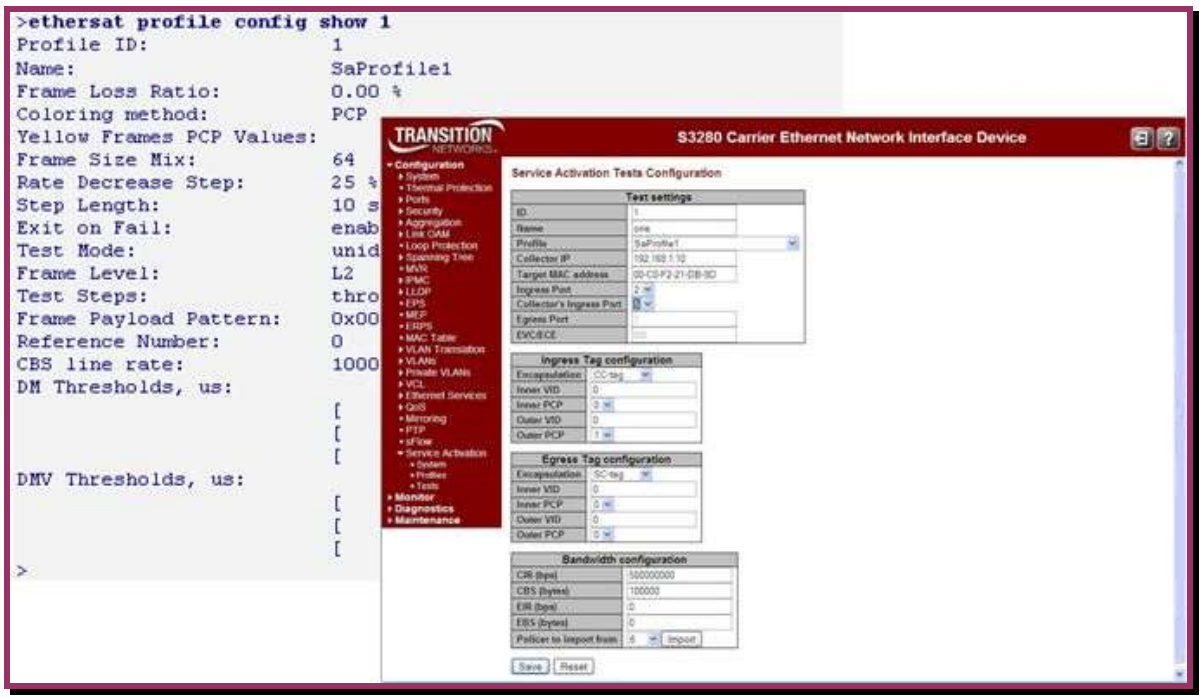
EtherSAT
(Service Activation Test)



User Guide

33540 Rev. D

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Service Activation Test (EtherSAT) User Guide, 33540 Rev. D

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Revision History

Rev	Date	Description
A	01/24/13	Released with software version 1.4.
B	06/12/13	Revised for *S3280-v1.4.3-rfc2544test.dat*. Adds S4140 EtherSAT support and Test Report Generation enhancements.
C	09/18/13	Revised for SW v 1.6.
D	12/03/13	Revised for SW v 1.7; update EtherSAT commands, add Ethernet Loopback example in Chapter 5, and add S4212/S4224 Shared Port information.

Contents

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Tables

1. Introduction

This manual documents the TN Ethernet Service Activation Test (EtherSAT) which can be used for EtherSATand in-service testing. The TN EtherSAT tests can be run on the TN S3280-TST, S4140, S4212, and S4224 devices.

IETF RFC 2544 defines a specific set of tests that can be used to measure and report the performance characteristics of network devices. The results of these tests will provide comparable data from different vendors with which to evaluate these devices. RFC 2544 is the de facto methodology that outlines the tests required to measure and to prove performance criteria for carrier Ethernet networks. It provides an out-of-service benchmarking methodology to evaluate the performance of network devices using throughput, back-to-back, frame loss and latency tests. Each standard test validates a specific part of a SLA. See the IETF website at http://www.ietf.org/rfc/rfc2544 for specifics.

The SAT (Service Activation Testing) is implemented early in the Ethernet Service lifecycle; when a new customer order is received, SAT (along with LLB) can be used to provision and turn up the circuit in order to verify the performance to the SLA (via FM and PM). Ethernet Service Activation Test (EtherSAT) methodology involves:

- Verify a new service after provisioning is complete, but before it is turned over to the customer.
- Check that the configuration is correct.
- Verify performance meets the Service Acceptance Criteria (SAC) to ensure CoS Performance Objectives are attained.

These four EtherSAT tests can be run via the Web interface or the CLI:

1. Throughput test
2. Latency test
3. Frame Loss test
4. Back-to-Back test

In terms of traffic flows, the S3280-TST or S4xxx can perform the following roles:

- The *Initiator* (*Generator*) if it is the source of a traffic flow.
- The *Collector* if it counts and terminates a traffic flow.
- The *Reflector* (*Loopback*) if it loops back a received traffic flow.

Note: Depending on a given test step, the near-end device may be either the Generator and/or Collector of the traffic flow.

A "*near-end device*" refers to the NID on which a test operation is initiated by the user.
A "*far-end device*" is the peer NID device where traffic is counted and/or optionally looped back.

Moreover, depending on a given test step, the near-end device may be either the Generator and/or Collector of the traffic flow. The following specifications apply:

- Frame Sizes: Standard RFC 2544 sizes
- Rates: 64 Kbps to 1G in 64 Kbps increments
- Encapsulations: Layer 2 and layer 3

Supported Models

EtherSAT tests are supported on Transition Networks model S3280-TST, S4212, S4224, and S4140 products. EtherSAT operation is essentially identical between models, with minor differences (e.g., Service Activation, EVC, PTP, wire speed, and frame sizes) noted where they exist.

Dependencies and Prerequisites

Note: The EtherSAT module does not require the configured Ethernet Services (EVC and ECE) VLAN, or BW Profiles/Policing for operation. PTP is not required if only Throughput test will be done. However, PTP must be running on both devices to synchronize the Time of Day.

ECE and **EVC:** EtherSAT Test Record must have a reference to an existing **ECE** and **EVC** record in the UI that has the same User Port and VLAN tag value as specified for the EtherSAT Test and direction type "UNI-to-NNI" or "Both". During the test, the ECE's ingress user port should block traffic for a given C-VLAN.

The S3280-TSTallows selection of the EtherSAT Test's bandwidth parameters as a reference to an existing Policer record to use its bandwidth profile configuration (CIR, EIR, CBS, and EBS). By default, the Policer that was assigned for a given ECE is used. The S3280-TSTshows the CIR, EIR, CBS, and EBS values in the list as well as the Policer IDs.

PTP Clock Configuration / **Clock synchronization**: IEEE 1588-based clock synchronization must be running on the S3280. The 1588 packets are sent periodically (from once every few seconds to every 5 minutes) from an internal source when the tests are not running. Frame encapsulation is L2 with EthType 0x88F7 and Broadcast Destination MAC. The PTP message type is "SYNC". Only the *originTimestamp* field is actual.

STP (Spanning Tree Protocols) is enabled by default on the S3280-TST. When enabled, the S3280-TST periodically sends Spanning Tree packets on all ports. The spanning tree packets take from the available bandwidth that is needed to pass the test. It is recommended to disable STP in these instances:

1. Disable STP if running "collector" or "initiator" mode on the S3280-TST.
2. Disable STP on the S3280-TSTfor any EtherSAT tests that is running 100% port utilization.

Configuration Model

The EtherSAT tests provided by the S3280-TST (or S4xxx) are used to validate that a newly established end-to-end service has been properly configured and that it meets the required SLA. The tests typically run before the service is delivered to the customer.

From a configuration model perspective, the EtherSAT tests are modeled by two entities:

a) The EtherSAT test profile, and
b) The EtherSAT test record.

These entities are described in Appendix B: Configuration Model on page 124.

Shared Port Note

The S4212 and S4224 switches have one port that is 'Shared'. On the S4212, port 12 is 'shared' and on the S4224 port 24 is 'shared'. The Shared port can be toggled between two modes of operation:

External: This is the default mode. In this mode, the shared port is attached to the SFP interface, and works like the rest of the ports on this switch. The Shared Port mode must be set to 'External' mode for normal port operation.

Internal: This mode disconnects the the Shared Port from the SFP interface and attaches it internally to to an FPGA. No connectivity can be done via the Shared Port's SFP interface while in this mode. The FPGA port is "hidden" when the Shared port is set to 'Internal' mode in several modules. Use this mode for EtherSAT Loopback and EtherSAT Test functions. Note that configuration settings that were saved on the shared port are lost when switching Shared Port modes; you may want to use the Configuration Backup/Restore function before switching Shared Port modes.

Related Manuals and Online Help

Related documentation may include:

- Product Documentation Postcard (33504)
- S3280-TST Install Guide (33520), User Guide (33506), and CLI Reference (33507)
- Indura™ Install Guide (33514), Web User Guide (33510) and CLI Reference (33508)
- S4140/ S4212 / S4224 Install Guide (33534)
- S4140/ S4212 / S4224 User Guide (33535)
- S4140/ S4212 / S4224 CLI Reference (33536)
- EtherSAT User Guide (33540) (this manual)
- Converge™ EMS Install Guides (33543, 33548) and Administrator's Procedures (33544)
- MRP User Guide (33541)
- Static IP Routing User Guide (33542)
- Release Notes (version specific)

Context-sensitive Help screens are built into the Web interface (click ) and the CLI (type **?** or **Help**).

Check the TN web site at http://www.transition.com/ for additional white papers, application notes, etc.

Check the S3280-TST landing page at www.transition.com/TransitionNetworks/Landing/s3280/s3280.aspx for Product Information, Application Notes, etc.

Check the S3280-TST product page at http://www.transition.com/TransitionNetworks/Products2/Family.aspx?Name=S3280 for access to the latest S3280-TST datasheet, features, applications, specs, SKUs, etc.

When the procedures in this manual are successfully completed, refer to the *S3280-TST Web Interface User Guide* or the *S3280-TST CLI Reference* for configuration, monitoring, diagnostics, and maintenance information.

EtherSAT Configuration Process

The EtherSAT functions can be performed from the CLI or web interface. The overall process includes:

1. Configure PTP instance
2. Configure Ethernet Services (EVC and ECE)
3. Configure VLAN port type (optional but suggested). EVCs configure VLANs, but the EVC configured VLANs are not reflected in the VLAN tables. A suggested best practice is to manually add those EVC configured VLANs to the VLAN table.
4. Configure BW Profiles/Policing (optional).
5. Configure ACL (if BW profiles will affect EtherSAT).
6. Configure **Service Activation** > **Profiles**.
7. Configure **Service Activation** > **Test**.
8. Configure **Service Activation** > **System**.
9. Run Test at **Diagnostics** > **Service Activation** > **Test**.
10. Check Test status and monitor results.

The process is similar for configuring EtherSAT via the Web GUI and via CLI commands:

► See section "5. CLI Commands" on page 51 for CLI command details.

► See section "4. Web Interface" on page 26 for web GUI details.

2. Service Activation Test Configuration Example

This appendix privides an example of how to run an Ethernet Service Activation Test (EtherSAT) between customer handoff points using two S3280-TST devices. Differences for S4xxx devices are noted where applicable.

Dependencies:

- The S3280-TST EtherSAT Delay Measurement and Back-to-back test implementation depends on PTP (IEEE 1588 v2) to synchronize the clocks of the Initiator and Collector, so PTP must be configured prior to EtherSAT Test. Results can only be as accurate as the Synchronization between the PTP clocks.
- The S3280-TST EtherSAT Test implementation must be run in an EVC, so EVCs/ECEs must be configured prior to EtherSAT Test.

Notes:

- The smallest accurate increment for Delay Measurement buckets is 300us.
- The smallest accurate increment for Delay Measurement Variation buckets is 0.1ms (100us).
- 1518 byte frames are not supported (only multiples of 4 (so 1516 and 1520 are supported).

Network configuration:

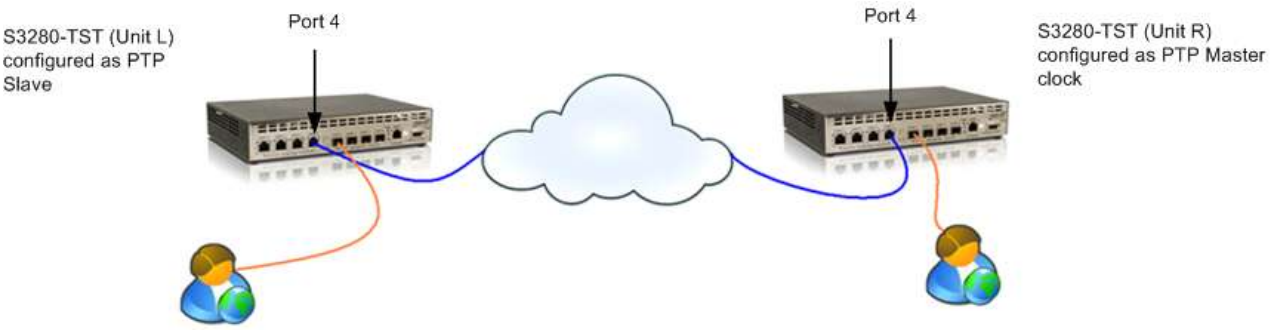


Figure 1. Service Activation Test Configuration Example

PTP Configuration for EtherSAT

This is required for Delay Measurement tests and Back-to-Back tests. If only Throughput will be tested, PTP configuration can be skipped. One S3280-TST (Unit R) will be the PTP Master clock, and the other S3280-TST (Unit L) will be the PTP Slave. The EtherSAT Test works with other PTP configurations as well. The Master and Slave are assumed to be connected to each other via port 4.

To configure the PTP Master Clock:

1. On Unit R, navigate to the **Configuration** > **PTP** menu path.
2. Click **Add New PTP Clock** button.
3. Configure the settings as shown below, then Save:

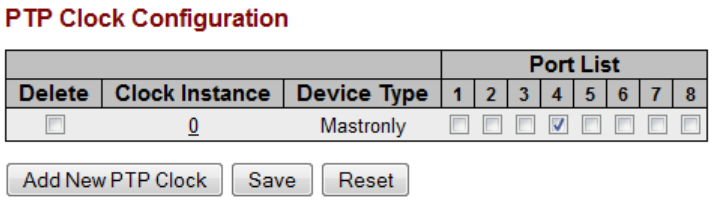
PTP Clock Configuration

			Port List
Delete	Clock Instance	Device Type	1 2 3 4 5 6 7 8
No Clock Instances Present			

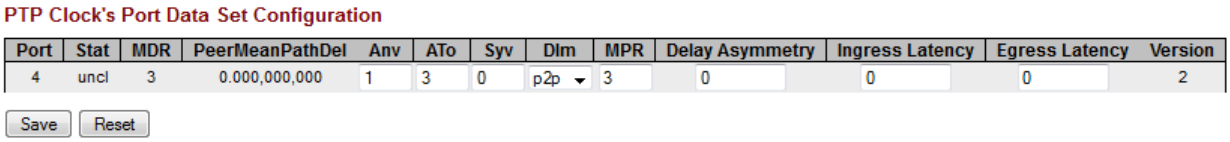
Delete	Clock Instance	Device Type	2 Step Flag	Clock Identity	One Way	Protocol	VLAN Tag Enable	VID	PCP
Delete	0	Mastronly	True	00:c0:f2:ff:fe:22:20:5c	False	Ethernet		0	0

Add New PTP Clock | Save | Reset

4. Select port 4 as shown below, then Save:

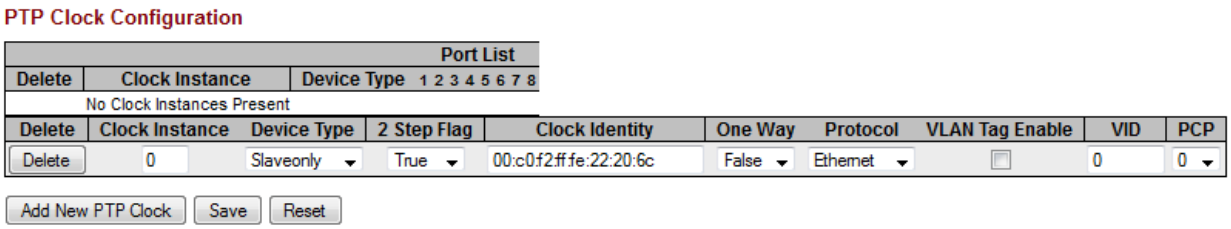


5. Click Clock Instance 0.
6. Click Ports Configuration.
7. Configure as shown below, then Save:

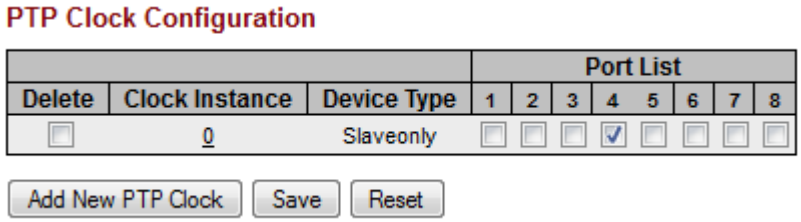


To Configure the PTP Slave Clock

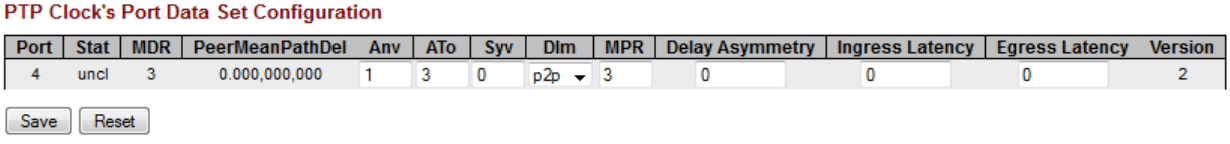
1. On Unit L, navigate to the **Configuration** > **PTP** menu path.
2. Click **Add New PTP Clock** button.
3. Configure the settings as shown below, then Save:



4. Select port 4 as shown below, then Save:

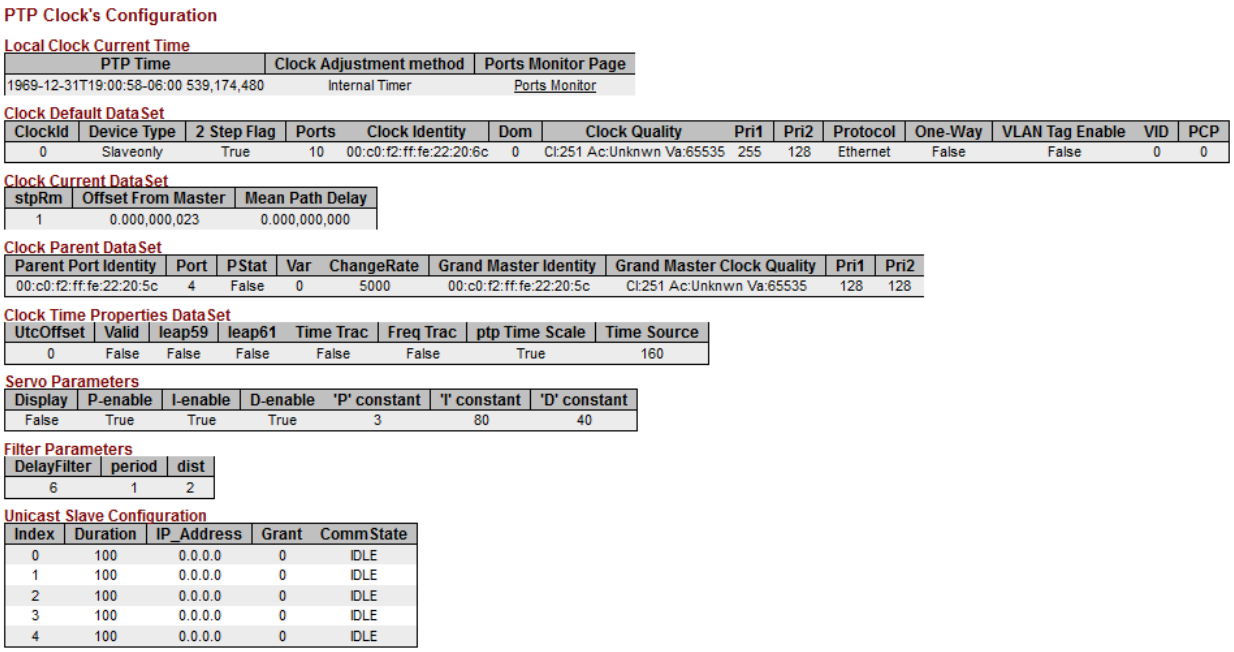


5. Click Clock Instance 0.
6. Click Ports Configuration.
7. Configure as shown below, then Save:



To Observe and Confirm PTP Synchronization Integrity

1. On the PTP Slave (Unit L), navigate to the **Monitor** > **PTP** menu path.
2. Click Clock Instance 0.
3. Tick Auto-refresh.
4. Watch the value in the field “Offset From Master”. With each refresh, the value should approach 0, until it eventually stabilizes to values smaller than 0.000,000,050 seconds. In a lab environment, clock sync to this level is usually reached about 3 minutes after initial Master-Slave communication. In a live network environment, this level of synchronization can take one or more hours.



PTP Clock's Configuration

Local Clock Current Time

PTP Time	Clock Adjustment method	Ports Monitor Page
1969-12-31T19:00:58-06:00 539,174,480	Internal Timer	Ports Monitor

Clock Default Data Set

ClockId	Device Type	2 Step Flag	Ports	Clock Identity	Dom	Clock Quality	Pri1	Pri2	Protocol	One-Way	VLAN Tag Enable	VID	PCP
0	Slaveonly	True	10	00:c0:f2:ff:fe:22:20:6c	0	Cl:251 Ac:Unknwn Va:65535	255	128	Ethernet	False	False	0	0

Clock Current Data Set

stpRm	Offset From Master	Mean Path Delay
1	0.000,000,023	0.000,000,000

Clock Parent Data Set

Parent Port Identity	Port	PStat	Var	ChangeRate	Grand Master Identity	Grand Master Clock Quality	Pri1	Pri2
00:c0:f2:ff:fe:22:20:5c	4	False	0	5000	00:c0:f2:ff:fe:22:20:5c	Cl:251 Ac:Unknwn Va:65535	128	128

Clock Time Properties Data Set

UtcOffset	Valid	leap59	leap61	Time Trac	Freq Trac	ptp Time Scale	Time Source
0	False	False	False	False	False	True	160

Servo Parameters

Display	P-enable	I-enable	D-enable	'P' constant	'I' constant	'D' constant
False	True	True	True	3	80	40

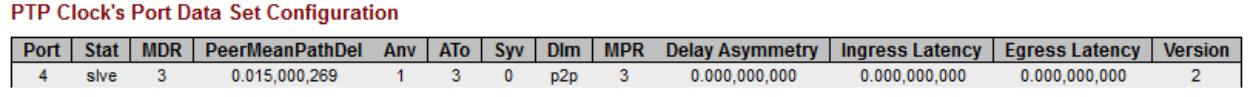
Filter Parameters

DelayFilter	period	dist
6	1	2

Unicast Slave Configuration

Index	Duration	IP_Address	Grant	Comm State
0	100	0.0.0.0	0	IDLE
1	100	0.0.0.0	0	IDLE
2	100	0.0.0.0	0	IDLE
3	100	0.0.0.0	0	IDLE
4	100	0.0.0.0	0	IDLE

5. Observe the Peer Mean Path Delay by clicking Ports Monitor in the screen above, which brings you to the screen below.



PTP Clock's Port Data Set Configuration

Port	Stat	MDR	PeerMeanPathDel	Anv	ATo	Syv	Dlm	MPR	Delay Asymmetry	Ingress Latency	Egress Latency	Version
4	slve	3	0.015,000,269	1	3	0	p2p	3	0.000,000,000	0.000,000,000	0.000,000,000	2

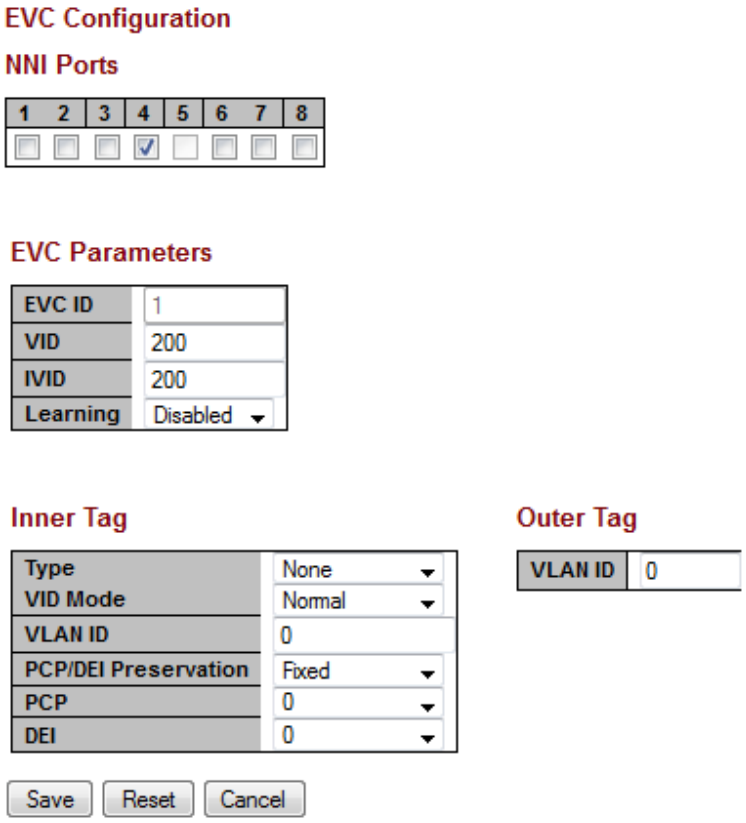
EVC / ECE Configuration for EtherSAT

This section shows how to create an EVC between Unit L and Unit R. The EtherSAT Test works with other EVC/ECE configurations as well. Configure Unit L and Unit R identically as described below.

