25/ADG%3C%3C/1970-01-07T00:20:12+00:00/5

Save an RFC2544 Test Report

The RFC2544 Report Overview page provides a **Save** button that lets you view or save a selected report.

Navigate to the **Configuration** > **RFC2544** > **Reports** menu path.

Click the **Save** button for the report instnce that you want to save. The ***Opening xxxx*** dialog displays.

Select either the ***Open with*** radio button and select an application with which to open the file, or select the Save radio button. Click the **OK** button on the ***Opening xxxx*** dialog to open or save the report file.

The test report is saved or opened. A sample RFC2544 Test Report is shown below in WordPad format.
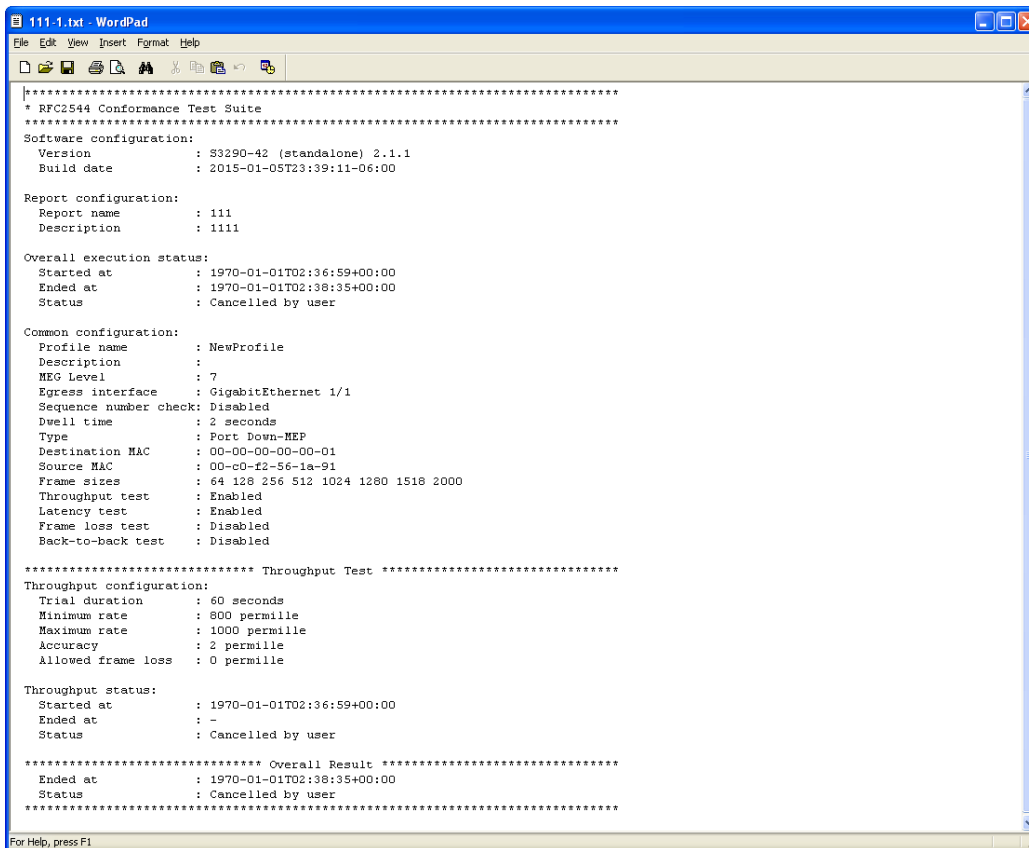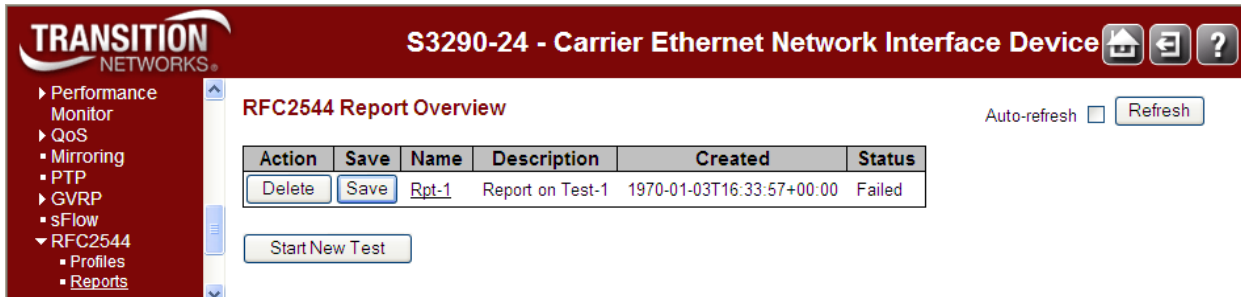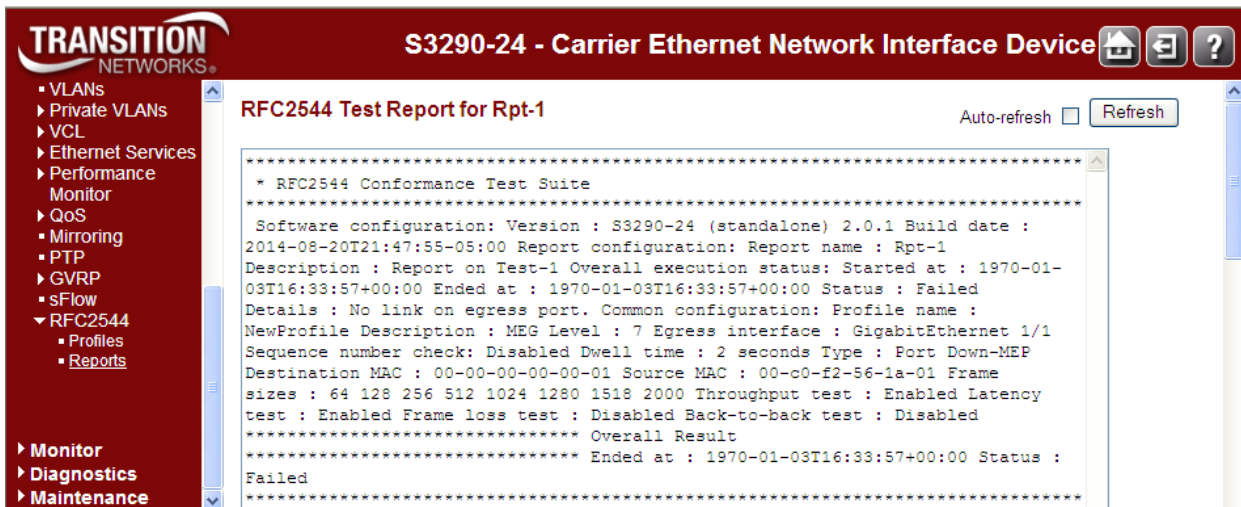
View an RFC2544 Test Report