Configure EVC & ECE that EtherSAT Test will run inside of:

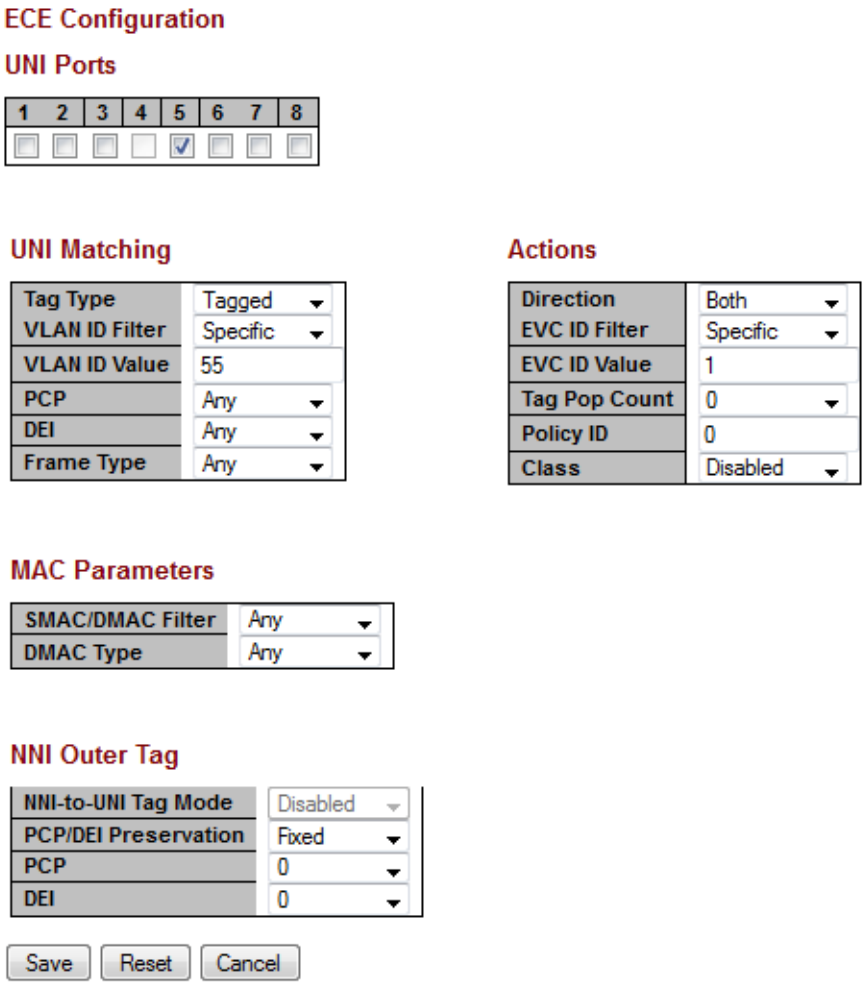
EVC configuration

1. Navigate to the **Configuration** > **Ethernet Services** > **EVCs** menu path.
2. Add EVC by clicking the ⊕ symbol.
3. Configure as shown below, then Save:



ECE Configuration

1. Navigate to the **Configuration** > **Ethernet Services** > **ECEs** menu path.
2. Add ECE by clicking the ⊕ symbol.
3. Configure as shown, then Save:

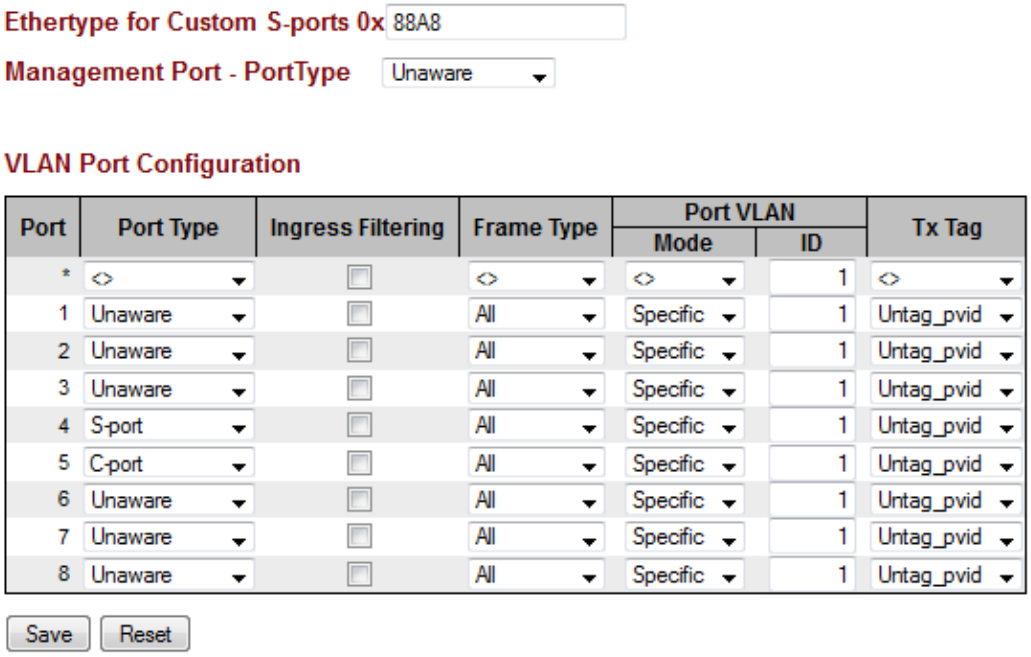


When these EVC/ECE configurations are combined with the upcoming EtherSAT Test configurations, EtherSAT Test traffic will be double-tagge with an outer tag of 200, and an inner tag of 55.

VLAN Configuration for EtherSAT

This is supplemental to the EVC/ECE configuration. Again, Unit L and Unit R will have identical configurations. Port 4 will be S-tagged and port 5 will be C-tagged.

1. Navigate to the **Configuration → VLANs** > **Ports** menu path.
2. Configure ports 4 and 5 as shown below:



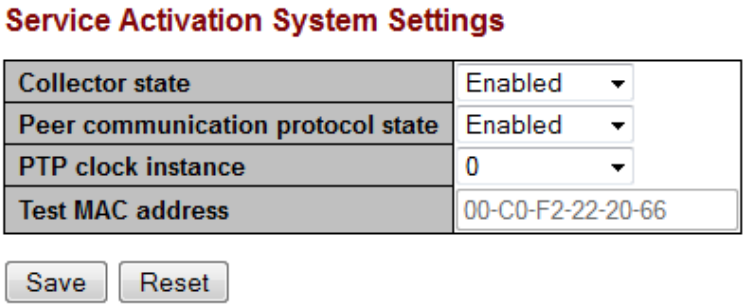
The dependencies are now configured.

EtherSAT Configuration

Configure the EtherSAT Test, beginning with Collector (Unit R) configuration.

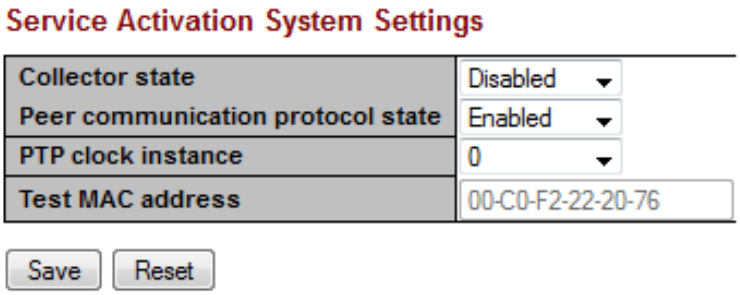
Collector Configuration

1. Navigate to the **Configuration** > **Service Activation** > **System** menu path.
2. Configure as shown below.



Initiator configuration

1. Navigate to the **Configuration** > **Service Activation** > **System** menu path.
2. Configure as shown below:



3. Navigate to the **Configuration** > **Service Activation** > **Profiles** menu path.
4. Click the **Add New Profile** button.

5. Configure as shown below, then Save:

Service Activation Profiles Configuration

Profile settings	
Profile ID	1
Name	test3FrameSizes
Payload Fill	PRBS
Payload Fill Pattern (hex)	0
CBS Line Rate (Mbps)	1
FLR (%)	0.00
Yellow Frames PCP Values	0 1 2 3 4 5 6 7
Frame Size Mix (bytes)	64 128 256 512 1024 1280 1516 9000 0 0
Rate Decrease Step (%)	30
Step Length (sec)	100
Test Mode	bidir
Test steps	Throughput Latency Frame Loss Rate Back-to-Back

Test Frame configuration	
Encapsulation Level	L2
Encapsulation Type	ETH Test
Custom Eth Type (hex)	0000
MEG Level	0
LLC/SNAP OUI (hex)	0-0-0
LLC/SNAP Protocol	0
Dest IP	0.0.0.0
Src IP	0.0.0.0
DSCP (hex)	0
ECN	0
Flags	0
TTL	0
Src Port	0
Dest Port	0
Seq Number	0
ACK	0
Control Bits (hex)	0
Window Size	0

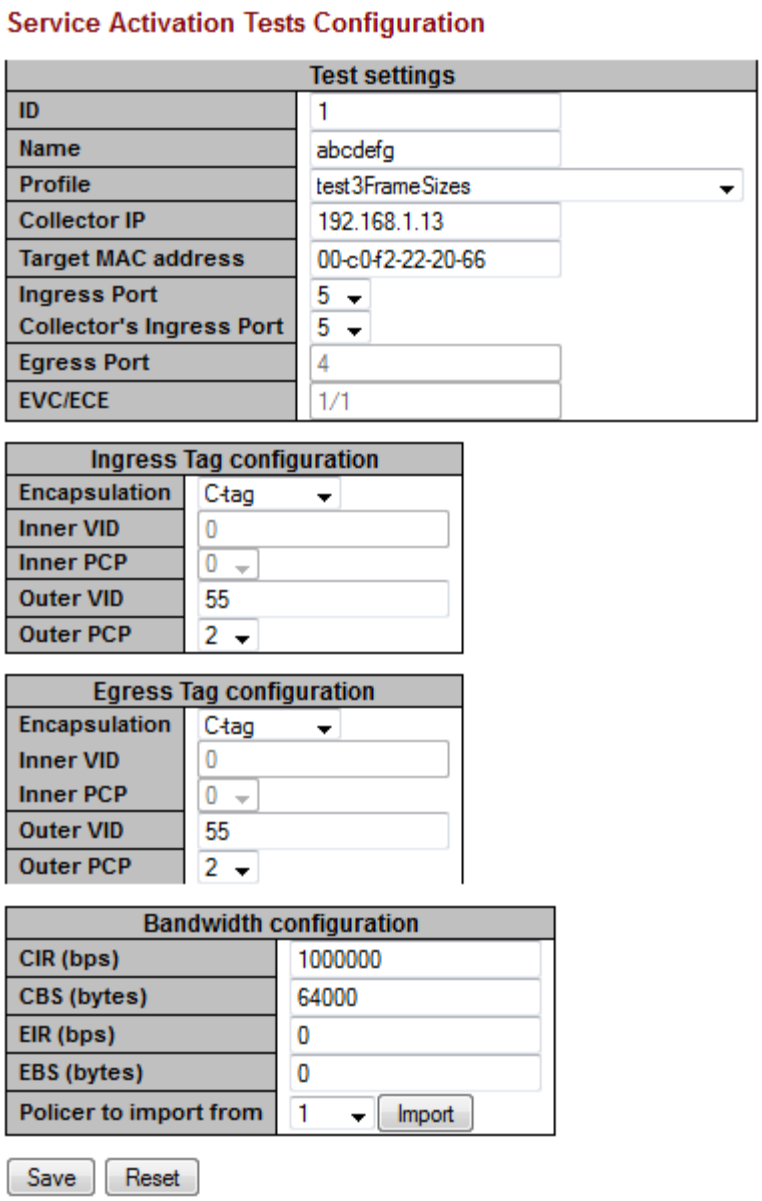
DM Threshold Configuration			
0	to	1000	usec
1001	to	2000	usec
2001	to	3000	usec
3001	to	4000	usec
4001	to	5000	usec
5001	to	6000	usec
6001	to	7000	usec
7001	to	8000	usec
8001	to	5000000	usec

DMV Threshold Configuration			
0	to	100	usec
101	to	200	usec
201	to	300	usec
301	to	400	usec
401	to	500	usec
501	to	600	usec
601	to	700	usec
701	to	800	usec
801	to	5000000	usec

Save Reset

6. Navigate to the **Configuration** > **Service Activation** > **Tests** menu path.
7. Click the **Add New Test** button.

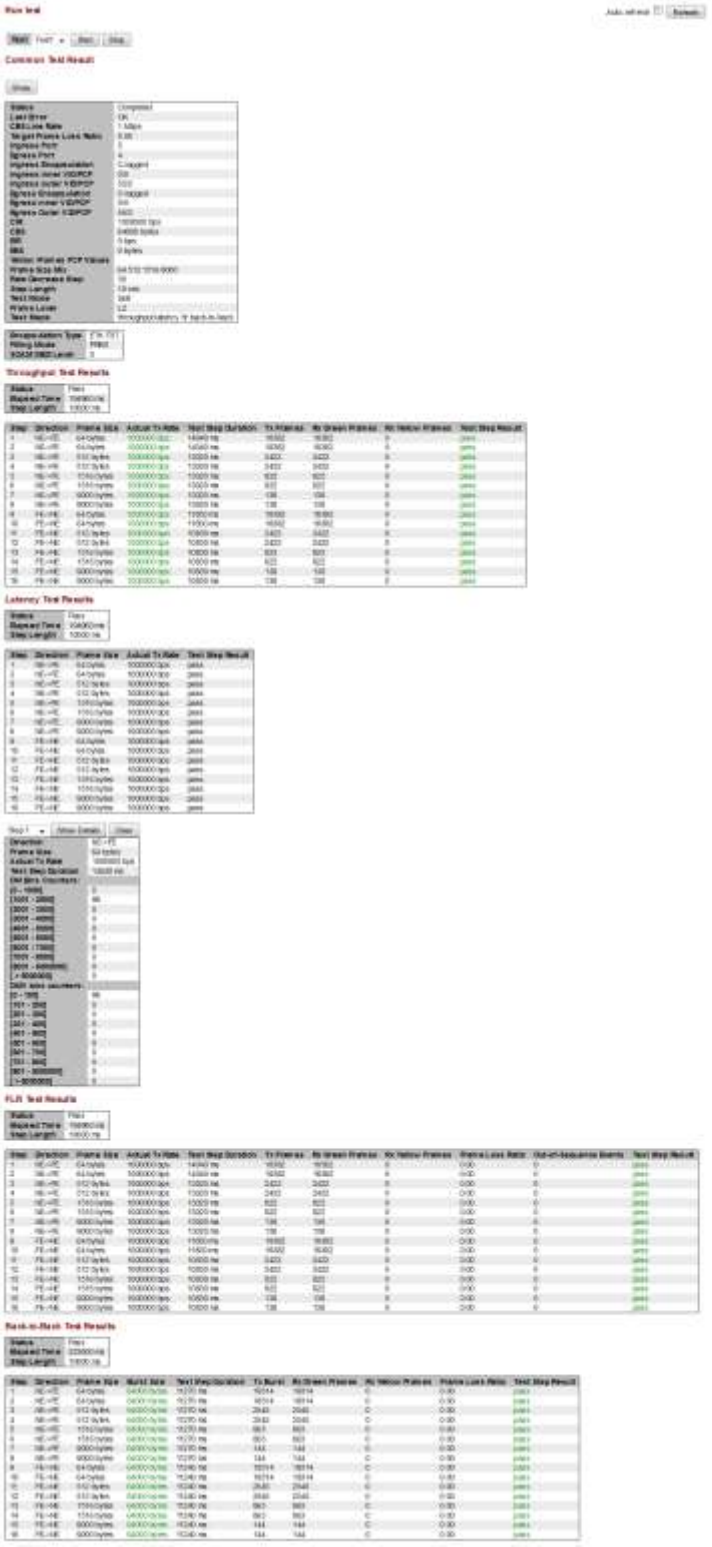
8. Configure as shown below, then Save:



The EtherSAT Test is now configured.

Run the Test

1. Navigate to the **Diagnostics** > **Service Activation** > **Test** menu path.
2. Make sure your test is selected and click the **Start** button.
3. Click the **Show** button, and to view results as they become available, tick the **Auto-refresh** button. Results are displayed as shown below.



3. EtherSAT Ethernet Loopback Configuration Example

This configuration example uses two S3280-TST NIDs. In the diagram below, the left NID is configured as an EtherSAT Initiator, and the right NID has an Ethernet Loopback configured. Test traffic will be generated at the EtherSAT initiator and be sent through the network under test to an Ethernet loopback device, which works by receiving a packet, then swapping its source and destination MAC addresses, then sending it back out the same port it was received on. The looped packets will go through the network under test and return to the EtherSAT initiator.

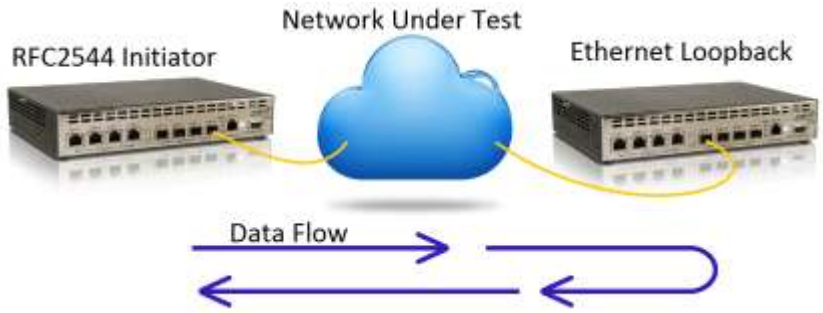
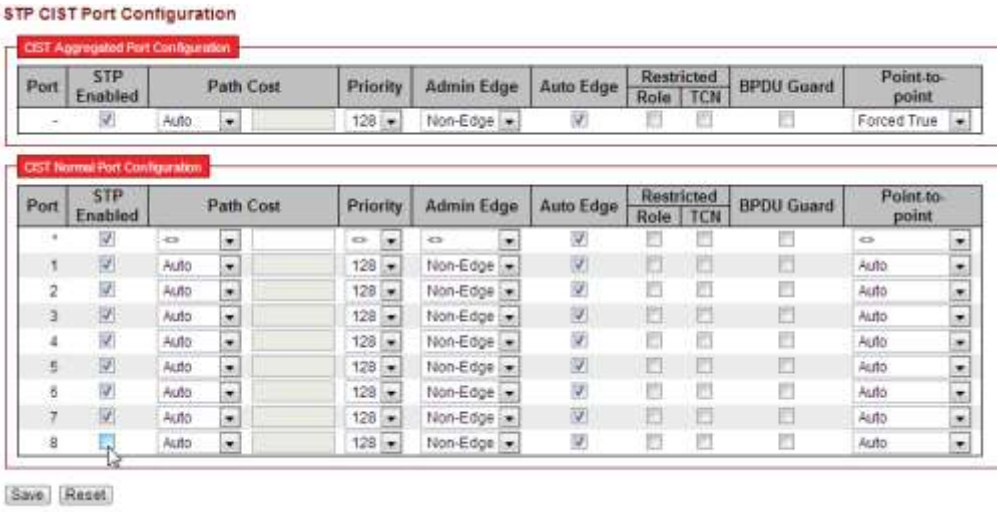


Figure 2. EtherSAT in an Ethernet Loopback Configuration

Follow these configuration steps on the EtherSAT Initiator:

1. Disable Spanning Tree

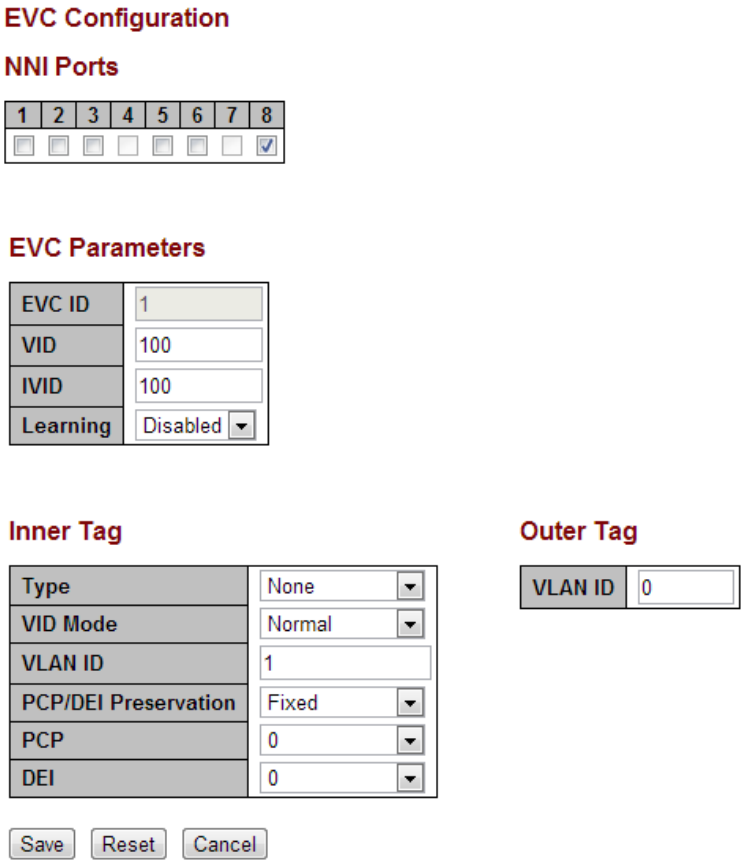
a. Navigate to the **Configuration** > **Spanning Tree** > **CIST Ports** menu path.
b. Un-tick the port that EtherSAT test will be run through.



- Spanning Tree is enabled by default, and will send packets out the test port, which may be undesirable while the test is running, and depending on the loopback used, Spanning Tree may be inadvertently triggered to block traffic on the test port. It is a best practice to disable Spanning Tree now to avoid confusion later.

2. Configure an EVC

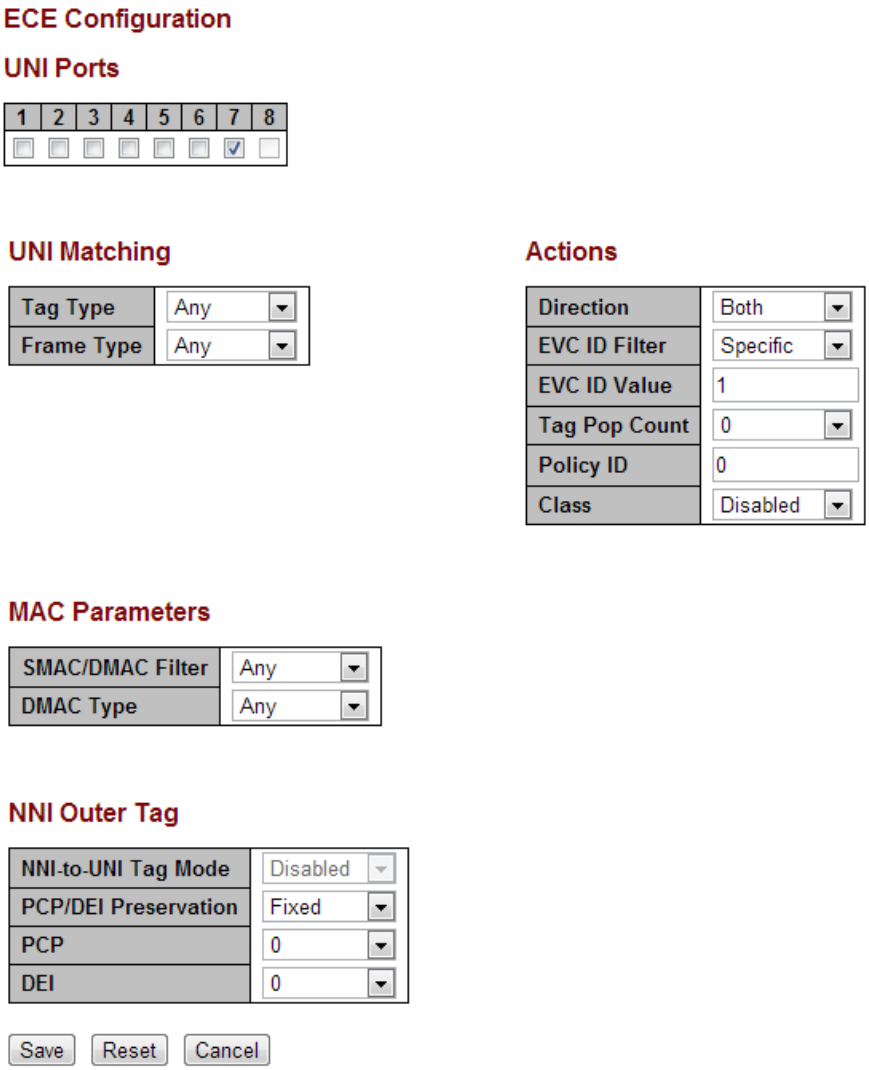
a. Navigate to the **Configuration** > **Ethernet Services** > **EVCs** menu path.
b. Create an EVC with the following parameters:



- All test traffic will be encapsulated in this EVC, and tagged with the VID configured here (100).
- You may need to enter this VLAN number (100) in the Ethernet Loopback device at the remote end of the network under test.

3. Configure an ECE

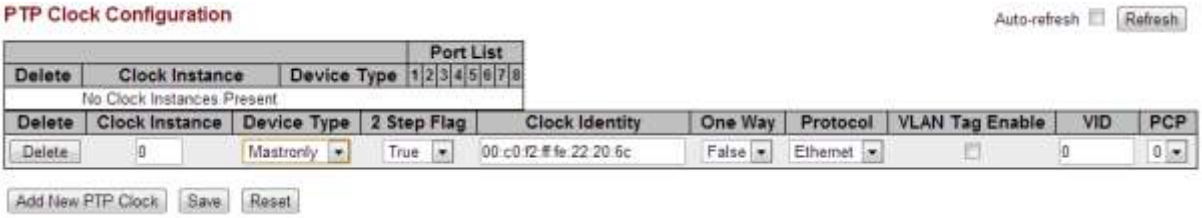
a. Navigate the GUI to the **Configuration** > **Ethernet Services** > **ECEs** menu path.
b. Create an ECE with the following parameters:



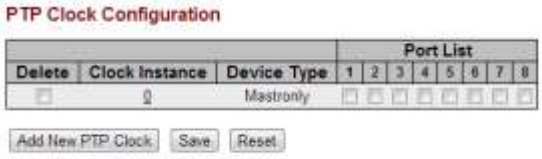
- When the EtherSAT test runs, the S3280's internal traffic generator will be logically connected to this port (and customer traffic that normally passes through this ECE will be blocked).

4. Configure PTP

a. Navigate to the **Configuration** > **PTP** menu path.
b. Add a new PTP clock with the following parameters:



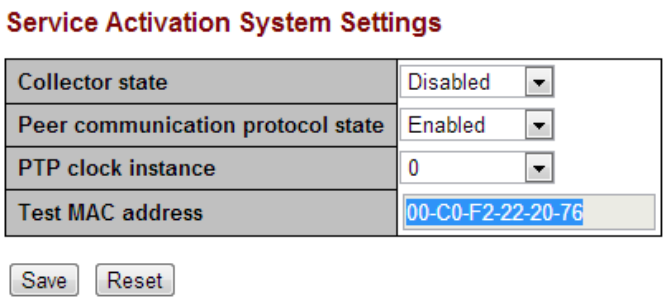
c. Save, and there's no need to add any ports.



- The EtherSAT implementation in the S3280-TST references PTP time when calculating the latency during the delay measurement portions of the test. If the tests are to include delay measurements, PTP must be configured, if not, it's okay to omit this step.
- This is the most basic PTP configuration possible, and only valid for this test.

5. Configure EtherSAT

a. Navigate to **Configuration** > **Service Activation** > **System** menu path.
b. Confirm configuration is as shown:



c. Copy this Test MAC address (each device has a unique Test MAC, which is different than the management MAC). You will need to enter it in the Ethernet Loopback configuration on the remote S3280-TST. All test traffic generated by the S3280-TST will contain this as the source MAC address.
d. Navigate to the **Configuration** > **Service Activation** > **Profiles** menu path.

e. Add a new profile with the following parameters:

Service Activation Profiles Configuration

Profile settings	
Profile ID	1
Name	abc
Payload Fill	PRBS
Payload Fill Pattern (hex)	0
CBS Line Rate (Mbps)	1000
FLR (%)	0.00
Yellow Frames PCP Values	0 1 2 3 4 5 6 7
Frame Size Mix (bytes)	64 128 256 512 1024 1280 1516 9000 0 0
Rate Decrease Step (%)	25
Step Length (sec)	10
Test Mode	loopback
Test steps	Throughput Latency Frame Loss Rate Back-to-Back

Test Frame configuration	
Encapsulation Level	L2
Encapsulation Type	ETH Test
Custom Eth Type (hex)	0000
MEG Level	5
LLC/SNAP OUI (hex)	0-0-0
LLC/SNAP Protocol	0
Dest IP	0.0.0.0
Src IP	0.0.0.0
DSCP (hex)	0
ECN	0
Flags	0
TTL	0
Src Port	0
Dest Port	0
Seq Number	0
ACK	0
Control Bits (hex)	0
Window Size	0

DM Threshold Configuration			
0	to	100	usec
101	to	200	usec
201	to	300	usec
301	to	400	usec
401	to	500	usec
501	to	600	usec
601	to	700	usec
701	to	800	usec
801	to	5000000	usec

DMV Threshold Configuration			
0	to	2	usec
3	to	4	usec
5	to	8	usec
9	to	16	usec
17	to	32	usec
33	to	64	usec
65	to	128	usec
129	to	256	usec
257	to	5000000	usec

Save Reset

f. Navigate to **Configuration** > **Service Activation** > **Tests** menu path.

Add a new test with the following parameters:

Service Activation Tests Configuration

Test settings	
ID	1
Name	def
Profile	abc
Collector IP	192.251.240.108
Target MAC address	00-c0-f2-22-20-66
Ingress Port	7
Collector's Ingress Port	7
Egress Port	8
EVC/ECE	1/1

Ingress Tag configuration	
Encapsulation	Untagged
Inner VID	0
Inner PCP	0
Outer VID	0
Outer PCP	0

Egress Tag configuration	
Encapsulation	Untagged
Inner VID	0
Inner PCP	0
Outer VID	0
Outer PCP	0

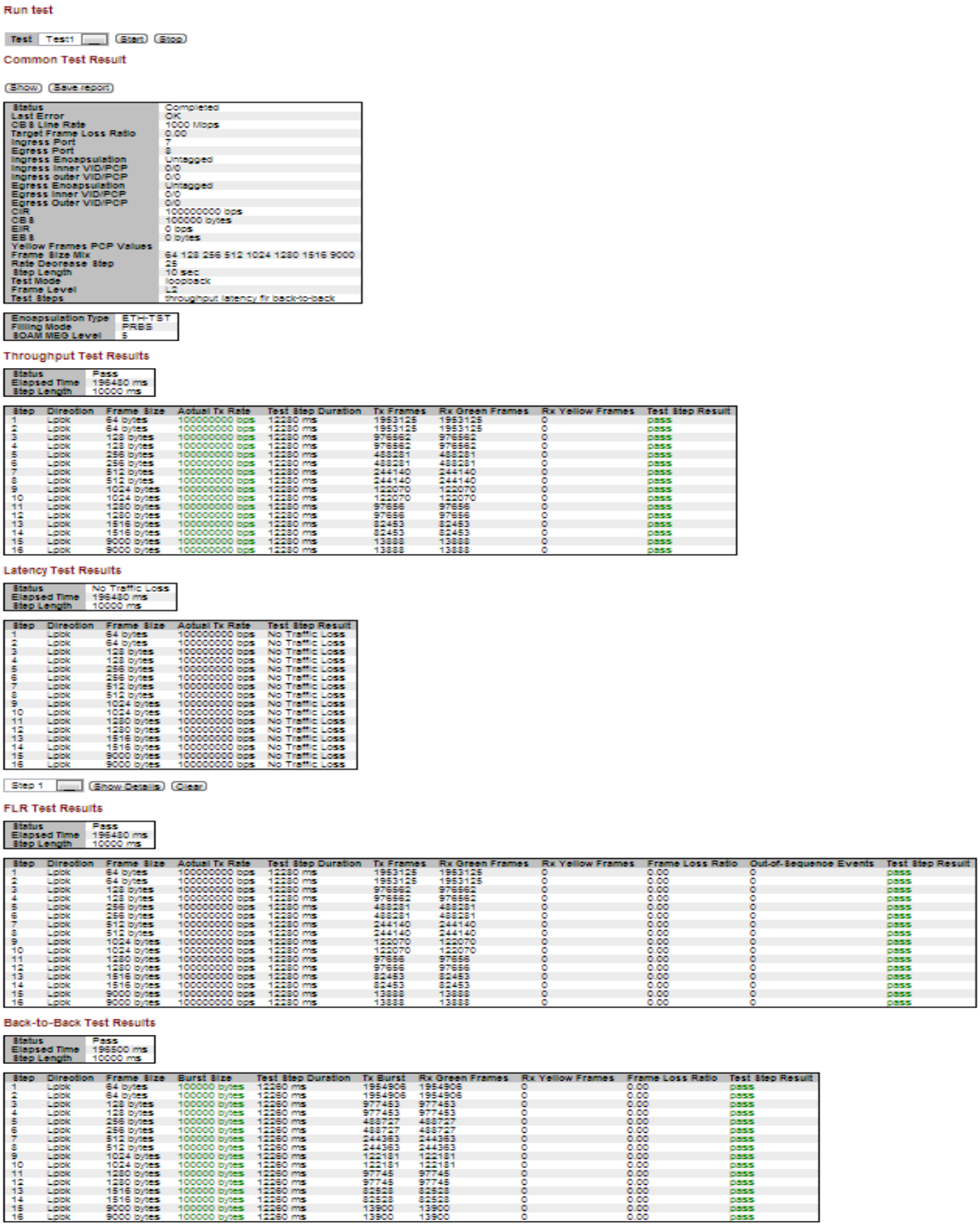
Bandwidth configuration	
CIR (bps)	100000000
CBS (bytes)	100000
EIR (bps)	0
EBS (bytes)	0
Policer to import from	1 Import

Save Reset

- When testing in loopback mode, the values for Collector IP and Target MAC still need to be populated, but they can be nearly anything, because the packets will be looped instead of sent to an actual collector.

g. Navigate to **Diagnostics** > **Service Activation** > **Test** menu path.

Click **Start**, click **Show**, and then click the **Auto-refresh** button. The results display:



Run test

Test | Test1 | Start | Stop

Common Test Result

Show | Save report

Status	Completed
Last Error	OK
CBS Line Rate	1000 Mbps
Target Frame Loss Ratio	0.00
Ingress Port	7
Egress Port	8
Ingress Encapsulation	Untagged
Ingress Inner VID/PCP	0/0
Ingress outer VID/PCP	0/0
Egress Encapsulation	Untagged
Egress Inner VID/PCP	0/0
Egress Outer VID/PCP	0/0
CIR	100000000 bps
CBS	100000 bytes
EIR	0 bps
EBS	0 bytes
Yellow Frames PCP Values	
Frame Size Mix	64 128 256 512 1024 1280 1516 9000
Rate Decrease Step	25
Step Length	10 sec
Test Mode	loopback
Frame Level	L2
Test Steps	throughput latency flr back-to-back

Encapsulation Type	ETH-TST
Filling Mode	PRBS
SOAM MEG Level	5

Throughput Test Results

Status	Pass
Elapsed Time	196480 ms
Step Length	10000 ms

Step	Direction	Frame Size	Actual Tx Rate	Test Step Duration	Tx Frames	Rx Green Frames	Rx Yellow Frames	Test Step Result
1	Lpbk	64 bytes	100000000 bps	12280 ms	1953125	1953125	0	pass
2	Lpbk	64 bytes	100000000 bps	12280 ms	1953125	1953125	0	pass
3	Lpbk	128 bytes	100000000 bps	12280 ms	976562	976562	0	pass
4	Lpbk	128 bytes	100000000 bps	12280 ms	976562	976562	0	pass
5	Lpbk	256 bytes	100000000 bps	12280 ms	488281	488281	0	pass
6	Lpbk	256 bytes	100000000 bps	12280 ms	488281	488281	0	pass
7	Lpbk	512 bytes	100000000 bps	12280 ms	244140	244140	0	pass
8	Lpbk	512 bytes	100000000 bps	12280 ms	244140	244140	0	pass
9	Lpbk	1024 bytes	100000000 bps	12280 ms	122070	122070	0	pass
10	Lpbk	1024 bytes	100000000 bps	12280 ms	122070	122070	0	pass
11	Lpbk	1280 bytes	100000000 bps	12280 ms	97656	97656	0	pass
12	Lpbk	1280 bytes	100000000 bps	12280 ms	97656	97656	0	pass
13	Lpbk	1516 bytes	100000000 bps	12280 ms	82453	82453	0	pass
14	Lpbk	1516 bytes	100000000 bps	12280 ms	82453	82453	0	pass
15	Lpbk	9000 bytes	100000000 bps	12280 ms	13888	13888	0	pass
16	Lpbk	9000 bytes	100000000 bps	12280 ms	13888	13888	0	pass

Latency Test Results

Status	No Traffic Loss
Elapsed Time	196480 ms
Step Length	10000 ms

Step	Direction	Frame Size	Actual Tx Rate	Test Step Result
1	Lpbk	64 bytes	100000000 bps	No Traffic Loss
2	Lpbk	64 bytes	100000000 bps	No Traffic Loss
3	Lpbk	128 bytes	100000000 bps	No Traffic Loss
4	Lpbk	128 bytes	100000000 bps	No Traffic Loss
5	Lpbk	256 bytes	100000000 bps	No Traffic Loss
6	Lpbk	256 bytes	100000000 bps	No Traffic Loss
7	Lpbk	512 bytes	100000000 bps	No Traffic Loss
8	Lpbk	512 bytes	100000000 bps	No Traffic Loss
9	Lpbk	1024 bytes	100000000 bps	No Traffic Loss
10	Lpbk	1024 bytes	100000000 bps	No Traffic Loss
11	Lpbk	1280 bytes	100000000 bps	No Traffic Loss
12	Lpbk	1280 bytes	100000000 bps	No Traffic Loss
13	Lpbk	1516 bytes	100000000 bps	No Traffic Loss
14	Lpbk	1516 bytes	100000000 bps	No Traffic Loss
15	Lpbk	9000 bytes	100000000 bps	No Traffic Loss
16	Lpbk	9000 bytes	100000000 bps	No Traffic Loss

Step 1 | Show Details | Clear

FLR Test Results

Status	Pass
Elapsed Time	196480 ms
Step Length	10000 ms

Step	Direction	Frame Size	Actual Tx Rate	Test Step Duration	Tx Frames	Rx Green Frames	Rx Yellow Frames	Frame Loss Ratio	Out-of-Sequence Events	Test Step Result
1	Lpbk	64 bytes	100000000 bps	12280 ms	1953125	1953125	0	0.00	0	pass
2	Lpbk	64 bytes	100000000 bps	12280 ms	1953125	1953125	0	0.00	0	pass
3	Lpbk	128 bytes	100000000 bps	12280 ms	976562	976562	0	0.00	0	pass
4	Lpbk	128 bytes	100000000 bps	12280 ms	976562	976562	0	0.00	0	pass
5	Lpbk	256 bytes	100000000 bps	12280 ms	488281	488281	0	0.00	0	pass
6	Lpbk	256 bytes	100000000 bps	12280 ms	488281	488281	0	0.00	0	pass
7	Lpbk	512 bytes	100000000 bps	12280 ms	244140	244140	0	0.00	0	pass
8	Lpbk	512 bytes	100000000 bps	12280 ms	244140	244140	0	0.00	0	pass
9	Lpbk	1024 bytes	100000000 bps	12280 ms	122070	122070	0	0.00	0	pass
10	Lpbk	1024 bytes	100000000 bps	12280 ms	122070	122070	0	0.00	0	pass
11	Lpbk	1280 bytes	100000000 bps	12280 ms	97656	97656	0	0.00	0	pass
12	Lpbk	1280 bytes	100000000 bps	12280 ms	97656	97656	0	0.00	0	pass
13	Lpbk	1516 bytes	100000000 bps	12280 ms	82453	82453	0	0.00	0	pass
14	Lpbk	1516 bytes	100000000 bps	12280 ms	82453	82453	0	0.00	0	pass
15	Lpbk	9000 bytes	100000000 bps	12280 ms	13888	13888	0	0.00	0	pass
16	Lpbk	9000 bytes	100000000 bps	12280 ms	13888	13888	0	0.00	0	pass

Back-to-Back Test Results

Status	Pass
Elapsed Time	196800 ms
Step Length	10000 ms

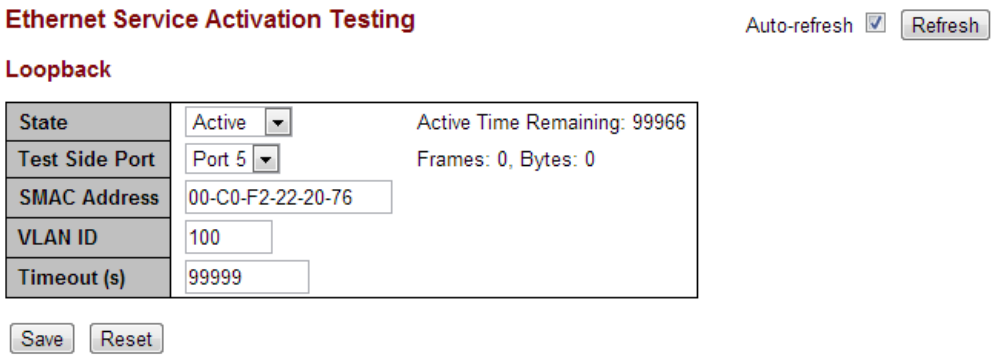
Step	Direction	Frame Size	Burst Size	Test Step Duration	Tx Burst	Rx Green Frames	Rx Yellow Frames	Frame Loss Ratio	Test Step Result
1	Lpbk	64 bytes	100000 bytes	12280 ms	1954906	1954906	0	0.00	pass
2	Lpbk	64 bytes	100000 bytes	12280 ms	1954906	1954906	0	0.00	pass
3	Lpbk	128 bytes	100000 bytes	12280 ms	977453	977453	0	0.00	pass
4	Lpbk	128 bytes	100000 bytes	12280 ms	977453	977453	0	0.00	pass
5	Lpbk	256 bytes	100000 bytes	12280 ms	488727	488727	0	0.00	pass
6	Lpbk	256 bytes	100000 bytes	12280 ms	488727	488727	0	0.00	pass
7	Lpbk	512 bytes	100000 bytes	12280 ms	244363	244363	0	0.00	pass
8	Lpbk	512 bytes	100000 bytes	12280 ms	244363	244363	0	0.00	pass
9	Lpbk	1024 bytes	100000 bytes	12280 ms	122181	122181	0	0.00	pass
10	Lpbk	1024 bytes	100000 bytes	12280 ms	122181	122181	0	0.00	pass
11	Lpbk	1280 bytes	100000 bytes	12280 ms	97745	97745	0	0.00	pass
12	Lpbk	1280 bytes	100000 bytes	12280 ms	97745	97745	0	0.00	pass
13	Lpbk	1516 bytes	100000 bytes	12280 ms	82528	82528	0	0.00	pass
14	Lpbk	1516 bytes	100000 bytes	12280 ms	82528	82528	0	0.00	pass
15	Lpbk	9000 bytes	100000 bytes	12280 ms	13900	13900	0	0.00	pass
16	Lpbk	9000 bytes	100000 bytes	12280 ms	13900	13900	0	0.00	pass

- Click the '**Save Report**' button to export the results to a text file.
- The reports will only pass after the Ethernet Loopback at the remote end has been activated.

Follow these configuration steps on the Ethernet Loopback device:

6. Configure Ethernet Loopback

a. Navigate to the **Diagnostics** > **Service Activation** > **Loopback** menu path.
b. Configure as shown below:



- The Source MAC is the MAC address from step 5c.
- The VLAN ID is the EVC VID mentioned in the note after step 2b.
- The loopback will only loop packets that match the VLAN and Source MAC filters. All other packets will still pass through the port.
- You should see the frame and byte counters increment during an EtherSAT test.

4. Web Interface

The EtherSAT web menu paths include:

Configuration > **Ports** > **Shared Port** (S4212 and S4224 only)
Configuration > **Service Activation** > **System**
Configuration > **Service Activation** > **Profiles**
Configuration > **Service Activation** > **Tests**
Diagnostics > **Service Activation** > **Test**
Diagnostics > **Service Activation** > **Loopback**

These EtherSAT menu paths are explained below.

Configuration > Ports > Shared Port (S4212 and S4224 only)

The S4212 and S4224 switches have one port that is 'Shared'. On the S4212, port 12 is ‘shared’ and on the S4224 port 24 is ‘shared’. The Shared port can be toggled between two modes of operation:

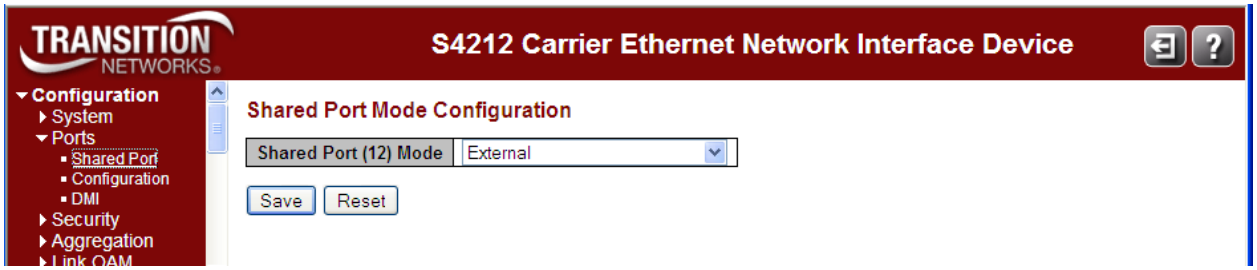
External: This is the default mode. In this mode, the shared port is attached to the SFP interface, and works like the rest of the ports on this switch. The Shared Port mode must be set to 'External' mode for normal port operation.

Internal: This mode disconnects the the Shared Port from the SFP interface and attaches it internally to to an FPGA. No connectivity can be achieved through the Shared Port's SFP interface while in this mode. The FPGA port is "hidden" when the Shared port is set to ‘Internal’ mode in several modules (ACL, EPS, ERPS, MEP, NAS, QoS, VLAN, PVLAN, VCL, EVC, MAC, DMI, etc.). Use this mode for EtherSAT Loopback and EtherSAT Test functions.

Note: saved port configurations are lost when switching modes; you may want to use the Configuration Backup/Restore function before switching modes. The Shared Port mode must be set to ' 'Internal' for these features to work:

Diagnostics > **Service Activation** > **Test** and
Diagnostics > **Service Activation** > **Loopback**

The FPGA port is set as a C-port by default to allow the Loopback test to work when EVC is configured.



When you change the Shared port (port 12) Mode and click the **Save** button, a webpage confirmation message displays: *Are you sure you want to switch the mode about the shared port?*.

Click the **OK** button only if you are sure that you want to change the Shared Port mode.

Messages:

Are you sure you want to switch the mode about the shared port?
Error: FPGA link ANEG failed
failed to open system sharedport table
GIVEN PORT IS NOT EAST OR WEST
The port is used for the internal for FPGA.
the shared port is not ready
The shared port mode must be internal!
The shared port must be internal mode!
Can't set VLAN config, port=%u
the shared port is not ready sa=%p

Meaning: A problem occurred with shared port configuration at the ***Configuration*** > ***Ports*** > ***Shared Port*** menu path.