Besides showing results of executing a test, test reports contain a copy of all input parameters. This page can show results from both an already executed test and from on-going tests. If execution is on-going, you are encouraged to click the Auto-refresh button. This will cause the page to refresh every three seconds and automatically scroll to the bottom of the page, where additional test results and status get added continuously.

Navigate to the **Configuration** > **RFC2544** > **Reports** menu path.

Click an existing Name (e.g., *Rpt-1* below).

The selected Reoprt is generated. A sample Report is shown below below.

The Report output is described below.

RFC2544 Test Report for *<test teport name>*

This is the output of the test report and is identical to what you will get by downloading the report to your computer. At the top it shows overall execution status along with common configuration parameters and a "test-started" timestamp. Subsequent sections show the result of executing given sub-tests along with their configuration parameters.
At the bottom of the test report, the overall status of executing the test along with a "test-ended" timestamp is shown.
Most lines are at most 80 characters wide, but a few may get wider. Use the resize capabilities that some browsers offer to resize the text window to accommodate for longer lines.

Buttons

Back : Click to go back to the RFC2544 Test Report Overview page.

Auto-refresh☐ : Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.

Refresh : Click to refresh the page immediately.

Messages

Status : Failed Details : No link on egress port.

Example (WordPad)

```
NewProfileTst1.txt - WordPad
File  Edit  View  Insert  Format  Help

*******************************************************************************
* RFC2544 Conformance Test Suite
*******************************************************************************
Software configuration:
   Version            : S3290-24 (standalone) 2.0.1
   Build date         : 2014-10-16T22:58:44-05:00

Report configuration:
   Report name        : NewProfileTst1
   Description        : Tst1

Overall execution status:
   Started at         : 1970-01-01T01:53:30+00:00
   Ended at           : 1970-01-01T01:55:34+00:00
   Status             : Failed

Common configuration:
   Profile name       : NewProfileTst1
   Description        : Tst1
   MEG Level          : 4
   Egress interface   : GigabitEthernet 1/1
   Sequence number check: Enabled
   Dwell time         : 2 seconds
   Type               : VLAN-based Down-MEP
   VLAN ID            : 1
   PCP                : 2
   DEI                : 1
   Destination MAC    : 00-00-00-00-00-01
   Source MAC         : 00-c0-f2-56-1a-01
   Frame sizes        : 64 128 256 512 1024 1280 1518 2000
   Throughput test    : Enabled
   Latency test       : Enabled
   Frame loss test    : Enabled
   Back-to-back test  : Enabled

****************************** Throughput Test **********************************
Throughput configuration:
   Trial duration     : 60 seconds
   Minimum rate       : 800 permille
   Maximum rate       : 1000 permille
   Accuracy           : 2 permille
   Allowed frame loss : 0 permille

Throughput status:
   Started at         : 1970-01-01T01:53:30+00:00
   Ended at           : 1970-01-01T01:55:34+00:00
   Status             : Failed
   Details            : Allowed TST frame loss exceeded.

Frame   Tx     Rx     Tx      Rx      Tx         Rx         Frame Status
Size    Rate   Rate   Rate    Rate    Frames     Frames     Loss
[bytes] [Mbps] [Mbps] [fps]   [fps]                         [%]
------- ------ ------ ------- ------- ---------- ---------- ----- ------
    64   79.9   0.0   119047       0    7142835          0 100.0 FAIL

****************************** Overall Result **********************************
   Ended at           : 1970-01-01T01:55:34+00:00
   Status             : Failed
*******************************************************************************

For Help, press F1
```
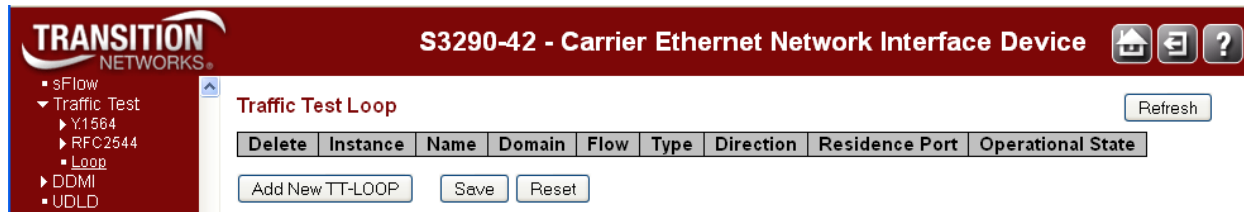
Configuration > Traffic Test > Loop

The Traffic Test Loop instances (TT-LOOP) are created from the **Configuration** > **Traffic Test** > **Loop** menu path.

The TT-LOOP (Traffic Test Loop) firmware module provides methods to perform tests defined in IETF RFC 2544 (Benchmarking Methodology for Network Interconnect Devices) and Y.1564 (remote end).

At the default Traffic Test Loop page, click the **Add New TT-LOOP** button to display the configurable parameters.
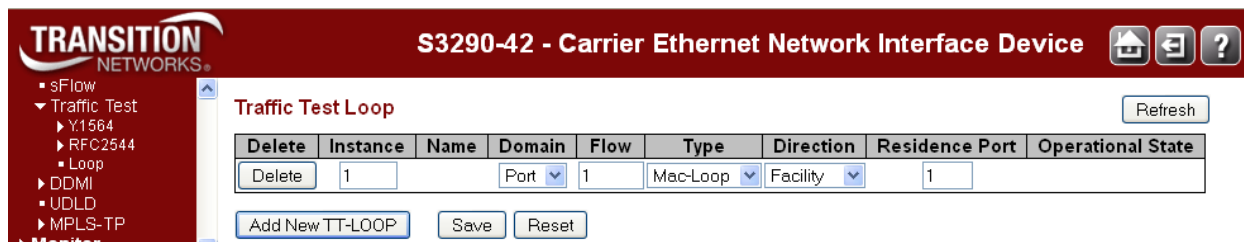
The parameters are described below.

Delete

This box is used to mark a TT-LOOP for deletion in next Save operation.

Instance

The ID of the TT-LOOP. Click on the ID of a TT-LOOP to enter its configuration page.

Name

This is a configurable name of the instance.

Domain

Port: This is a TT-LOOP in the Port Domain.

Evc: This is a TT-LOOP in the EVC Domain. 'Flow' is an EVC. The EVC must be created.