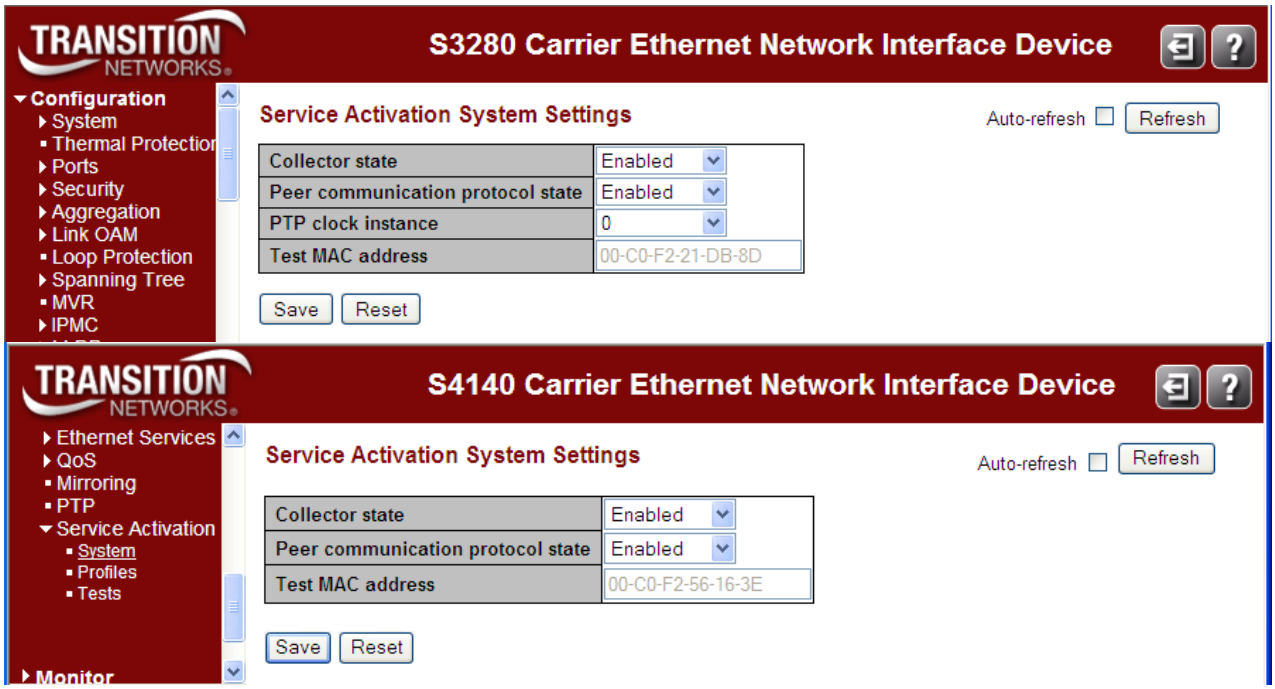
Recovery:

1. Click the **OK** button to clear the webpage message.

2. Verify the the Shared port (port 12 or port 24) Mode setting.

Configuration > Service Activation > System

The **Service Activation Systems Settings** table lets you set the SA systems settings (S3280-TST and S4140 shown below).



The **Service Activation Systems Settings** table selections are explained below.

Collector state: The Collector Flag determines will the SA module accept SA test requests from outside. Select *Disabled* or *Enabled*. The default is *Disabled*.

Peer communication protocol state: select *Disabled* or *Enabled*. The default is *Enabled*. If disabled, a NID is unable to support unidirectional and bidirectional EtherSAT tests (both as Initiator and Collector) since it cannot communicate with the far end. Only loopback tests can be executed if this is set to "*Disabled*".

PTP clock instance: from the S3280-TST dropdown select a configured PTP clock instance (***0***-***3***).

Test MAC address: displays the currently configured MAC address for this test (e.g., *00-C0-F2-21-DB-8D*). This Test MAC Address is used as the source MAC address of the generating frames.

Buttons

Auto-refresh: Check this box to automatically update (refresh) the page the page every three seconds.

Refresh: Refresh the page. Any changes made locally will be undone.

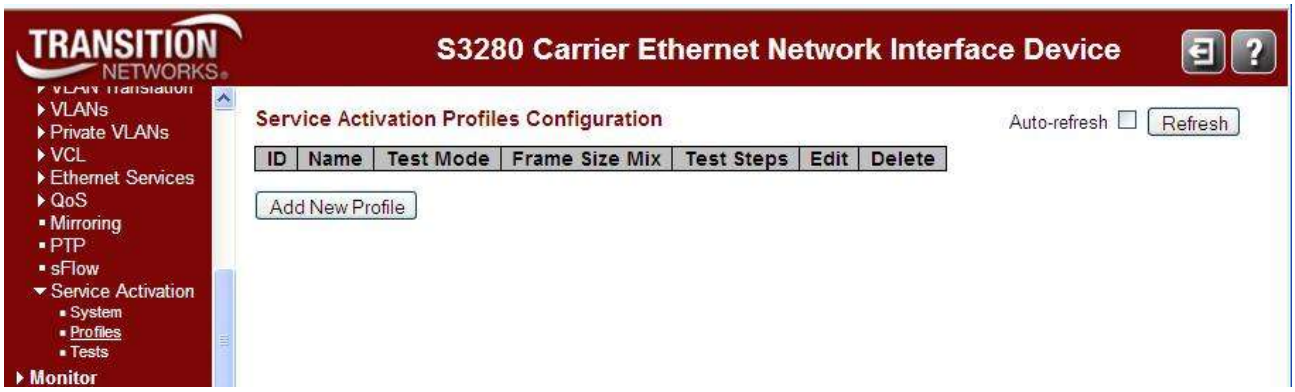
Save: Click to save changes.

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

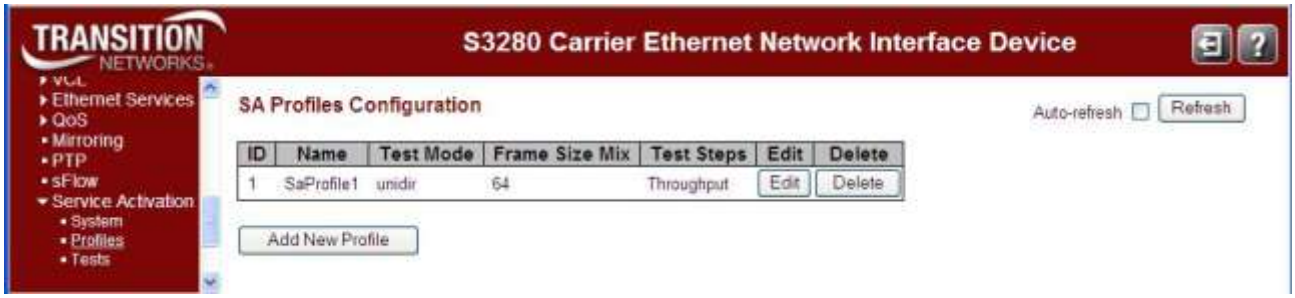
Configuration > Service Activation > Profiles

Add a New Service Activation Profile

At the default Service Activation Profiles Configuration page, click the **Add New Profiles** button.



At the updated Service Activation Profiles Configuration table, click the "**Edit**" button to modify the existing profile.



The Service Activation Profiles Configuration table parameters are explained below.

ID: the SA profile identifier entry (e.g., *1*).

Name: the SA profile name (e.g., *SaProfile1*)

Test Mode: the profile's assigned testing mode (***unidir***ectional, ***bidir***ectional, or ***loopback***).

Frame Size Mix: a number of bytes in the range 64-9600 bytes for throughput tests. No two instances can have the same Frame Size Mix. No two instances can have the range setting.

Test Steps: the test step(s) (*Throughput*, *Latency*, *Back-to-Back*, or *Frame Loss*) to be executed as part of the EtherSAT testing. This attribute indicates, for each of the test steps, whether they are included in the testing. By default, all the test steps are included. Since the Latency test is not a separate test, it is always assumed that the Throughput test will be executed instead with a DM/DMV results calculation.

Edit button: click to change the selected SA profile's configuration.

Delete button: click to delete the selected SA profile from the table.

Buttons

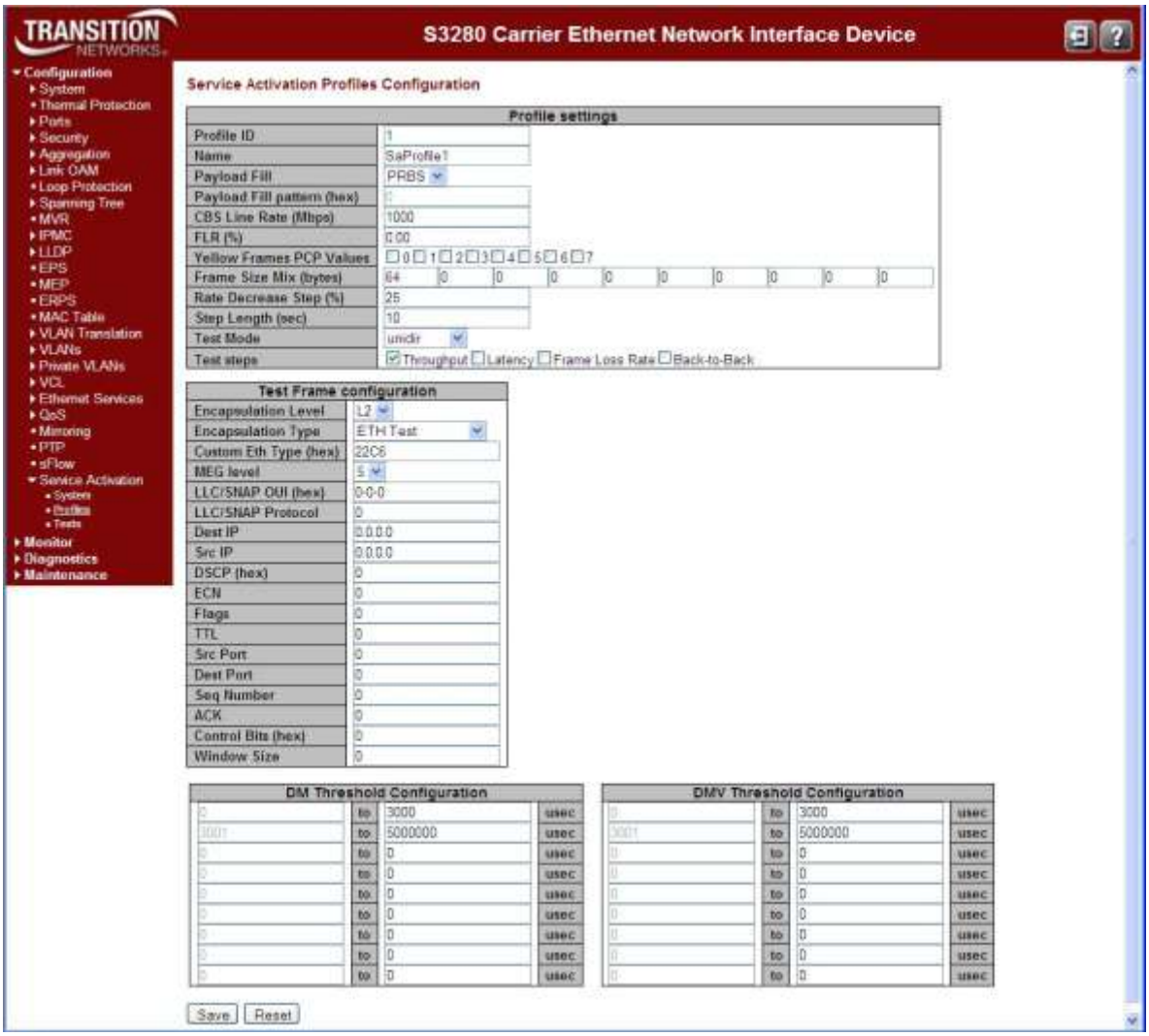
Auto-refresh: Check this box to automatically update (refresh) the page the page every three seconds.

Refresh: Click to refresh (update) the page. Any changes made locally will be undone.

Add New Profile: Click to create and configure a new Service Activation Profile to add to the page.

To specify the “Frame Mode” field in the Profiles table, you must first create an entry in the “L2 Protocol Configuration” or “L3 Protocol Configuration” table. Then this user can specify what frame mode will be used for profile and index of entry in the L2 or L3 Protocol configuration table (e.g. L2:1 L3:1).

To specify the “DM bin” field in the Profiles table, you must first create an entry in the “DM Threshold Configuration” table. After this, you can specify the DM bin from the drop down list using the index from “DM Threshold Configuration” table. The same is valid for a DMV bin field.



The **Service Activation Profiles Configuration** tables and parameters are explained below.

Profile parameters:

Profile ID: The profile entry ID. Enter a unique SA profile identifier (e.g., *1*).

Name: Enter a name for this test profile (e.g., *SaProfile1*).

Payload Fill: At the dropdown, select **PRBS** (pseudo-random bit stream) pattern or **Fixed** (fixed pattern of 4 octets). The pattern value is defined in a separate 32-bit FPGA register.

Payload Fill pattern (hex): Enter only if **Payload Fill** = **Fixed** selected above.

CBS Line Rate (Mbps): Line rate at which burst traffic should be sent for the Back-to-back frames test, in Mbps. The CBS line rate in Mbps (e.g., *1000*). The valid range is *1-1000*.

FLR (%): Frame loss ratio (expressed as a percentage, with 2 decimals (i.e., 99.99 %). The Frame Loss Ratio (e.g., *0.00* or *1.25* %).

Yellow Frames PCP Values: List of PCP values corresponding to yellow frame. Check a checkbox *0-7*.

Frame Size Mix (bytes): Traffic frame size mix, for throughput tests. A number of bytes in the range *64-9600*.

Rate Decrease Step (%): Rate decrease step size, in percentage. Enter the percentage of rate decrease at each test step (e.g., *25*%).

Step Length (sec): Rate step length, in seconds. Enter the amount of time (duration) of each test step (e.g., *10* seconds)

Test Mode: Directionality of the tests: uni-directional, bi-directional or loopback based. At the dropdown select **unidir**ectional, **bidir**ectional, or **loopback** test mode.

Test steps: List of tests to execute. Check the checkbox for which test steps to perform (check or uncheck **Throughput**, **Latency**, **Frame Loss Rate**, or **Back to Back)**. **Note**: you must have a PTP clock instance configured for accurate Latency test step timestamps. PTP must be running on both devices to synchronize the Time of Day.

Test Frame configuration

Encapsulation Level: Frame level - L2 or L3. At the dropdown select **L2** (Level 2) or **L3** (Level 3) as the encapsulation level.

Encapsulation Type: Encapsulation type for L2/L3 frames. At the dropdown select **ETH Test**, **Custom ETH Test**, **LLC SNAP**, **UDP**, or **TCP** encapsulation.

Custom Eth Type (hex): Custom Eth-Type for L2 ETH-TST frames (e.g., *22C6*).

MEG level: Level of MEG that is used by ETH-TST frames. At the dropdown select a MEG level of *0-7*.

LLC/SNAP OUI (hex): LLC/SNAP OUI field – 3 bytes. Enter only if “LLC SNAP” was selected as “Encapsulation Type” above (e.g., *0-0-0*).

LLC/SNAP Protocol: enter only if “LLC SNAP” was selected as “Encapsulation Type” above (e.g., *0*).

Dest IP: Enter the Destination IP address (e.g., *0.0.0.0*).

Src IP: Enter the Source IP address (e.g., *0.0.0.0*).

DSCP (hex): DSCP value for L3 IP frames. Enter only if “UDP” or “TCP” was selected as the “Encapsulation Type” above (e.g., *0*). This is for the **D**ifferentiated **S**ervices **C**ode **P**oint field in the IPv4 and IP6 headers.

ECN: Enter the ECN (Explicit Congestion Notification) value for L3 IP frames (e.g., *0*). See IETF RFC 3168.

Flags: Enter the Flags value for L3 IP frames (e.g., *0*).

TTL: Enter the TTL value for L3 IP frames. This is the Time To Live (in seconds). The default is *0* seconds. The valid range is 0 - 255.

Src Port: Source port for L3 TCP or UDP frames. Enter a Source port (e.g., *0*).

Dest Port: Destination port for L3 TCP or UDP frames. Enter a Destination Port only if “UDP” or “TCP” was selected as the “Encapsulation Type” above (e.g., *0*).

Seq Number: Sequence number for L3 IP/TCP frames. Enter a Sequence Number only if “TCP” was selected as the “Encapsulation Type” above (e.g., *0*).

ACK: Enter an ACK (Acknowledge) number for L3 IP/TCP frames (e.g., *0*).

Control Bits (hex): Enter the number of Control bits for L3 IP/TCP frames (e.g., *0*).

Window Size: Enter the Window size for L3 IP/TCP frames (e.g., *0*).

DM Threshold Configuration

The Delay Measurement threshold values in usec. The valid range is 0 to 5000000 usec (microseconds). The default is *0*. Note that with more than one DM thresholds configured, the last DM threshold value must be set to 5000000 usec.

DMV Threshold Configuration

The Delay Measurement Variation threshold values in usec. The valid range is 0 to 5000000 usec (microseconds). The default is *0*. Note that with multiple DM thresholds configured, the DMV Thresholds must be sorted and the last value must be set to 5000000 usec.

Buttons

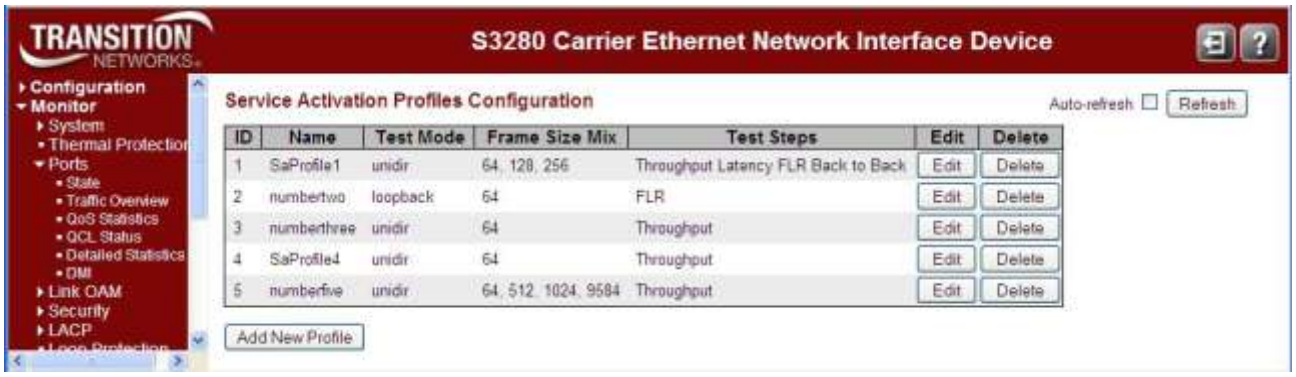
New: Add new entry to the appropriate table.

Delete: Delete a table entry.

Save: Click to save changes.

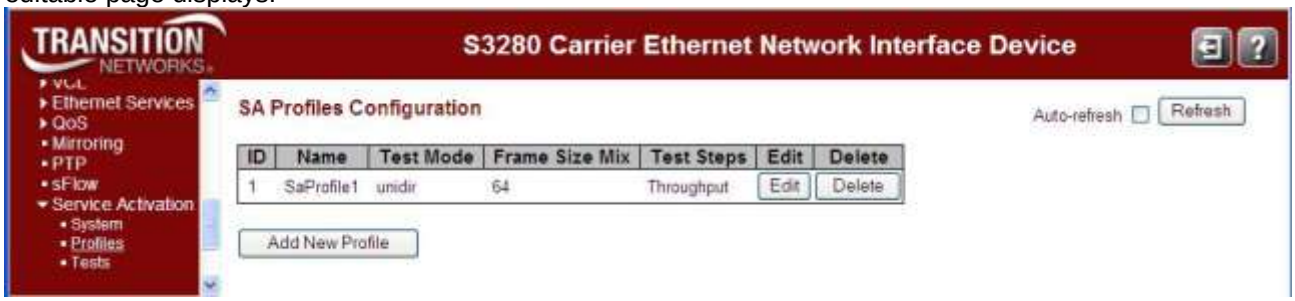
Reset: Click to undo any changes made locally and revert to previously saved values.

The sample screen below shows five configured saved SA Profiles.



Edit an Existing Service Activation Profile

At the **Service Activation Profiles Configuration** page click the **Edit** button for the Profile to edit; the editable page displays.



Delete an Existing Service Activation Profile

At the **Service Activation Profiles Configuration** page click the **Delete** button of the Profile to delete that instance; the profile is deleted from the page immediately.

Messeges

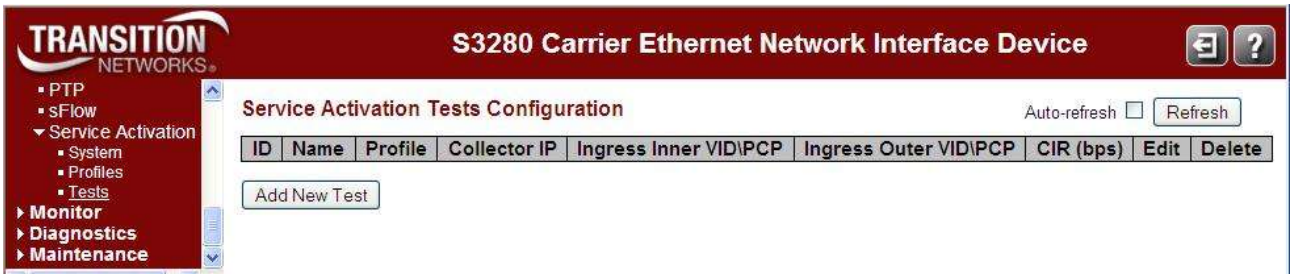
Message: *Service Activation Error*
Min frame size for TCP encapsulation is: 68 bytes

Message: *The last DM threshold value must be set to 5000000 us.*

Message: *Error. Invalid value : DMV Threshold must be sorted and last value must be 5000000.*

Configuration > Service Activation > Tests

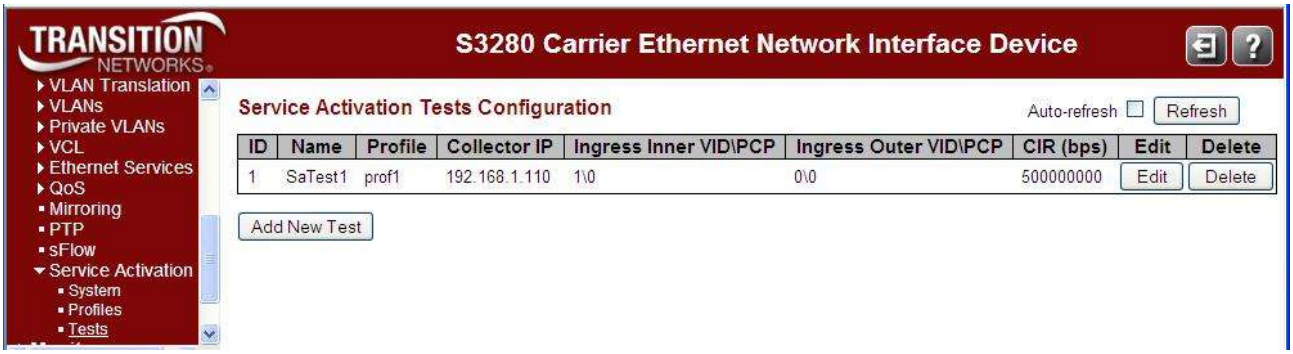
At the default SA Profiles Configuration table, click the "**Add New Test**" button.



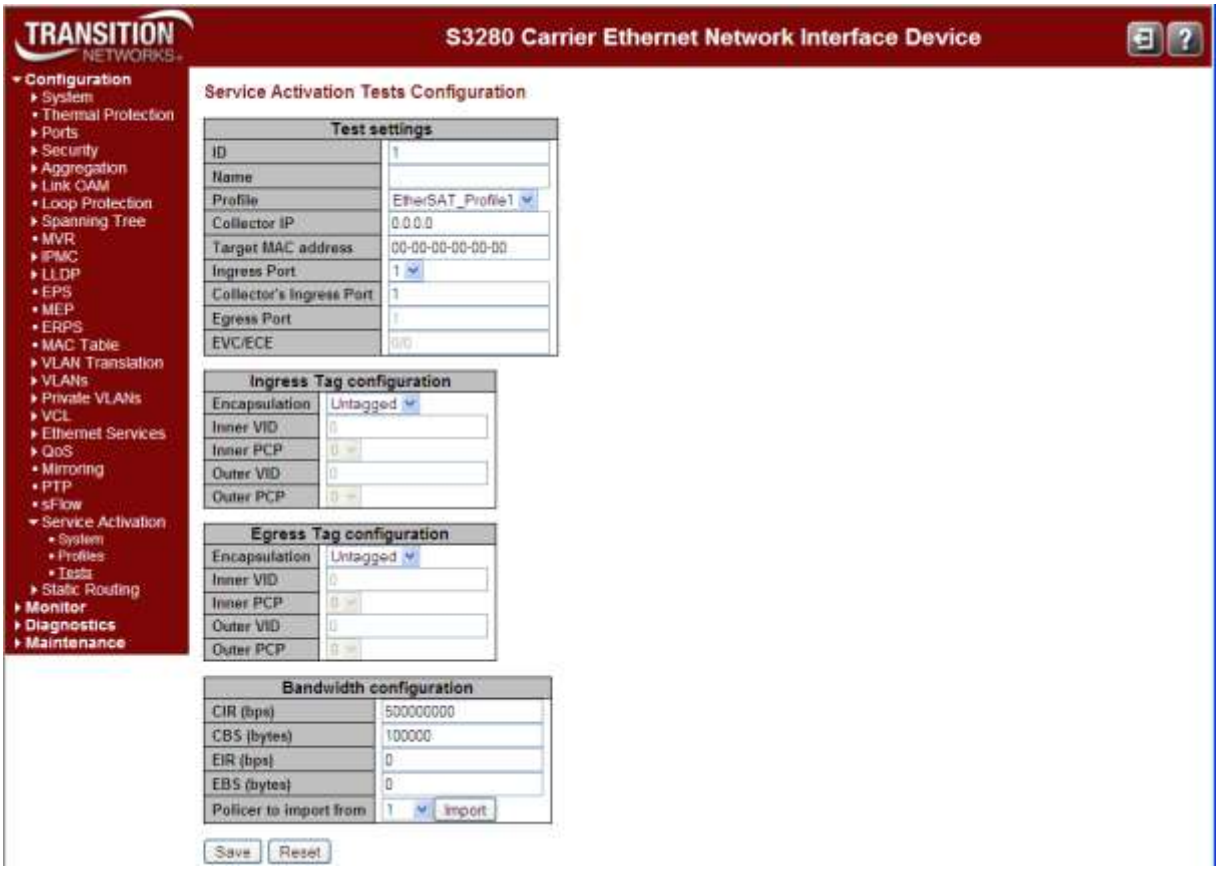
The default **Service Activation Tests Configuration** page displays. This page lets you set the SA **Test settings**, **Ingress Tag configuration**, **Egress Tag configuration**, and **Bandwidth configuration** parameters.

This page lets you add and configure EtherSAT tests. Before test creation, you must first create appropriate records in the Ingress Tag, Egress Tag, and Bandwidth tables.

Egress Tag settings can be copied from Ingress or can be configured in the Egress Tag table. Bandwidth settings can be imported from a Policer or can be defined manually.



When you add a test, click the **Edit** button to display its parameters:



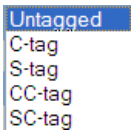
The **Service Activation Tests Configuration** page parameters are explained below.

Test settings

ID: enter an identifier for this Test.
Name: enter an identifying name for this Test.
Profile: select a configured test from the dropdown (e.g., *SaProfile1*).
Collector IP: enter the IP address for the Test Collector.
Target MAC address: enter the MAC address of the Test target (e.g., *00-C0-F2-21-DB-8D*).
Ingress Port: select an ingress port for this test from the dropdown (e.g., *1-8*).
Collector's Ingress Port: displays the Collector's ingress port for this test (e.g., *1-8*).
Egress Port: displays the configured egress port number (e.g., *port 1*).
EVC/ECE: displays the configured EVC and ECE numbers (e.g., *0/0*).

Ingress Tag configuration

Encapsulation: Untagged, C-tag, S-tag, CC-tag, or SC-tag, where:

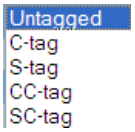


Untagged: no Ingress tagging to be used for this test.
C-tag: Subscriber VLAN Tagging (ingress) to be used for this test.
S-tag: Service VLAN Tagging (ingress) to be used for this test.
CC-tag: Two c-tags (ingress) to be used for this test.
SC-tag: One c-tag and one s-tag (ingress) to be used for this test.

Inner VID: enter the inner VLAN ID for this Ingress Tag; the default of 0 can not be used.
Inner PCP: select 0-7 as the inner Priority Code Point for the Ingress Tag. The PCP is a 3-bit field storing the priority level for the 802.1Q frame (also known as User Priority.)
Outer VID: enter the outer VLAN ID for this Egress Tag; the default of 0 can not be used.
Outer PCP: select 0-7 as the outer Priority Code Point for the Ingress Tag. The PCP is a 3-bit field storing the priority level for the 802.1Q frame (also known as User Priority.)

Egress Tag configuration

Encapsulation: Untagged, C-tag, S-tag, CC-tag, or SC-tag, where:



Untagged: no Egress tagging to be used for this test.
C-tag: Subscriber VLAN Tagging (egress) to be used for this test.
S-tag: Service VLAN Tagging (egress) to be used for this test.
CC-tag: Two c-tags (egress) to be used for this test.
SC-tag: One c-tag and one s-tag (egress) to be used for this test.

Inner VID: enter the inner VLAN ID for this Egress Tag; the default of 0 can not be used.

Inner PCP: select 0-7 as the inner Priority Code Point for the Egress Tag. The PCP is a 3-bit field storing the priority level for the 802.1Q frame (also known as User Priority.)

Outer VID: enter the outer VLAN ID for this Egress Tag; the default of 0 can not be used.

Outer PCP: select 0-7 as the outer Priority Code Point for the Egress Tag. The PCP is a 3-bit field storing the priority level for the 802.1Q frame (also known as *User Priority*.)

Bandwidth configuration

CIR (bps): the default is 500,000,000 bps (500 Mbps).
CBS (bytes): the default is 100,000 bytes (500 Kbytes).
EIR (bps): the default is 0 bps.
EBS (bytes): the default is 0 bytes.
Policer to import from: select a number from 1-128 from the dropdown and click the **Import** button. This updates the BW config with the selected BW config from the **Configuration** > **Ethernet Services** > **Bandwidth Profiles** menu path. If the imported policer is not configured, the CIR, CNS, EIR, and EBS parameters are set to 0. Use the **Reset** button to replace the 0 values with the previously configured values.

Buttons

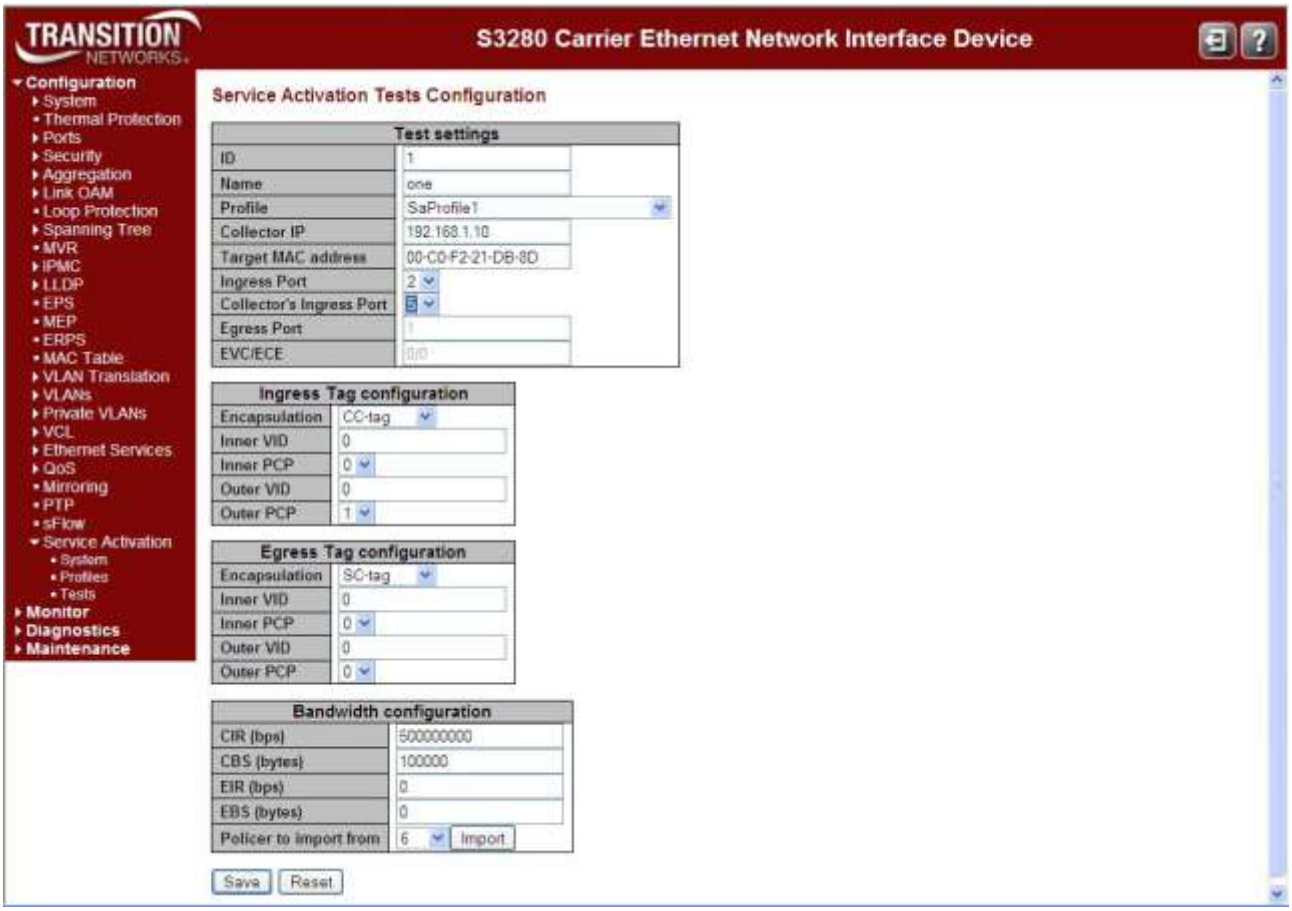
Import: click when the dropdown is selected in order to import the BW from the selected Policer. This updates the BW config with the selected BW config from the **Configuration** > **Ethernet Services** > **Bandwidth Profiles** menu path. If the imported policer is not configured, the CIR, CNS, EIR, and EBS parameters are set to 0. Use the Reset button to replace the 0 values with the previously configured values.

Save: Click to save changes.

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

Example

A sample configured Service Activation Tests Configuration page is shown below.

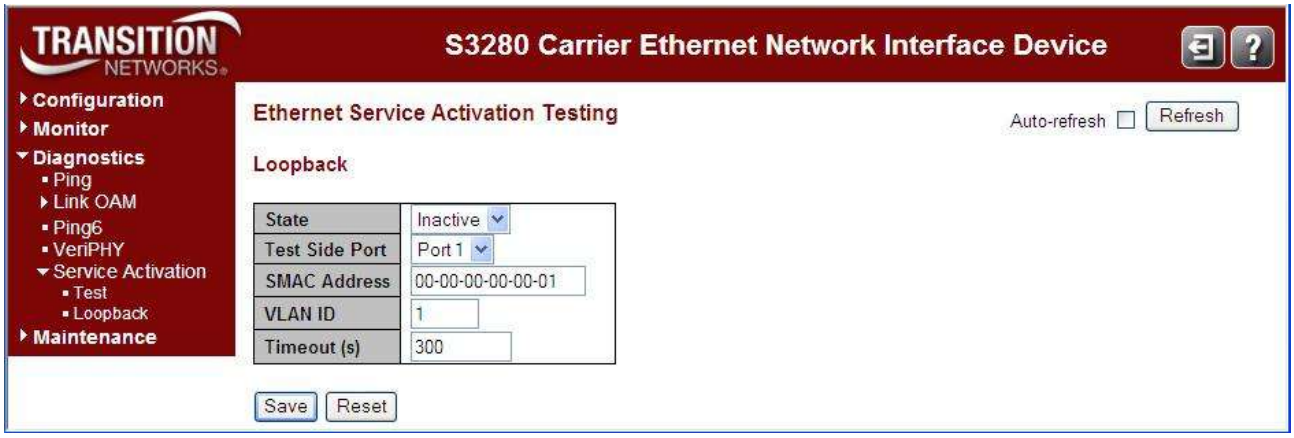


Messeges

Service Activation Error
Can't find ECE for VID 0, port 1

Diagnostics > Service Activation > Loopback

The Ethernet Service Activation Testing page displays the Loopback table.



The table lets you activate loopback on a port. All traffic matching the criteria below will be looped back to the SMAC in the incoming frame.

Note: Policy ID 254 is used for marking traffic. Make sure this Policy ID is not used for other purposes (ECEs) and the ACE Policy Filter is not being used as a bit field that would inadvertently match 254 (i.e., Policy Bitmask should be 0xFF for all ACEs). See the related User Guide's "ACL Ports Configuration" section for more information.

The Loopback parameters are:

State: change the current state of loopback from Active to Inactive and back, where:

Active: Loopback is active. The time remaining active is displayed in the next column.

Inactive: Loopback is inactive

Test Side Port: Test port where this loopback will be enabled.

SMAC Address: Source MAC Address to match.

VLAN ID: the VLAN ID to match. To match untagged traffic, make this value equal to the Port VLAN ID.

Timeout (s): the timeout period in seconds until loopback automatically becomes inactive.

Buttons

Auto-refresh: Automatically update (refresh) the page the page every three seconds.

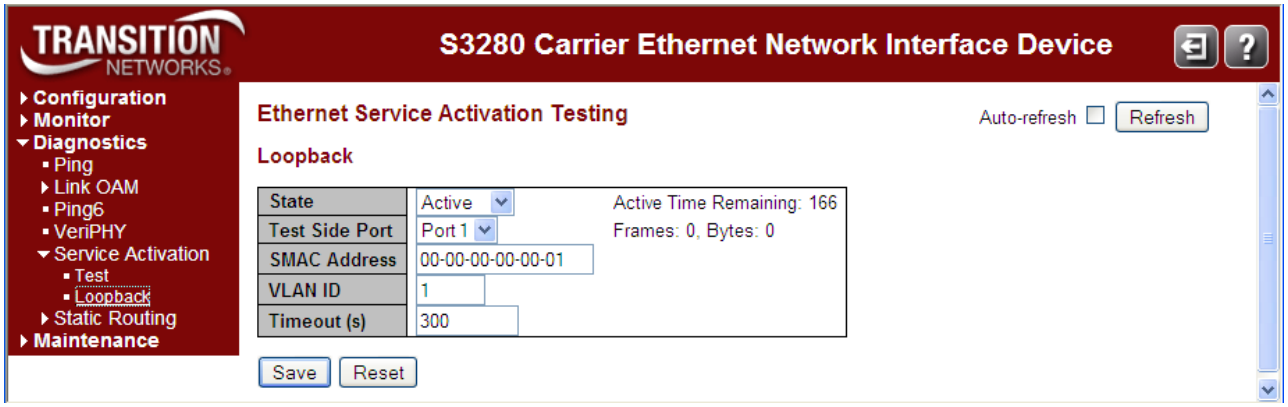
Refresh: Refresh the page. Any changes made locally will be undone.

Save: Click to save changes.

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

Example

An active Loopback test page is shown below.



Loopback Test Parameter Descriptions

The active Loopback test parameters are described below.

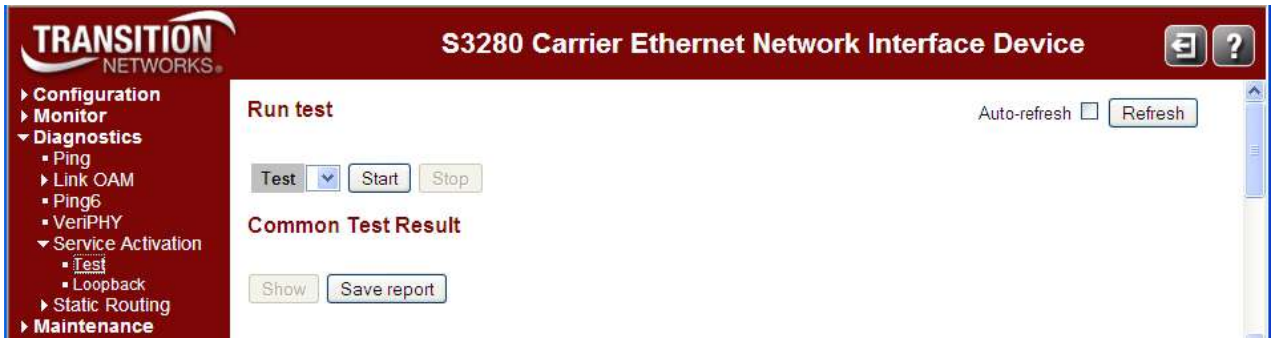
Active Time Remaining: How much longer the test has to run (in seconds). When the “Active Time Remaining” counts down to 0, the reported “State” changes from “Active” to “Inactive”.

Frames: the number of frames that were looped back.

Bytes: the number of bytes that were looped back.

Diagnostics > Service Activation > Test

This page lets you start and stop an existing configured test and show the test results. The default page is shown below (with no tests configured).



A test selection displays when a test has been created from the **Configuration** > **Service Activation** > **Test** menu path.

Run Test

Test: At the **Test** dropdown, select an existing configured Test from the dropdown (e.g., *Test1*).

Start: Click to initiate the selected test. Start the selected SA test. Only one test can be executed at time.

Stop: Click to end a started test. Stops the test currently being executed. The test's status displays as "*Aborted*".

Show: click to display the test results (described below).

Save report: click to display a "File Download" dialog that lets you select to open or save the test report .TXT file.

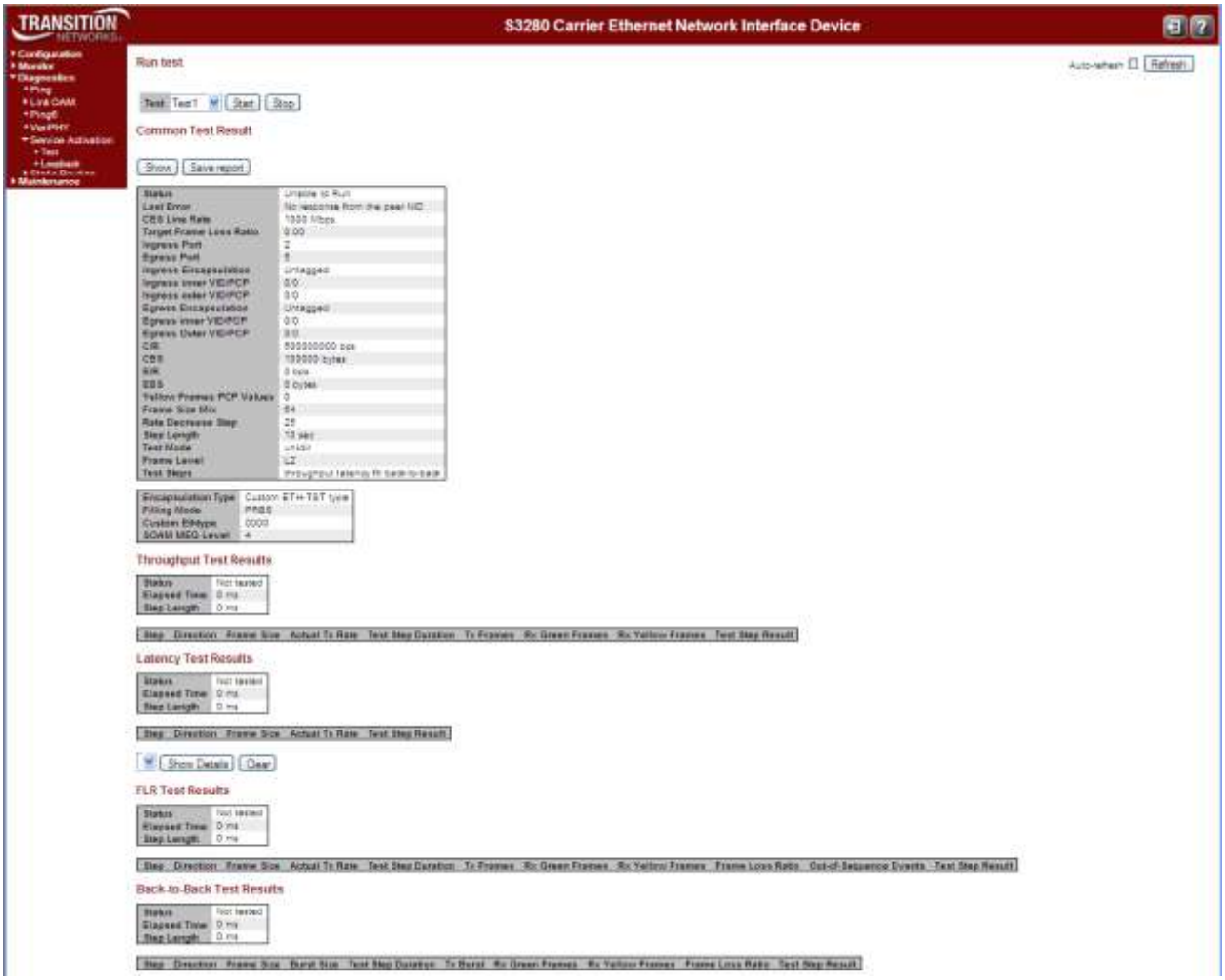
Buttons

Auto-refresh: Automatically update (refresh) the page the page every three seconds.

Refresh: Refresh the page. Any changes made locally will be undone.

A configured page is shown below.

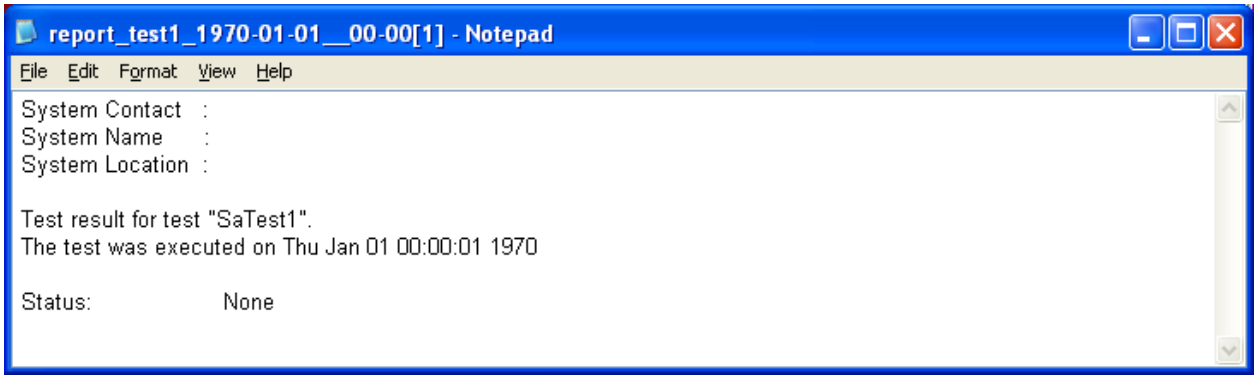
A sample Service Activation test display is shown below with **Common**, **Throughput**, and **FLR Test Results**.



To see the result of a completed test, select the appropriate test in the dropdown list and press the **Refresh** button. The results tables contain detailed information about the specific tests.

Each of the test results is described in the following sections.

Saved Test Report Format



Common Test Results

This test displays test data that is common to (shared by) all of the SA tests.

Show button: click to display the latest test result data.

Save report button: click to display a dialog with the options to open or save the test report as a Text file.

Status: Test status (e.g., *Aborted*, *In Progress (x %), Unable to Run*).

Last Error: The last error string (e.g., *OK, No response from the peer NID*).

CBS Line Rate: Line rate at which burst traffic should be sent for the Back-to-back frames test (e.g., *1000 Mbps*).

Target Frame Loss Ratio: Acceptable frame loss ratio, expressed in percentage (e.g., *1.00*).

Ingress Port: Ingress port number (e.g., *4*).

Egress Port: Egress port number (e.g., *2*).

Ingress Encapsulation: VLAN tag encapsulation type (e.g., *CS-tagged*).

Ingress inner VID/PCP: Ingress Inner VLAN ID and PCP value (e.g., *1/0*).

Ingress outer VID/PCP: Ingress Outer VLAN ID and PCP value (e.g., *0/0*).

Egress Encapsulation: VLAN tag encapsulation type (e.g., *CS-tagged*).

Egress inner VID/PCP: Egress Inner VLAN ID and PCP value (e.g., *1/0*).

Egress Outer VID/PCP: Egress Outer VLAN ID and PCP value (e.g., *0/0*).

CIR: Committed Information Rate (e.g., *500000000 bps*).

CBS: Committed Burst Size (e.g., *100000 bytes*).

EIR: Excess Information Rate (e.g., *0 bps*).

EBS: Excess Burst Size (e.g., *0 bytes*).

Yellow Frames PCP Values: List of PCP values corresponding to yellow frame (e.g., *0*).

Frame Size Mix: Traffic frame size mix, for throughput tests (e.g., *64*).

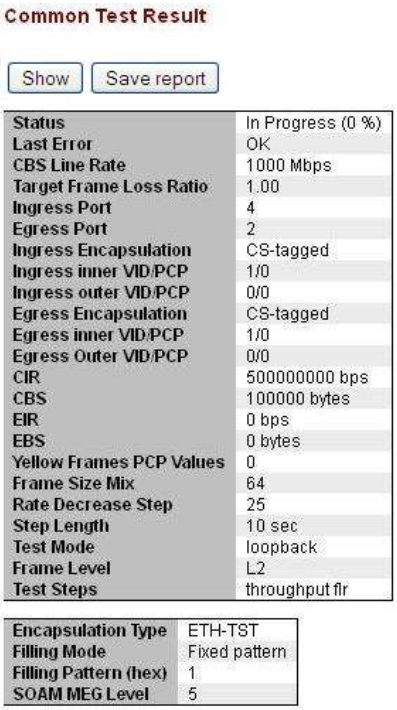
Rate Decrease Step: Rate decrease step size, in percentage (e.g., *25*).

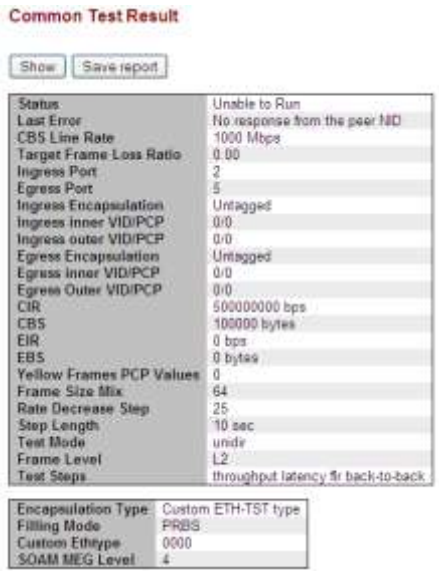
Step Length: Rate step length, in seconds (e.g., *10 sec*).