VLAN: This is a TT-LOOP in the VLAN Domain. 'Flow' is a VLAN. In case of Up-TT-LOOP, the VLAN must already have been created. The VLAN domain is not currently supported.
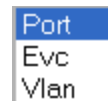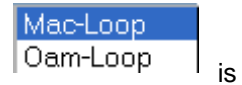
Flow

The flow instance number related to this TT-LOOP instance - depending on the 'Domain'. See 'Domain'.

Type

Mac_loop: This TT-LOOP is the MAC looping type. All frames in the flow is looped with MAC swap.

Oam_loop: This TT-LOOP is the OAM looping type. Is Y.1731 OAM aware and is looping LBM->LBR and DMM->DMR. This is currently not supported.

Direction

Facility: This TT-LOOP is pointing out to the port. Looping is done from ingress to egress.

Terminal: This TT-LOOP is pointing into the forwarding plane. Looping is done from egress to ingress. This is currently not supported.

Residence Port

The port where TT-LOOP is resident - see 'Direction'. For an EVC TT-LOOP the port must be a port in the EVC. For a VLAN TT-LOOP the port must be a VLAN member.

Operational State

Up: Instance Operational State is UP - all resources are available and allocated.

Down: Instance Operational State is DOWN - not all resources are available or administrative state is disabled.

With one or more Traffic Test Loop instances configured and saved, click on the linked text of an instance in the Instances column to display its Traffic Test Loop configuration page.
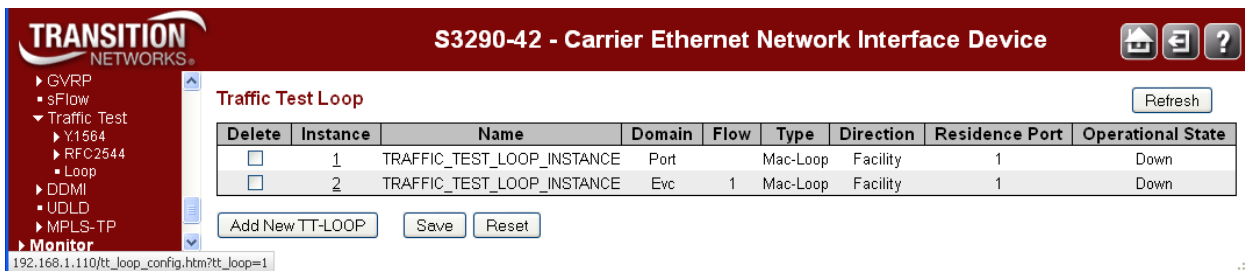
At the selected instance's Traffic Test Loop configuration page, change the Admin State from **Disable** to **Enable** and click the **Save** button.
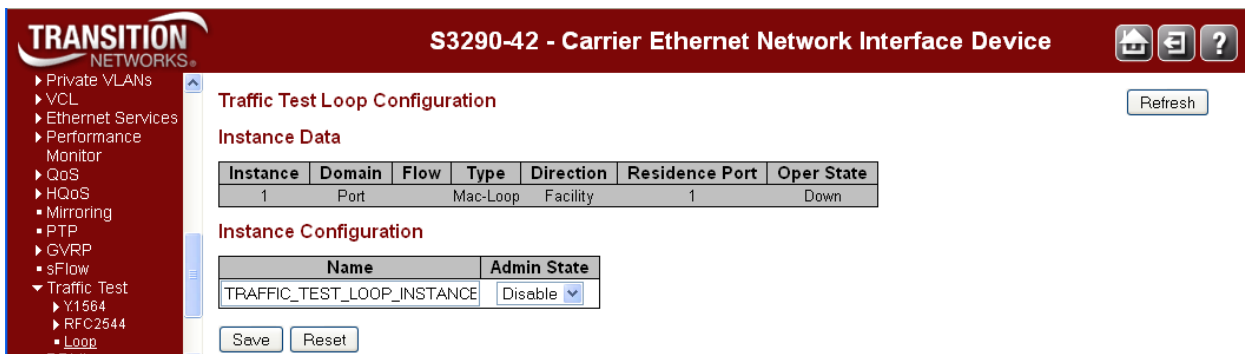
Buttons

Add New TT-LOOP: Click to add a new TT-LOOP entry.

Refresh: Click to refresh the page immediately.

Save: Click to save changes. Only one instance can be added per Save operation.

Reset: Click to undo any changes made locally and revert to previously saved values.

Messages

Message: Configuration is duplicate of other instance
Meaning: Two TT-Loop instances have the same configuration, which is not supported.
Recovery:
1. Click the **OK** button to clear the message.
2. Change one or more parameters for one of the TT Loop instances.
3. Click the Save button.
4. Refer to the parameter descriptions above.