Test Mode: Direction of the tests: uni-directional, bi-directional or loopback based (e.g., *loopback*).

Frame Level: Encapsulation type (either *L2* or *L3*).

Test Steps: List of tests to execute (e.g., *throughput flr*).





Encapsulation Type: Encapsulation type for L2/L3 frames (e.g., *ETH_TST*).

Filling Mode: Payload filling mode (either *PRBS* or *Fixed* pattern).

SOAM MEG Level: Level of MEG that is used by ETH-TST frames (e.g., *5*).

Throughput Test Results

This test displays the output parameters from the Throughput Test step.

Throughput Test Results

Status	Pass
Elapsed Time	217210 ms
Step Length	10000 ms

Step	Direction	Frame Size	Actual Tx Rate	Test Step Duration	Tx Frames	Rx Green Frames	Rx YellowFrames	Test Step Result
1	NE->FE	64 bytes	1000000 bps	14020 ms	18382	18382	0	pass
2	NE->FE	64 bytes	1000000 bps	14020 ms	18382	18382	0	pass
3	NE->FE	128 bytes	1000000 bps	14020 ms	9469	9469	0	pass
4	NE->FE	128 bytes	1000000 bps	14020 ms	9469	9469	0	pass
5	NE->FE	256 bytes	1000000 bps	13000 ms	4807	4807	0	pass
6	NE->FE	256 bytes	1000000 bps	14020 ms	4807	4807	0	pass
7	NE->FE	512 bytes	1000000 bps	14020 ms	2422	2422	0	pass
8	NE->FE	512 bytes	1000000 bps	13000 ms	2422	2422	0	pass
9	NE->FE	1024 bytes	1000000 bps	13000 ms	1215	1215	0	pass
10	NE->FE	1024 bytes	1000000 bps	13000 ms	1215	1215	0	pass
11	NE->FE	1280 bytes	1000000 bps	13000 ms	973	973	0	pass
12	NE->FE	1280 bytes	1000000 bps	14030 ms	973	973	0	pass
13	NE->FE	1518 bytes	999999 bps	14020 ms	821	821	0	pass
14	NE->FE	1518 bytes	999999 bps	14020 ms	821	821	0	pass
15	NE->FE	9000 bytes	1000000 bps	13010 ms	138	138	0	pass
16	NE->FE	9000 bytes	1000000 bps	13010 ms	138	138	0	pass

Status: Test status (e.g., *Pass*).

Elapsed Time: Total elapsed time for appropriate test (e.g., *217210 ms*).

Step Length: Rate step length (e.g., *10000 ms*).

Step: Test step number (e.g., *1* or *2* or *3*).

Direction: The report direction (*NE->FE - near end to far end*).

Frame Size: Frame size used (e.g., *64 bytes*).

Actual Tx Rate: The Actual transmission rate (e.g., *1000000 bps*).

Test Step Duration: Step duration (e.g., 14020 ms) that includes:

- two seconds to send three MAC learning frames (NE to FE direction only),
- profile step length time of traffic generation,
- 500 ms (milliseconds) of poll interval if traffic generation has finished, and
- time for messages exchanging between the devices over the network.

Tx Frames: Transmitted frames (e.g., *4807*).

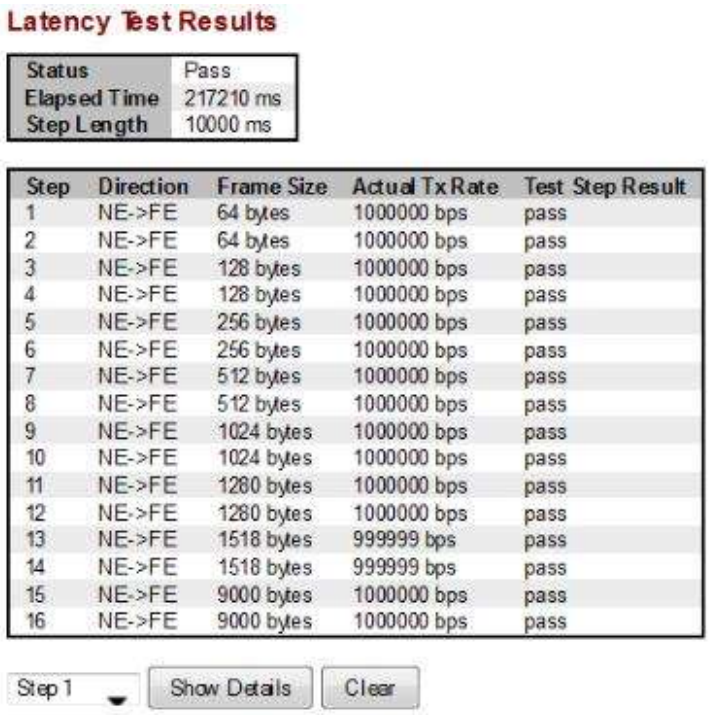
Rx Green Frames: Received green frames (e.g., *4807*).

Rx Yellow Frames: Received yellow frames (e.g., *0*).

Test Step Result: The Step result (*pass* or *fail*).

Latency Test Results

This test displays the output parameters from the Latency Test step. **Note**: you must have a PTP clock instance configured for accurate Latency test step timestamps. PTP must be running on both devices to synchronize the Time of Day.



Status: The Test status (e.g., *Traffic Loss*, *No Traffic Loss*, *Not tested*, or *Fail to execute*).

Elapsed Time: Total elapsed time for appropriate test in milliseconds (e.g., *21720 ms*).

Step Length: Rate step length (e.g., *10000 ms*).

Step: Test step number (e.g., *1*, *2*, or *3*).

Direction: The report direction (e.g., *NE->FE - near end to far end*).

Frame Size: The test Frame size (e.g., *64 bytes*).

Actual Tx Rate: The Actual transmission rate (e.g., *1000000 bps*).

Test Step Result: The Step result for the test (e.g., *Traffic Loss*, *No Traffic Loss*, *Not tested*, or *Fail to execute*).

Buttons:

Test Step dropdown: Select a configured test (e.g., *Step1*)

Show Details button: Click to display the selected test results for the selected Step in the dropdown.

Clear button: Click to clear the displayed test results.

FLR Test Results

This test displays the output parameters from the Frame Loss Test step.

FLR Test Results

Status	Pass
Elapsed Time	217210 ms
Step Length	10000 ms

Step	Direction	Frame Size	Actual Tx Rate	Test Step Duration	Tx Frames	Rx Green Frames	Rx Yellow Frames	Frame Loss Ratio	Out-of-Sequence Events	Test Step Result
1	NE->FE	64 bytes	1000000 bps	14020 ms	18382	18382	0	0.00	0	pass
2	NE->FE	64 bytes	1000000 bps	14020 ms	18382	18382	0	0.00	0	pass
3	NE->FE	128 bytes	1000000 bps	14020 ms	9469	9469	0	0.00	0	pass
4	NE->FE	128 bytes	1000000 bps	14020 ms	9469	9469	0	0.00	0	pass
5	NE->FE	256 bytes	1000000 bps	13000 ms	4807	4807	0	0.00	0	pass
6	NE->FE	256 bytes	1000000 bps	14020 ms	4807	4807	0	0.00	0	pass
7	NE->FE	512 bytes	1000000 bps	14020 ms	2422	2422	0	0.00	0	pass
8	NE->FE	512 bytes	1000000 bps	13000 ms	2422	2422	0	0.00	0	pass
9	NE->FE	1024 bytes	1000000 bps	13000 ms	1215	1215	0	0.00	0	pass
10	NE->FE	1024 bytes	1000000 bps	13000 ms	1215	1215	0	0.00	0	pass
11	NE->FE	1280 bytes	1000000 bps	13000 ms	973	973	0	0.00	0	pass
12	NE->FE	1280 bytes	1000000 bps	14030 ms	973	973	0	0.00	0	pass
13	NE->FE	1518 bytes	999999 bps	14020 ms	821	821	0	0.00	0	pass
14	NE->FE	1518 bytes	999999 bps	14020 ms	821	821	0	0.00	0	pass
15	NE->FE	9000 bytes	1000000 bps	13010 ms	138	138	0	0.00	0	pass
16	NE->FE	9000 bytes	1000000 bps	13010 ms	138	138	0	0.00	0	pass

Status: The Test status (e.g., *Pass* or *Not tested*).

Elapsed Time: Total elapsed time for the related test (e.g., *217210 ms* or *0 ms*).

Step Length: Rate step length (e.g., *10000 ms* or *0 ms*).

Step: The test step number (e.g., *1*, *2*, or *3*).

Direction: The report direction (e.g., *NE->FE*).

Frame Size: The test Frame size (e.g., *64 bytes*).

Actual Tx Rate: The Actual transmission rate (e.g., *1000000 bps*).

Test Step Duration: Step duration in milliseconds (e.g., *13010 ms*) that includes:
- two seconds to send three MAC learning frames (NE to FE direction only);
- profile step length time of traffic generation;
- 500 ms of poll interval if traffic generation has finished;
- time for messages exchanging between the devices over the network.

Tx Frames: Transmitted frames (e.g., *18382*).

Rx Green Frames: Received green frames (e.g., *18382*).

Rx Yellow Frames: Received yellow frames (e.g., *0*).

Frame Loss Ratio: The Calculated frame loss ratio (e.g., *0.00*).

Out-of-Sequence Events: Out of sequence events (e.g., *0*).

Test Step Result: The Step result (*pass* in green text or *fail* in red text).

Back-to-Back Test Results

This test displays the output parameters from the Back-to-Back Test step.

Back-to-Back Test Results

Status	Fail NE
Elapsed Time	618010 ms
Step Length	10000 ms

Step	Direction	Frame Size	Burst Size	Test Step Duration	Tx Burst	Rx Green Frames	Rx Yellow Frames	Frame Loss Ratio	Test Step Result
1	NE->FE	64 bytes	64000 bytes	11280 ms	19315	18539	0	4.02	fail
2	NE->FE	64 bytes	44800 bytes	11280 ms	19036	18539	0	2.61	fail
3	NE->FE	64 bytes	25600 bytes	11280 ms	18756	18538	0	1.16	fail
4	NE->FE	64 bytes	6400 bytes	11280 ms	18475	18475	0	0.00	pass
5	NE->FE	64 bytes	6400 bytes	11280 ms	18475	18475	0	0.00	pass
6	NE->FE	128 bytes	64000 bytes	11270 ms	9950	9561	0	3.91	fail
7	NE->FE	128 bytes	44800 bytes	11280 ms	9806	9561	0	2.50	fail
8	NE->FE	128 bytes	25600 bytes	11290 ms	9662	9561	0	1.05	fail
9	NE->FE	128 bytes	6400 bytes	11280 ms	9517	9517	0	0.00	pass
10	NE->FE	128 bytes	6400 bytes	11280 ms	9517	9517	0	0.00	pass
11	NE->FE	256 bytes	64000 bytes	11280 ms	5052	4857	0	3.86	fail
12	NE->FE	256 bytes	44800 bytes	11280 ms	4978	4857	0	2.43	fail
13	NE->FE	256 bytes	25600 bytes	11270 ms	4905	4856	0	1.00	fail
14	NE->FE	256 bytes	6400 bytes	11270 ms	4831	4831	0	0.00	pass
15	NE->FE	256 bytes	6400 bytes	11270 ms	4831	4831	0	0.00	pass
16	NE->FE	512 bytes	64000 bytes	11270 ms	2545	2448	0	3.81	fail
17	NE->FE	512 bytes	44800 bytes	11270 ms	2508	2448	0	2.39	fail
18	NE->FE	512 bytes	25600 bytes	11270 ms	2471	2448	0	0.93	fail
19	NE->FE	512 bytes	6400 bytes	11270 ms	2433	2433	0	0.00	pass
20	NE->FE	512 bytes	6400 bytes	11270 ms	2433	2433	0	0.00	pass
21	NE->FE	1024 bytes	64000 bytes	10250 ms	1276	1228	0	3.76	fail
22	NE->FE	1024 bytes	44800 bytes	10250 ms	1258	1228	0	2.38	fail
23	NE->FE	1024 bytes	25600 bytes	10250 ms	1239	1228	0	0.89	fail
24	NE->FE	1024 bytes	6400 bytes	10250 ms	1220	1220	0	0.00	pass
25	NE->FE	1024 bytes	6400 bytes	10250 ms	1220	1220	0	0.00	pass
26	NE->FE	1280 bytes	64000 bytes	11270 ms	1022	963	0	3.82	fail
27	NE->FE	1280 bytes	44800 bytes	11270 ms	1007	963	0	2.38	fail
28	NE->FE	1280 bytes	25600 bytes	11270 ms	992	963	0	0.91	fail
29	NE->FE	1280 bytes	6400 bytes	11270 ms	977	977	0	0.00	pass
30	NE->FE	1280 bytes	6400 bytes	11270 ms	977	977	0	0.00	pass
31	NE->FE	1518 bytes	64000 bytes	11270 ms	862	829	0	3.83	fail
32	NE->FE	1518 bytes	44800 bytes	11270 ms	849	829	0	2.36	fail
33	NE->FE	1518 bytes	25600 bytes	11270 ms	837	829	0	0.96	fail
34	NE->FE	1518 bytes	6400 bytes	11270 ms	824	824	0	0.00	pass
35	NE->FE	1518 bytes	6400 bytes	11270 ms	824	824	0	0.00	pass
36	NE->FE	9000 bytes	64000 bytes	10250 ms	144	138	0	4.17	fail
37	NE->FE	9000 bytes	44800 bytes	10250 ms	142	138	0	2.82	fail
38	NE->FE	9000 bytes	25600 bytes	10250 ms	140	138	0	1.43	fail
39	NE->FE	9000 bytes	6400 bytes	10250 ms	139	138	0	0.72	fail

Status: e.g., *Fail NE*).

Elapsed Time: (e.g., *618010 ms*).

Step Length: Rate step length, in milliseconds.

Step: The test step number (e.g., *1*, *2*, or *3*).

Direction: The report direction (e.g., *NE->FE*).

Frame Size: The test Frame size (e.g., *64 bytes*).

Burst Size: The burst size (e.g., *64000 bytes*) displayed in green text (passed) or red text (failed).

Test Step Duration: The Step duration in milliseconds that includes:

- two seconds to send three MAC learning frames (NE->FE direction only),
- profile step length time of traffic generation,
- 500 ms of poll interval if traffic generation has finished, and
- time for messages exchanging between the devices over the network.

Tx Burst: Transmitted frames.

Rx Green Frames: Received green frames.

Rx Yellow Frames: Received yellow frames.

Frame Loss Ratio: The Calculated frame loss ratio.

Test Step Result: The Step result (displays *pass* in green text or *fail* in red text).

EtherSAT Example (Web GUI)

This section provides an example of RFC 2455 functionality on the S3280-TST NID via the Web GUI (using only uni-directional procedures). (For the equivalent test example run via the CLI see “EtherSAT Example (CLI)” on page 90.)

The setup consists of two TN 3280 NIDs (Unit L and Unit R), connected to traffic generators (SB1 and SB2) as shown below. A third unit (or a third party device capable of performing VLAN level policing) is used as en emulator for the network.

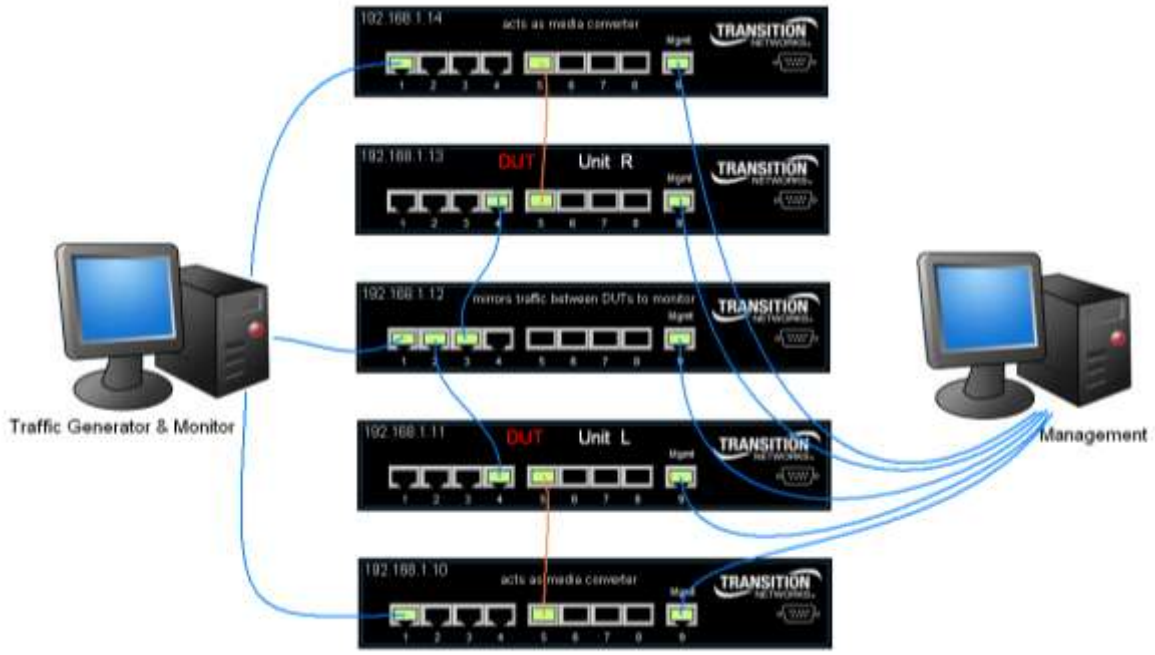
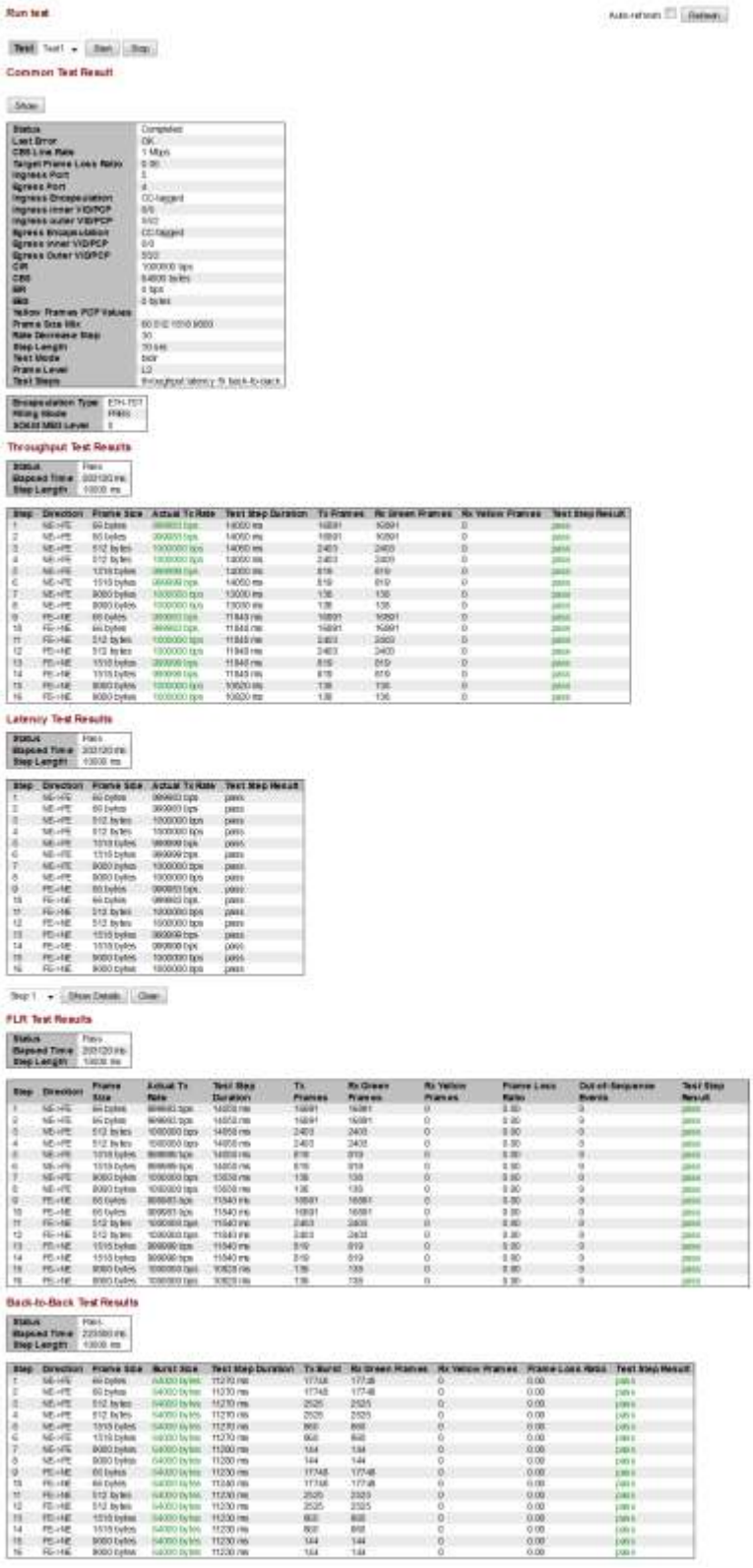


Figure 3. EtherSAT Example (Web GUI)

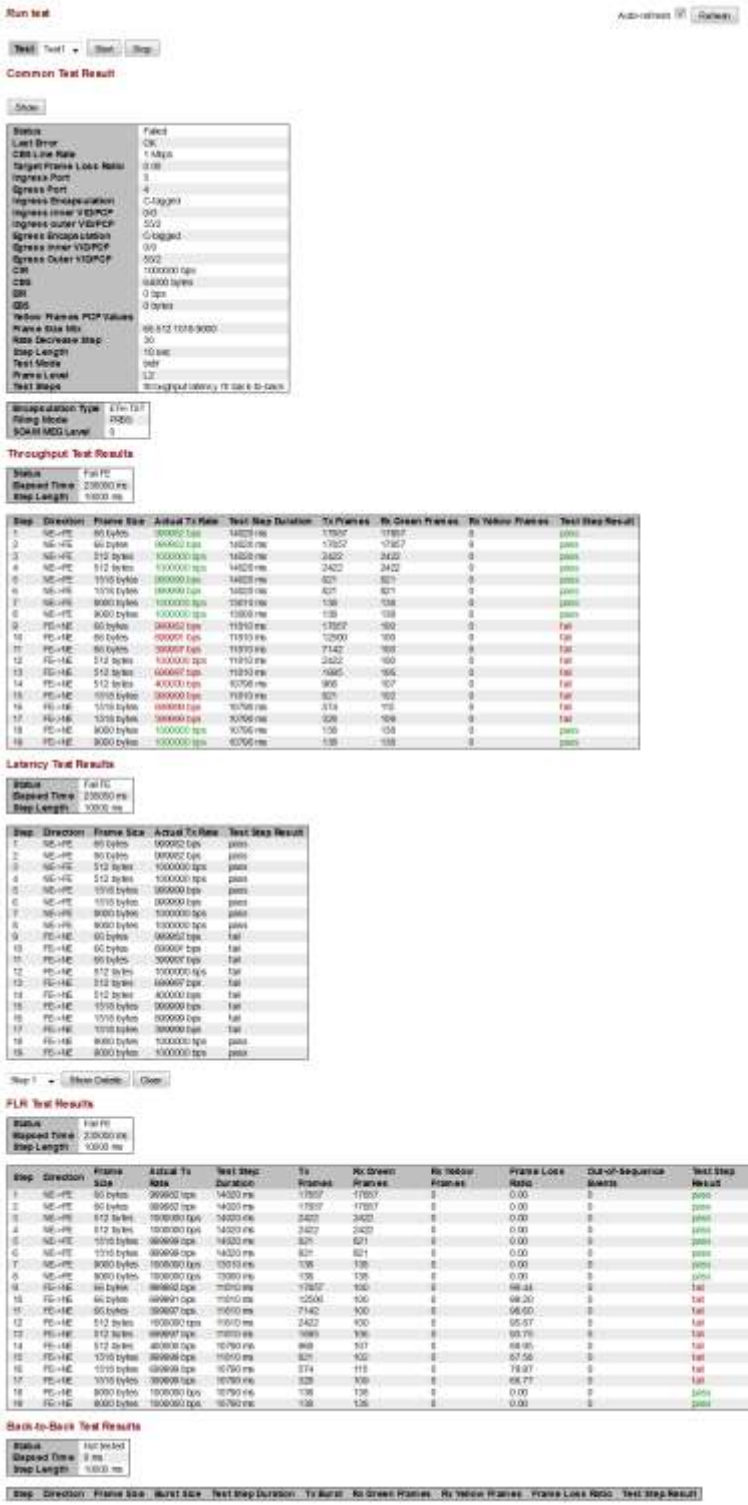
There are two EVCs configured across the network, each with one ECE. The configuration is symmetric between S3280-TST Unit L and Unit R.

EVC 300 (blue) carrying CVID 77 is not subject to EtherSAT tests. Traffic is sent continuously on that EVC, and will not be affected by the EtherSAT operations.

“Passed” Test Results



“Failed” Test Results



5. CLI Commands

Introduction

The S3280-TST offers a rich set of commands through its CLI for performing configuration and status monitoring. The CLI is accessible through the RS-232 serial console, telnet and SSH. The CLI incorporates user authentication for security purposes.

The CLI interface can be accessed via Secure Shell (SSH) interface. This provides a more secure interface as SSH uses public-key cryptography for authentication. When the SSH server is enabled, normal telnet access can be enabled or disabled to avoid potential security holes.

This manual is for experienced network administrators who are responsible for configuring and maintaining the S3280. The CLI offers a comprehensive set of management features for use during initial setup (set IPs etc.) and troubleshooting, as well as for day-to-day management (device management, firmware upgrades, managing security features, etc.).

Note: CLI commands are case sensitive. Enter the CLI commands in lower case unless otherwise specified. In order to execute the commands described in this manual, you must press Enter after the command has been entered.

The full set of available EtherSAT commands are categorized as:

- Shared Port Command (S4212 and S4224 only)
- EtherSAT Loopback Configuration Commands
- EtherSAT Engine Commands
- EtherSAT Profile Commands
- EtherSAT Test Commands
- EtherSAT Test Result Commands

The full set of available EtherSAT commands islisted below and described in the following sections.

EtherSAT Commands (All Models)

The ‘ethersat’ group commands provide EtherSAT test settings and options.

1. EtherSAT Collector [enable|disable]
2. EtherSAT Loopback Configuration
3. EtherSAT Loopback SMAC [<smac>]
4. EtherSAT Loopback State [<state>]
5. EtherSAT Loopback Status
6. EtherSAT Loopback TestSidePort [<port>]
7. EtherSAT Loopback Timeout [<timeout>]
8. EtherSAT Loopback VID [<vid>]
9. EtherSAT PeerProto [enable|disable]
10. EtherSAT Config Show
11. EtherSAT Profile New <number> [<name>]
12. EtherSAT Profile Delete <number>
13. EtherSAT Profile Show
14. EtherSAT Profile Name Set <number> <name>
15. EtherSAT Profile Flr Set <number> [<ratio>]
16. EtherSAT Profile Linerate Set <number> [<rate>]
17. EtherSAT Profile YellowPCP Set <number> [<pcp_list>]
18. EtherSAT Profile YellowPCPmask Set <number> [<mask>]
19. EtherSAT Profile Sizemix Set <number> [<size>] [<size>] [<size>] [<size>] [<size>] [<size>] [<size>] [<size>] [<size>] [<size>]
20. EtherSAT Profile RateDecStep Set <number> [<rate_step>]
21. EtherSAT Profile StepLength Set <number> [<length>]
22. EtherSAT Profile Testmode Set <number> [unidir|bidir|loopback]
23. EtherSAT Profile FrameEncaps Set <number> [l2|l3] [ethtst|customethtst|llcsnap|udp|tcp]
24. EtherSAT Profile Framefill Set <number> [prbs|fixed] [<pattern>]
25. EtherSAT Profile Frameethtyp Set <number> [<type>]
26. EtherSAT Profile Framellcsnap Set <number> [<id>] [<protocol>]
27. EtherSAT Profile Framemeglevel Set <number> [<level>]
28. EtherSAT Profile FrameIP Set <number> [<destadr>] [<srcadr>] [<dscp>] [<ecn>] [<flags>] [<ttl>]
29. EtherSAT Profile FrameUDP Set <number> [<udpsrcport>] [<udpdestport>]
30. EtherSAT Profile FrameTCP Set <number> [<tcpsrcport>] [<tcpdestport>] [<seq_num>] [<ack_num>] [<control_bits>] [<window_size>]
31. EtherSAT Profile Teststep Set <number> [<step>] [<step>] [<step>] [<step>]
32. EtherSAT Profile Dmthr Insert <number> <threshould_value>
33. EtherSAT Profile Dmthr Remove <number> <threshould_value>
34. EtherSAT Profile Dmvthr Insert <number> <threshould_value>
35. EtherSAT Profile Dmvthr Remove <number> <threshould_value>
36. EtherSAT Profile Config Show <number>
37. EtherSAT Profile Frameformat Show <number>
38. EtherSAT Test New <number> <profile> <address> <in_port> <collector_in_port> <in_tag_type> <in_inner_tag_id> <in_inner_pcp> <in_outer_tag_id> <in_outer_pcp> [<eg_tag_type>] [<eg_inner_tag_id>] [<eg_inner_pcp>] [<eg_outer_tag_id>] [<eg_outer_pcp>] [<name>]
39. EtherSAT Test Delete <number>
40. EtherSAT Test Start <number>
41. EtherSAT Test Stop <number>
42. EtherSAT Test Show
43. EtherSAT Test Name Set <number> [<name>]
44. EtherSAT Test Profile Set <number> [<profile>]
45. EtherSAT Test Ingress Set <number> [<in_tag_type>] [<in_inner_tag_id>] [<in_inner_pcp>] [<in_outer_tag_id>] [<in_outer_pcp>]
46. EtherSAT Test Egress Set <number> [<eg_tag_type>] [<eg_inner_tag_id>] [<eg_inner_pcp>] [<eg_outer_tag_id>] [<eg_outer_pcp>]
47. EtherSAT Test Address Set <number> [<address>]
48. EtherSAT Test CIR Set <number> [<cir>]
49. EtherSAT Test CBS Set <number> [<cbs>]
50. EtherSAT Test EIR Set <number> [<eir>]
51. EtherSAT Test EBS Set <number> [<ebs>]
52. EtherSAT Test BwParams Set <number> <policer_id>
53. EtherSAT Test Testmacaddr Set <number> [<macaddr>]
54. EtherSAT Test Config Show <number>
55. EtherSAT Test Result Show <number>
56. EtherSAT Test Throughput Show <number> [<step_number>]
57. EtherSAT Test Latency Show <number> [<step_number>]
58. EtherSAT Test Flr Show <number> [<step_number>]
59. EtherSAT Test Back-to-back Show <number> [<step_number>]
60. EtherSAT Test Result Export <number> <hostname> <file_name>

EtherSAT Commands (S3280-TST Only)

The S3280-TST has the following additional EtherSAT test command.

1. **EtherSAT PTPClock** [<ptp_clock>]

EtherSAT Commands (S4212 and S4224 Only)

The S4212 and S4224 have the following additional EtherSAT test command.

1. **Port Sharedport** [internal|external]

The EtherSAT commands are explained in the following sections.

Shared Port Command (S4212 and S4224 only)

The S4212 and S4224 switches have one port that is 'Shared'. On the S4212, port 12 is ‘shared’ and on the S4224 port 24 is ‘shared’. The Shared port can be toggled between two modes of operation:

External: This is the default mode. In this mode, the Shared port is attached to the SFP interface, and works like the rest of the ports on this switch. The Shared port mode must be set to 'External' mode for normal port operation.

Internal: This mode disconnects the the Shared Port from the SFP interface and attaches it internally to to an FPGA. No connectivity can be achieved through the Shared Port's SFP interface while in this mode. The FPGA port is "hidden" when the Shared port is set to ‘Internal’ mode in several modules (ACL, EPS, ERPS, MEP, NAS, QoS, VLAN, PVLAN, VCL, EVC, MAC, DMI, etc.). Use this mode for EtherSAT Loopback and EtherSAT Test functions.

The Shared Port mode must be set to ' 'Internal' for these features to work:

Diagnostics > **Service Activation** > **Test** and
Diagnostics > **Service Activation** > **Loopback**

The FPGA port is set as a C-port by default to allow the Loopback test to work when EVC is configured.

When you change the Shared port (port 12) mode, a confirmation message displays: *Are you sure you want to switch the mode about the shared port?*. Click the **OK** button only if you are sure that you want to change the Shared port mode.

Messages:
Are you sure you want to switch the mode about the shared port?
Error: FPGA link ANEG failed
failed to open system sharedport table
GIVEN PORT IS NOT EAST OR WEST
The port is used for the internal for FPGA.
the shared port is not ready
The shared port mode must be internal!
The shared port must be internal mode!
Can't set VLAN config, port=%u
the shared port is not ready sa=%p
Meaning: A problem occurred with shared port configuration at the Configuration > Ports > Shared Port menu path.
Recovery:
1. Click the OK button to clear the webpage message.
2. Verify the the Shared port (port 12 or port 24) Mode setting.

EtherSAT Loopback Configuration Commands

The MEF has established a new project to produce a 'latching loopback' protocol and functionality for use in service activation applications. This new loopback is significantly different than the LBM / LBR protocol and functionality of ITU-T Y.1731 and IEEE 802.1ag (as well as the 802.1Qaw encapsulation method).

The SAT (Service Activation Testing) is implemented early in the Ethernet Service lifecycle; when a new customer order is received, SAT (along with LLB and ITU Y.1564) can be used to provision and turn up the circuit in order to verify the performance to the SLA (via FM and PM).

Ethernet Service Activation Test methodology involves:

- Verify a new service after provisioning is complete, but before it is released to the customer.
- Check that the configuration is correct.
- Verify performance meets the Service Acceptance Criteria (SAC) to ensure CoS Performance objectives are attained.

Note: Policy ID 254 is used for marking traffic. Make sure this Policy ID is not used for other purposes (ECEs) and the ACE Policy Filter is not being used as a bit field that would inadvertently match 254 (i.e., the Policy Bitmask must be 0xFF for all ACEs). For ACE commands, see the "Security Network ACL Group" section in the S3280-TST documentation. The Policy ID can be used to pick any L2-L4 flow. The Ethernet Virtual Connection (EVC) Latching Loopbacks for Service Activation Testing (SAT) commands are explained below.

Command: **EtherSAT Loopback Configuration**
Syntax: **ethersat loopback config**
Description: Show the current SAT loopback configuration.
Example:

```
>ethersat loopback config

EtherSAT Loopback Configuration:
================================

EtherSAT Loopback State: Inactive
EtherSAT Loopback TestSidePort: 1
EtherSAT Loopback SMAC: 00-00-00-00-00-01
EtherSAT Loopback VID: 1
EtherSAT Loopback Timeout: 300
>
```

Command: **EtherSAT Loopback SMAC**
Syntax: **ethersat loopback smac** [<smac>]
Description: Set or show loopback SMAC (Source MAC address), where:
<**smac**>: The SMAC to match.
Example:

```
>ethersat loopback smac
EtherSAT Loopback SMAC: 00-00-00-00-00-01
>ethersat loopback smac 11-22-33-44-55-99
>ethersat loopback smac
EtherSAT Loopback SMAC: 11-22-33-44-55-99
>
```

Command: **EtherSAT Loopback State**
Syntax: **ethersat loopback state** [<state>]
Description: Set or show loopback state, where:
<**state**>: Set LB state to active or inactive. The default is "Inactive". (The loopback state must be "inactive" to be able to change SAT parameters.)

Example:
```
>ethersat loopback state
EtherSAT Loopback State: Inactive
>ethersat loopback state active
>ethersat loopback state
EtherSAT Loopback State: Active
>
```

States: "INIT" , "START", "CONF_DEF, isid: %d", "MASTER_UP", "MASTER_DOWN", "SWITCH_ADD, isid: %d", "SWITCH_DEL, isid: %d", "exit".

Command: **EtherSAT Loopback Status**
Syntax: **ethersat loopback status**
Description: Show the current SAT loopback status.

Example:
```
>ethersat loopback status

EtherSAT Loopback Status:
=========================

State: Active
Active Time Remaining: 161
Frames: 0, Bytes: 0
>eth loop status

EtherSAT Loopback Status:
=========================

State: Inactive
Frames: 0, Bytes: 0
>
```

The **EtherSAT Loopback** parameters that can be reported are:

State: whether the EtherSAT loopback function is currently "Active" or "Inactive".

Active Time Remaining: How much longer the test has to run (in seconds). When the "Active Time Remaining" counts down to 0, the reported "State" changes from "Active" to "Inactive".

Frames: the number of frames that were looped back.

Bytes: the number of bytes that were looped back.

Command: **EtherSAT Loopback TestSidePort**
Syntax: **ethersat loopback testsideport** [<port>]
Description: Set or show loopback test side port, where:
[<**port**>] : Port number (e.g., 1-8).

Example:
```
>ethersat loopback testsideport
EtherSAT Loopback TestSidePort: 1
>ethersat loopback testsideport 2
>ethersat loopback testsideport
EtherSAT Loopback TestSidePort: 2
>ethersat loopback testsideport 9
```

Messages: *Invalid parameter: 9*
Loopback must be inactive to change parameters

Command: **EtherSAT Loopback Timeout**
Syntax: **ethersat loopback timeout** [<timeout>]
Description: Set or show loopback timeout (s) where:
[<**timeout**>] : the loopback timeout in seconds. The default is 300 seconds (5 minutes).
The valid range is 1 - 99999999 seconds.

Example:
```
>ethersat loopback timeout
EtherSAT Loopback Timeout: 300
>ethersat loopback timeout 600
>ethersat loopback timeout
EtherSAT Loopback Timeout: 600
>
```

Messages:
Invalid parameter: xxxxx
Loopback must be inactive to change parameters

Command: **EtherSAT Loopback VID**
Syntax: **ethersat loopback vid** [<vid>]
Description: Set or show loopback VID, where:
[<**vid**>] :

Example:
```
>ethersat loopback vid
EtherSAT Loopback VID: 1
>ethersat loopback vid 0
>ethersat loopback vid
EtherSAT Loopback VID: 0
>
```

Messages: *Loopback must be inactive to change parameters*
Loopback VLAN %d not found

EtherSAT Engine Commands

Configuration commands

Command: **Configure Collector Flag**
Syntax: **ethersat collector** [enable|disable]
Description: This command lets you display and configure the 'Collector Flag'. The Collector Flag determines if the EtherSAT module will accept test requests from outside (i.e., this module will work as a collector). The default value for Collector Flag is "disabled".
The parameters are:
enable : Accept SA test requests from outside.
disable: Reject SA test requests from outside.
Example: The example below sets the Collector Flag:

```
>ethersat collector enable
>ethersat collector disable
>ethersat collector
Collector:            disabled
>
```

Command: **Configure Peer Protocol State**
Syntax: **ethersat peerproto** [enable|disable]
Description: This command lets you configure the Peer communication channel state Flag. The Flag determines if communication channel is enabled (i.e., if the S3280-TST can process the SA messages). The S3280-TST can not execute unidirectional or bidirectional test both as Generator and Collector if the flag is disabled, since the NID must communicate with the peer NID in this case. Only the Loopback test can be started since it does not require the communication channel. The default value for the peer-proto Flag is enabled.
The parameters are:
enable : enable peerproto
disable: disable peerproto
Example: The example below sets the *peerproto* Flag:

```
>ethersat peerproto enable
>ethersat peerproto
Peer channel:         enabled
>
```

Command: **Set/Show EtherSAT PTP Clock**
Syntax: **ethersat ptpclock** [<ptp_clock>]
Description: Modify or show PTP clock instance for FPGA sync, where:
<**ptp_clock**>: clock instance number (0-3).
Example:

```
>EtherSAT PTPClock
PTP clock instance: 0
>EtherSAT PTPClock 1
>EtherSAT PTPClock
PTP clock instance: 1
>
```

Messages: *Invalid parameter: 4*

Command: **Display EtherSAT Engine Configuration**
Syntax: **ethersat config show**
Description: This command lets you display the current EtherSAT engine configuration.
Example: The example below displays the existing configuration of the EtherSAT engine.

```
>ethersat config show
Collector:            enabled
Peer channel:         enabled
Test MAC Address:     00:c0:f2:21:db:8d
>
```

EtherSAT Profile Commands

Initialization Commands

Command: **Add New Ethersat Profile**
Syntax: **ethersat profile new** <number> [<name>]
Description: Adds a new profile to the EtherSAT engine, where:
<**number**> Profile number – enter the number (1-16) for the profile to be added.
[**name**] Profile name – enter a string of up to 32 symbols for the new profile.

Example:

```
>ethersat profile new 2 numbertwo
>ethersat profile show
ID |     Name      | Test mode | Test steps                  | Frame size
-------------------------------------------------------------------------
  2| numbertwo     | unidir    | Throughput                  | 64
>ethersat profile new 3 numberthree
>ethersat profile new 4 numberfour
>ethersat profile new 5 numberfive
>ethersat profile show
ID |     Name      | Test mode | Test steps                  | Frame size
-------------------------------------------------------------------------
  2| numbertwo     | unidir    | Throughput                  | 64
  3| numberthree   | unidir    | Throughput                  | 64
  4| numberfour    | unidir    | Throughput                  | 64
  5| numberfive    | unidir    | Throughput                  | 64
>ethersat profile new 5 numbersix
E sa 22:56:03 11/saDbProfileNew#391: Error: SA: Profile with Id 5 exist
Error: unable create profile with Id 5 and name "numbersix"
>
```

Command: **Show Ethersat Profiles**
Syntax: **ethersat profile show**
Description: Displays all existing profiles configured in the EtherSAT engine.

Example 1:

```
>ethersat profile show
ID |     Name      | Test mode | Test steps                  | Frame size
-------------------------------------------------------------------------
  2| numbertwo     | unidir    | Throughput                  | 64
  3| numberthree   | unidir    | Throughput                  | 64
  4| numberfour    | unidir    | Throughput                  | 64
  5| numberfive    | unidir    | Throughput                  | 64
>
```

Example 2:

```
>ethersat profile show
ID |     Name     | Test mode | Test steps                    | Frame size
-------------------------------------------------------------------------------
  1| P1T1         | bidir     | Throughput Latency FLR Back-To-Back | 64
>
```

Command: **Delete Ethersat Profile**
Syntax: **ethersat profile delete** <number>
Description: Removes an existing profile from the EtherSAT engine, where:
<**number**> Profile number – enter an integer (1-16) for the profile to be deleted.

Example:

```
>ethersat profile show
ID |     Name      | Test mode | Test steps                | Frame size
-------------------------------------------------------------------------
  1| none          | unidir    | Throughput                | 64
  3| nombretres    | unidir    | Throughput                | 64
>ethersat profile delete 3
>ethersat profile show
ID |     Name      | Test mode | Test steps                | Frame size
-------------------------------------------------------------------------
  1| none          | unidir    | Throughput                | 64
>
```

Configuration Commands

These commands let you set the parameters configured for each profile. The configurable parameters include Name, CBS Line rate, Frame Loss Ratio, Yellow Frames PCP Values, Frame Size Mix, Rate Decrease Step, Step Length, Test Mode, Test Steps, and Thresholds for DM and DMV bins.

Each of these commands is described below.

Command: **Configure Profile Name**
Syntax: **ethersat profile name set** [<number>] [<name>]
Description: This command lets you configure the name of profile, where:

<**number**> enter a profile number (1-16).

<**name**> enter a profile name –a string of up to 32 symbols. By default, if name is not defined upon creation, a name is configured to "EtherSAT Profile#", where "#" is the number of profile.

Example: The example below sets the name of Profile 1 to "EtherSAT Profile1":

```
>ethersat profile name set 1 SaProfile1
>
```

Messages: *Error: unable set a new value of parameter*

Command: **Configure CBS Line Rate**
Syntax: **ethersat profile linerate set** <number> <rate>
Description: This command lets you configure the Line rate at which burst traffic should be sent for the Back-to-back frames test. This parameter should be the lowest line rate available on the paths between the Initiator and Collector NIDs. The default value is 1Gbps. The parameters are:

<**number**> enter a number (1-16) for the profile to be configured.

<**rate**> enter a CBS line rate in Mbps (1-1000) for this profile.

Example: The example below sets the CBS line rate of profile 2 to 100 Mbps:

```
>ethersat profile linerate set 2 100
>
```

Command: **Configure Frame Loss Ratio (FLR)**
Syntax: **ethersat profile flr set** <number> <ratio>
Description: The command lets you configure the acceptable frame loss ratio for the profile. The frame loss ratio is defined as the ratio of the number of lost packets to the total number of packets expressed as a percentage. The default frame loss ratio is 0.0 %. The parameters are:

<**number**> enter a profile number (1-16).

<**ratio**> Frame loss ratio (0.0 - 99.99).

Example: The example below will set the frame loss ratio of profile 2 to 10.0 %:

```
>ethersat profile flr set 2 10.0
>ethersat profile flr set 2
Frame Loss Ratio: 10.00 %
>
```

Messages: *Error: unable get profile with Id 2*

Command: **Configure Yellow Frames PCP Values**

Syntax: **ethersat profile yellowpcpmask set** <number> <mask>

Description: Set or show the profile Yellow PCP mask. By default, none of the PCP values are defined as a yellow frame PCP value. The parameters are:

<**number**> enter a profile number (1-16) to set or show.

<**mask**> the 8-bit mask of PCP value; each bit of which corresponds to appropriate PCP value. Enter an integer in hexadecimal format (00-FF).

Example: The example below defines frames with PCP values 0, 2 and 5 as yellow for profile 4:

```
>ethersat profile yellowpcpmask set 1 ff
>
```

Messages: *Invalid parameter: 2*

Error: unable set a new value of parameter

Command: **Configure Yellow Frames PCP Values**

Syntax: **ethersat profile yellowpcp set** <number> [<nmb>] [<nmb>] [<nmb>] [<nmb>] [<nmb>] [<nmb>] [<nmb>] [<nmb>]

Description: Set or show the profile Yellow PCP list. By default, none of the PCP values are defined as yellow frame PCP value. The parameters are:

<**number**> Profile number (1-16).

<**nmb0**> PCP value – Integer [0-7].

[**nmb1**] PCP value – Integer [0-7].

[**nmb2**] PCP value – Integer [0-7].

[**nmb3**] PCP value – Integer [0-7].

[**nmb4**] PCP value – Integer [0-7].

[**nmb5**] PCP value – Integer [0-7].

[**nmb6**] PCP value – Integer [0-7].

[**nmb7**] PCP value – Integer [0-7].

<**mask**> Integer the 8-bit mask, each bit of which corresponds to appropriate PCP value – in hexadecimal format [00-FF].

Example: The example below defines frames with PCP values 0, 2 and 5 as yellow for profile 4:

```
>ethersat profile yellowpcp set 1 0 2 5
>
```

Command: **Configure Frame Size Mix**

Syntax: **ethersat profile sizemix set** <number> <size1> [<size2> ...<size*n*>]

Description: Set or show the profile frame sizes. Configures the frame size mix of profile. The maximum length of the profile frame size mix is 10. The default frame size mix is "64" bytes. The parameters are:

<**number**>	Profile number (1-16).
<**size**>	Frame size mix – Any frame size from 64 to 9600 bytes not including any VLAN tags. Enter up to 10 frame sizes in the sequence.

Example: The example below sets the frame size mix of profile 5.

```
>ethersat profile sizemix set 5 64 512 1024 9600
>
```

Messages: *Error: unable get profile with Id 5*

Command: **Configure Rate Decrease Step**

Syntax: **ethersat profile ratedecstep set** <number> <step>

Description: This command lets you set or show the rate decrease step of profile. **Note**: The rate decrease step determines the step on which current Tx rate will be reduced in the case of test fails. It is expressed as a percentage. The default rate decrease step is 10 %.

The parameters are:

<**number**>	Profile number (1-16).
<**step**>	Rate decrease step (10-90).

Example: The example below sets the rate decrease step of profile 6 to 10 %:

```
>ethersat profile ratedecstep set 6 10
>
```

Messages:

Error: unable set a new value of parameter

Invalid parameter: 900

Command: **Configure Step Length**

Syntax: **ethersat profile steplength set** <number> <length>

Description: This command lets you set or show the step length of profile. **Note**: The step length determines the duration of test step in seconds. The default step length is 10 seconds.

The parameters are:

<**number**> Profile number (1-16).

<**length**> Enter a Step length of 10-300 seconds. The step length determines the duration of test step in seconds.

Example: The example below will set the step length of profile 6 to 10 seconds.

```
>ethersat profile sizemix set 1 64 256
>ethersat profile sizemix set 1
Frame sizes: 64 256
>ethersat profile sizemix set 1 64 512 1024 9600
>ethersat profile sizemix set 1
Frame sizes: 64 512 1024 9584
```

>*Messages*: *Error: unable set a new value of parameter*

Error: unable get profile with Id 5

Command: **Configure Test Mode**

Syntax: **ethersat profile testmode set** <number> [unidir|bidir|loopback]

Description: This command lets you set or show the test mode of profile. **Note**: Select one of the three test modes (unidirectional, bidirectional, or loopback). The default test mode is unidirectional. The parameters are:

<**number**> Profile number (1-16).

unidir Unidirectional test mode (default); or

bidir Bidirectional test mode; or

loopback Loopback mode.

Example: The example below will set the test mode of profile **2** to **loop**back mode:

```
>ethersat profile testmode set 1 loop
>ethersat profile testmode set 1
Test Mode: loopback
>
```

Messages:

Error: unable get profile with Id 1

Error: unable set a new value of parameter

Command: **Configure Encapsulation Type**

Syntax: **ethersat profile frameencaps set** <number> [l2|l3] [ethtst|customethtst|llcsnap|udp|tcp]

Description: Set or show the profile frame encapsulation. This command lets you select the frame encapsulation type of profile. **Note**: The encapsulation type affects the use of several other frame format parameters. The default encapsulation type is *EthTst*. The parameters are:

<**number**> Profile number (1-16).
frame level Frame format layer (**l2** frame or **l3** frame).
for ***l2*** frame – ***EthTst***, ***CustomEthTst***, ***LlcSnap***;
for ***l3*** frame– ***UDP***, ***TCP***.

If encapsulation type is ***CustomEthTst*** the custom EthType can be used (default).
If encapsulation type is ***EthTst*** or ***CustomEthTst*** the SOAM MEG level can be used.
If encapsulation type is ***LlcSnap*** the LLC/SNAP OUI and LLC/SNAP protocol can be used.

Example: The example below selects the **EthTst** encapsulation type for frames of profile **11**:

```
>ethersat profile frameencaps set 1 EthTst
>ethersat profile frameencaps set 1
Frame level: L3
Frame encapsulation: UDP/IP
>
```

Messages:

Error: unable get profile with Id 1

Error: unable set a new value of parameter

E sa 00:57:48 11/saProfileValidateData#411: Error: SA: Invalid SA profile frame format.

Command: **Configure Payload Filling Mode**

Syntax: **ethersat profile framefill set** <number> <prbs|fixed> [pattern]

Description: This command lets you select the frame filling mode of profile. Specify how the remainder of the packet (after the configured headers) will be filled, up to the maximum frame size for the test. The default filling mode is PRBS. The parameters are:

<**number**> : enter a profile number (1-16).

Frame filling mode : enter ***PRBS*** (pseudo-random bit stream) pattern or ***Fixed*** (fixed pattern of 4 octets. The pattern value is defined in a separate 32-bit FPGA register.

[**pattern**] : Payload pattern –a 32-bit value used if filing mode is ‘Fixed’.

Example: The example below will select the Fixed filling mode for frames of profile **2**:

```
>ethersat profile framefill set 2 PRBS
>ethersat profile framefill set 2 fixed
>ethersat profile framefill set 2
Frame fill mode: Fixed pattern, pattern: 0
>
```

Messages: *Error: unable get profile with Id 11*

Command: **Configure Custom EthType**

Syntax: **ethersat profile frameethtyp set** <number> <type>

Description: Set or show the profile frame EthType. This command let you configure the frame custom EthTyp of a profile. **Note**: The custom EthTyp defines EthType if the encapsulation type is CustomEthTst. The default custom EthTyp is *0x8902*. The parameters are:

<**number**> Profile number (1-16).

<**type**> Custom EthTyp –defines EthType if the encapsulation type is CustomEthTst. The valid 'EtherType' range is *0x600* to *FFFF*. Typical 'EtherType' values include:

8100: VLAN-tagged frame (IEEE 802.1Q).

88A8: Provider Bridging (IEEE 802.1ad).

9100: VLAN Tag Protocol Identifier (Q-in-Q).

Note that the CLI can accept values both in decimal and in hex format (e.g., *0x8100* or *8100*). See http://standards.ieee.org/develop/regauth/ethertype/eth.txt for more information.

Example: The example below sets the custom EthTyp of profile **1** to 0x**8902**:

```
>ethersat profile frameethtyp set 1 8902
>ethersat profile frameethtyp set 1
Frame custom EthType: 8902
>ethersat profile frameethtyp set 1
Frame custom EthType: 0000
>ethersat profile frameethtyp set 1 8808
>ethersat profile frameethtyp set 1
Frame custom EthType: 2268
```

Messages: *Error: unable get profile with Id 11*

Command: **Configure LLC/SNAP Parameters**
Syntax: **ethersat profile framellcsnap set** <number> <id> <protocol>
Description: Set or show the profile frame LLC/SNAP header. This command lets you configure the frame LLC/SNAP OUI and LLC/SNAP protocol of profile. **Note**: The LLC/SNAP OUI and LLC/SNAP protocol are used only if the encapsulation type is ***LlcSnap***. The default LLC/SNAP OUI is 00-00-00 and LLC/SNAP protocol is 0. The parameters are:

<**number**> Profile number (1-16).
<**id**> Frame LLC/SNAP OUI in the format xx-xx-xx.
<**protocol**> Frame LLC/SNAP protocol (0-65535).

Example: The example below sets the LLC/SNAP OUI to **12-34-5A** and the LLC/SNAP protocol to **0** for profile **2**:

```
>ethersat profile framellcsnap set 2 12-34-5A 0
>ethersat profile framellcsnap set 2
LLC/SNAP OUI/protocol:  12-34-5a/0000
>
```

Messages: *Error: unable get profile with Id 11*

Command: **Configure IP header parameters**
Syntax: **ethersat profile frameip set** <number> <destadr> <srcadr> <dscp> <ecn> <flags> <ttl>
Description: Sets or shows the profile frame IP header. The IP header parameters are used only if the frame level is l3. You can configure the following IP header parameters of a profile.

<**number**> Profile number (1-16).
<**destadr**> Destination IP address, an IPv4 address in the format a.b.c.d.
<**srcadr**> Source IP address, an IPv4 address in the format a.b.c.d.
<**dscp**> DSCP – Integer in hexadecimal format (0-3F).
<**ecn**> ECN – Integer in hexadecimal format (0-3).
<**flags**> Flags – Integer in hexadecimal format (0-7).
<**ttl**> TTL (Time To Live) (0-255 seconds).

The default values for IP header parameters are: Destination IP address = 0.0.0.0, Source IP address = 0.0.0.0, DSCP = 0x0, ECN = 0x0, Flags = 0x0, and TTL = 0.

Example 1: The example below sets the following IP header parameters for of profile 11:
Destination IP address = 10-10-152-12, Source IP address = 10-10-152-13, DSCP = 0x0, ECN = 0x3, Flags = 0x5, and TTL = 100:

```
>ethersat profile frameip set 11 10.10.152.12 10.10.152.13 0 3 5 100
>ethersat profile frameip set 2
Frame IP dest address: 0.0.0.0
Frame IP src  address: 0.0.0.0
Frame IP DSCP        : 0
Frame IP ECN         : 0
Frame IP Flags       : 0
Frame IP TTL         : 0
>ethersat profile frameip set 2 192.168.1.30 192.168.1.110 4 2 5 60
>ethersat profile frameip set 2
Frame IP dest address: 192.168.1.30
Frame IP src  address: 192.168.1.110
Frame IP DSCP        : 4
Frame IP ECN         : 2
Frame IP Flags       : 5
Frame IP TTL         : 60
>
```

Example 2:

```
>ethersat profile frameip set 1
Frame IP dest address: 10.10.152.12
Frame IP src  address: 10.10.152.13
Frame IP DSCP        : 0
Frame IP ECN         : 3
Frame IP Flags       : 5
Frame IP TTL         : 100
>ethersat profile frameip set 1 10.10.152.12 10.10.152.13 0 3 5 100
>ethersat profile frameip set 1
Frame IP dest address: 10.10.152.12
Frame IP src  address: 10.10.152.13
Frame IP DSCP        : 0
Frame IP ECN         : 3
Frame IP Flags       : 5
Frame IP TTL         : 100
>
```

Messages: *Error: unable get profile with Id 11*

Command: **Configure UDP Header Parameters**

Syntax: **ethersat profile frameudp set** <number> [<udpsrcport>] [<udpdestport>]

Description: Set or show the profile frame UDP header. This command lets you configure these UDP header parameters of a profile, where:

<**number**> : Profile number (1-16).

<**srcport**> : Source port – an integer (0-65535).

<**destport**> : Destination port – an integer (0-65535).

Note: The UDP header parameters are used only if the frame level is l3. The default values for UDP header parameters are Source port = 0 and Destination port = 0.

Example: The example below will set for profile **11** the UDP header parameters Source port = **10** and Destination port = **20**:

```
>ethersat profile frameudp set 2
Frame UDP src  port: 0
Frame UDP dest port: 0
>ethersat profile frameudp set 2 10 20
>ethersat profile frameudp set 2
Frame UDP src  port: 10
Frame UDP dest port: 20
>
```

Messages: *Error: unable get profile with Id 2*

Command: **Configure TCP header parameters**
Syntax: **ethersat profile frametcp set** <number> [<tcpsrcport>] [<tcpdestport>] [<sequence_num>] [<ack_num>] [<control_bits>] [<window_size>]
Description: This command lets you configure the following TCP header parameters of a profile:
<**number**> : Profile number (1-16).
<**tcpsrcport**> : Source port, an integer (0-65535).
<**tcpdestport**> : Destination port, an integer (0-65535).
<**sequence_num**>: Sequence number (0-4294967295).
<**ack_num**> : ACK number (0-4294967295).
<**control_bits**>: Control bits (0-63).
<**window_size**> : Window size (0-65535).
Example: The example below will set the following six TCP header parameters for profile **2**: Source port = **10**; Destination port = **20**; Sequence number = **100**; ACK Number = **200**; Control Bits = 0x**15**; Window Size = **256**.

```
>ethersat profile frametcp set 2 10 20 100 200 15 256
>ethersat profile frametcp set 2
Frame TCP src  port      : 10
Frame TCP dest port      : 20
Frame TCP Sequence Number: 100
Frame TCP Ack Number     : 200
Frame TCP Control Bits   : f
Frame TCP Window Size    : 100
>
```

Note: The TCP header parameters are used only if the frame level is l3. The default values for the six TCP header parameters are Source port - 0; Destination port - 0; Sequence number - 0; ACK Number - 0; Control Bits – 0x0; and Window Size - 0.
Messages: *Error: unable get profile with Id 11*
Missing <number> parameter

Command: **Configure Test Steps**
Syntax: **ethersat profile teststep set** <number> [<step>] [<step>] [<step>] [<step>]
Description: This command lets you set or show the profile test steps, where:

<**number**>	:	Profile number 1-16.
<**step0**> [**step1**] …		Test step(s) - a string that can include ***Throughput***, ***Latency***, ***FLR***, and/or ***Back to Back***. By default, only the throughput test is selected for the profile.

Example: The example below selects the Throughput, Latency, FLR, and Back-to-Back test steps for profile 1:

```
>ethersat profile teststep set 1 thr lat flr back
>ethersat profile teststep set 1
Test Steps:               throughput latency flr back-to-back
>
```

Messages: *Error: unable get profile with Id 12*
Note: you must have a PTP clock instance configured for accurate EtherSAT Latency test step timestamps. PTP must be running on both devices to synchronize the Time of Day.

Command: **Insert EtherSAT Profile DM Threshold**
Syntax: **etherSat profile Dmthr insert** <number> <threshould_value>
Description: Insert a new threshold for DM bins, where:
<**number**> : Profile number (1-16).
<**threshould_value>:** Threshold in usec (1 - 3000000 microseconds).
Example 1: The example below inserts a new DM threshold:

```
>ethersat profile dmthr insert 12 3000
>
```

As the result the DM bins will be defined as:
[0 – 3000]
[3001 - 3000000]
[> 3000000]

Command: **Remove EtherSAT Profile DM Threshold**
Syntax: **etherSat profile Dmthr remove** <number> <threshould_value>
Description: Remove the DM threshold, where:
<**number**> : Profile number (1-16)
<**threshould_value**>: Threshold in usec (1 - 3000000 microseconds).
Example:

```
The example below removes the threshold:
>ethersat profile dmthr remove 12 3000
>
```

As the result the DM bins will be defined as:
[0 – 3000000]
[> 3000000]

Command: **Insert EtherSAT Profile DMV Threshold**
Syntax: **etherSat profile Dmvthr insert** <number> <threshould_value>
Description: Insert a new threshold for DMV bins, where:
<**number**> : Profile number (1-16).
<**threshould_value**>: Threshold in usec [(1 - 3000000 microseconds).
Example:

```
>etherSat profile Dmvthr insert 1 765000
>
```

Command: **Remove EtherSAT Profile DMV Threshold**
Syntax: **etherSat profile dmvthr remove** <number> <threshould_value>
Description: Remove the existing DMV threshold, where:
<**number**> : Profile number (1-16).
<**threshould_value**> : Threshold in usec (1 - 3000000 microseconds).
Example:

```
>etherSat profile Dmvthr remove 1 765000
>
```

Messages: *Error: unable get profile with Id 12*
Invalid <threshould_value> parameter: 0

Command: **Display Profile Configuration**

Syntax: **ethersat profile config show** [<number>]

Description: This command lets you display the current profile configuration (attributes), where:

<**number**> : Profile number to display (1-16).

Example 1: The example below displays the current configuration of profile **1**:

```
>ethersat profile config show 1
Profile ID:               1
Name:                     SaProfile1
Frame Loss Ratio:         0.00 %
Coloring method:          PCP
Yellow Frames PCP Values:
Frame Size Mix:           64
Rate Decrease Step:       25 %
Step Length:              10 sec
Exit on Fail:             enabled
Test Mode:                unidir
Frame Level:              L2
Test Steps:               throughput
Frame Payload Pattern:    0x00000000
Reference Number:         0
CBS line rate:            1000 Mbps
DM Thresholds, us:
                          [      0 - 3000   ]
                          [   3001 - 5000000]
                          [        > 5000000]
DMV Thresholds, us:
                          [      0 - 3000   ]
                          [   3001 - 5000000]
                          [        > 5000000]
>
```

Example 2: The example below displays the current configuration of profile **2**:

```
>ethersat profile config show 2
Profile ID:               2
Name:                     numbertwo
Frame Loss Ratio:         0.00 %
Coloring method:          PCP
Yellow Frames PCP Values: 0 2 5
Frame Size Mix:           64 512 1024 9584
Rate Decrease Step:       25 %
Step Length:              10 sec
Exit on Fail:             enabled
Test Mode:                bidir
Test Steps:               throughput latency flr back-to-back
Reference Number:         0
CBS line rate:            100 Mbps
DM Thresholds, us:
                          [      0 - 5000000]
                          [        > 5000000]
DMV Thresholds, us:
                          [      0 - 5000000]
                          [        > 5000000]
>
```

Command: **Display Frame Format Configuration**
Syntax: **ethersat profile frameformat show** [<number>]
Description: This command displays the current frame format configuration for each profile, where:
<**number**> Profile number (1-16).

Example: The example below displays the current frame format configuration for profile **2**:

```
>ethersat profile frameformat show 2
Level:                      L2
Encapsulation Type:         ETH-TST
Filling Mode:               PRBS
Frame Payload Pattern:      0x00000000
Custom EthType:             0x8902
LLC/SNAP OUI:               12-34-5a
LLC/SNAP Protocol:          0x0000
SOAM MEG Level:             5
IP Header:
  Destination IP Address:   192.168.1.30
  Source IP Address:        192.168.1.110
  DSCP:                     4
  ECN:                      2
  Flags:                    5
  TTL:                      60
UDP Header:
  Source Port:              10
  Destination Port:         20
TCP Header:
  Source Port:              10
  Destination Port:         20
  Sequence Number:          100
  ACK Number:               200
  Control Bits:             15
  Window Size:              256
>
```

Messages: *Error: unable get profile with Id 1*
Invalid <number> parameter: 2-16

EtherSAT Test Commands

The EtherSAT Test commands are explained below.

Command: **Add New EtherSAT Test**
Syntax: **ethersat test new** <number> <profile> <address> <in_port> <collector_in_port> <in_outer_tag_id> <in_outer_pcp> [<eg_tag_type>] [<eg_inner_tag_id>] [<eg_inner_pcp>] [<eg_outer_tag_id>] [<eg_outer_pcp>] [<name>]
Description: Creates a new EtherSAT test record, where:
<**number**> : Test number (1-16)
<**profile**> : Profile number (1-16)
<**address**> : IP address of the collector
<**in_port**> : Port number (1-8)
<**collector_in_port**>: Port number (1-8)
<**in_tag_type**> : Ingress tag type: none|c-tag|s-tag|cs-tag|cc-tag
none - no Ingress tagging to be used for this test.
c-tag - Subscriber VLAN tag.
s-tag - Service VLAN tag.
cs-tag - One c-tag and one s-tag.
cc-tag - Two c-tags.
<**in_inner_tag_id**> : Ingress inner VLAN ID.
<**in_inner_pcp**> : Ingress inner PCP value.
<**in_outer_tag_id**> : Ingress outer VLAN ID.
<**in_outer_pcp**> : Ingress outer PCP value.
<**eg_tag_type**> : Egress tag type: none|c-tag|s-tag|cs-tag|cc-tag
<**eg_inner_tag_id**> : Egress inner VLAN ID.
<**eg_inner_pcp**> : Egress inner PCP value.
<**eg_outer_tag_id**> : Egress outer VLAN ID.
<**eg_outer_pcp**> : Egress outer PCP value.
<**name**> : Test name**.**

Note: By default, if frames are tagged, then the Egress outer CVID and PCP are the same as Ingress outer CVID/PCP.

Example:

```
>ethersat test new 1 2 192.168.1.110 3 4 none 1 1 1 0 none 1 1 1 1 test1
>
```

Messages:

E sa 02:30:56 11/saDbTestNew#955: Error: SA: Profile with Id 2 doesn't exist
Error: unable create test with Id 1, Profile 2

E sa 02:46:27 11/saDbTestNewHelper#880: Error: SA: Can't find Egress port
Error: unable create test with Id 1, Profile 1

E sa 02:57:14 11/saDbTestFindEgressPort#2231: Error: SA: Can't find ECE for VID 0, port 3
Error: unable create test with Id 1, Profile 2

Command: **Delete an Ethersat Test**
Syntax: **ethersat test delete** <number>
Description: Remove the specified, existing EtherSAT test record, where:
<**number**>: Test number (1-16) to be deleted.
Example:
```
>ethersat test delete 1
>
```
Messages:
E sa 02:40:54 11/saDbTestDelete#1042: Error: SA: Test with Id 1 doesn't exist
Error: unable delete test with Id 1 and name "

Command: **Start an Ethersat Test**
Syntax: **ethersat test start** <number>
Description: Start an existing specified EtherSAT test, where:
<**number**>: Test number (1-16) of the test to be started.
Example:
```
>ethersat test start 1
>
```
Messages:
E sa 02:43:27 11/saDbTestStart#1735: Error: SA: Test with Id 1 doesn't exist
Error: Wrong Test ID

Command: **Stop an Ethersat Test**
Syntax: **ethersat test stop** <number>
Description: Stop an existing specified EtherSAT test, where:
<**number**>: Test number (1-16) of the test to be stopped.
Example:
```
>ethersat test stop 1
>
```
Messages: *Error: unable stop test with Id 1*
E sa 02:45:28 11/saDbTestStop#1770: Error: SA: Test with Id 1 doesn't exist

Command: **EtherSAT Test Show**
Syntax: **ethersat test show**
Description: Show current test attributes.
Example:
```
>ethersat test show
ID  Name              Inner VID/PCP  Outer VID/PCP  Target NID
--  ----------------  -------------  -------------  ----------
1   SaTest1                                 2/0    0.0.0.0
>
```

Configuration Commands

This section contains all parameters configured for each test (Name; Profile; CIR; CBS; EIR; EBS; and Target Test MAC address (to be used for Loopback test only).

Command: **Configure Test Name**

Syntax: **ethersat test name set** <number> <name>

Description: Set or show test name. This command lets you configure the name of test, where:

<**number**> : Test number (1-16) of the test to set or show.

<**name**> : Test name – String (up to 32 symbols). The maximum length of the test name is 32. By default, if a name is not defined when created, a name is configured to "EtherSATTest".

Example: The example below sets the test name to "SATest1":

```
>ethersat test name set 1 SaTest1
>
```

Messages: *Missing <number> parameter*

Error: unable get test with Id 0

E sa 02:54:02 11/saDbTestSetHelper#1263: Error: SA: Test with Id 1 doesn't exist
Error: unable set a new value of parameter

Command: **Set EtherSAT Test Ingress**

Syntax: **etherSat test ingress set** <number> [<in_tag_type>] [<in_inner_tag_id>] [<in_inner_pcp>] [<in_outer_tag_id>] [<in_outer_pcp>]

Description: Set or show test ingress Encapsulation, where:

<**number**> : Test number (1-16).

<**in_tag_type**> : Ingress tag type (**none**|**c-tag**|**s-tag**|**cs-tag**|**cc-tag**)

<**in_inner_tag_id**> : Ingress inner VLAN ID.

<**in_inner_pcp**> : Ingress inner PCP value.

<**in_outer_tag_id**> : Ingress outer VLAN ID.

<**in_outer_pcp**> : Ingress outer PCP value.

Example:

```
>etherSat test ingress set 1 c-tag 1 2 1 3
>
```

Messages:

E ether_sat 22:47:48 11/saDbTestSetHelper#1356: Error: SA: Test with Id 1 doesn't exist
Error: unable set a new value of parameter

Command: **Set EtherSAT Test Egress**

Syntax: **etherSAT test egress set** <number> [<eg_tag_type>] [<eg_inner_tag_id>] [<eg_inner_pcp>] [<eg_outer_tag_id>] [<eg_outer_pcp>]

Description: Set or show EtherSAT test egress Encapsulation, where:

<**number**> : Test number (1-16)

<**eg_tag_type**> : Egress tag type: none|c-tag|s-tag|cs-tag|cc-tag

<**eg_inner_tag_id**> : Egress inner VLAN ID.

<**eg_inner_pcp**> : Egress inner PCP value.

<**eg_outer_tag_id**> : Egress outer VLAN ID.

<**eg_outer_pcp**> : Egress outer PCP value.

Example:

```
>etherSAT test egress set 1 none 1 2 1 3
>
```

Messages: *E ether_sat 22:54:31 11/saDbTestSetHelper#1356: Error: SA: Test with Id 1 doesn't exist*
Error: unable set a new value of parameter

Command: **Configure Test Profile**

Syntax: **ethersat test profile set** <number> <profile number>

Description: This command lets you set or show the profile for test, where:

<**number**> : Test number (1-16).

<**profile number**> : Referenced profile number (1-16). **Note**: A Test always has a referenced profile number. The Test will not be created if a profile number is not defined. There is no default value for a profile number. It must always be explicitly defined.

Example: The example below sets the profile to 1 for test 1:

```
>ethersat test profile set 1 1
>
```

Messages: *Error: unable set a new value of parameter*

E sa 02:56:39 11/saDbTestSetHelper#1263: Error: SA: Test with Id 1 doesn't exist
No such profile.

Command: **Import BW Profile Parameters**

Syntax: **ethersat test bwparams set** <number> <policerid>

Description: This command lets you import the BW parameters from a configured policer, where:

<**number**> Test number (1-16)

<**policerid**> Configured EVC policer ID (1-128) or 'none' or 'discard'.

Example: The example below will import bandwidth values from policer with ID 10:

```
>ethersat test bwparams set 1 10
>
```

BW parameters are imported (CIR=1000000, EIR=0, CBS=80000, EBS=0) in this example.

Messages: *E sa 03:09:32 11/saDbTestSetHelper#1321: Error: SA: Test with Id 1 doesn't exist*

Error: unable set a new BW parameters (CIR=0,EIR=0,CBS=0,EBS=0)

Command: **Configure CIR**

Syntax: **ethersat test cir set** <number> <value>

Description: This command lets you set or show the CIR of a test, where:

<**number**> Test number (1-16) of an existing test.

<**value**> CIR value in bps. The default CIR is 0 bps.

Example: The example below sets the CIR of test 1 to 1000000 Kbps:

```
>ethersat test cir set 1 1000000
>
```

Messages: *E sa 03:03:39 11/saDbTestSetHelper#1263: Error: SA: Test with Id 1 doesn't exist*

Error: unable get test with Id 0

Error: unable set a new value of parameter

Command: **Configure CBS**
Syntax: **ethersat test cbs set** <number> <value>
Description: This command lets you configure the CBS of a test, where:
<**number**> Test number (1-16) to be configured.
<**value**> CBS value in bytes. The default CBS is 9600 bytes.
Example: The example below sets the CBS of test to 100000 bytes:

```
>ethersat test cbs set 1 100000
>
```

Messages: E ether_sat 00:31:10 11/saDbTestSetHelper#1349: Error: SA: Test with Id 1 doesn't exist
Error: unable set a new value of parameter

Command: **Configure EIR**
Syntax: **ethersat test eir set** <number> <value>
Description: This command lets you set or show the EIR of a test, where:
<**number**> Test number (1-16).
<**value**> EIR value in bps. The default EIR is 0 bps.
Example: The example below sets the EIR of test to 1000000 Kbps:

```
>ethersat test eir set 1 1000000
>
```

Command: **Configure EBS**
Syntax: **ethersat test ebs set** <number> <value>
Description: This command lets you configure the EBS of a test, where:
<**number**> Test number (1-16).
<**value**> EBS – Integer [9600-100000] (in bytes). The default EBS is 9600 bytes.
Example: The example below sets the EBS of the test to 100000 bytes:

```
>ethersat test ebs set 1 100000
>
```

Messages: *Error: unable get test with Id 0* (displays if you enter a test number but no value).

Command: **Target Test MAC address**
Syntax: **ethersat test testmacaddr set** <number> <macaddr>
Description: Set or show the Test MAC address for Loopback test, where:
<**number**> Test number (1-16).
<**macaddr**> Target Test MAC address (to be used for Loopback test only).

Example: The example below will set the Test MAC address for a Loopback test:

```
>etherSat test testmacaddr set 1 00-00-00-00-00-ff
>
```

Messages: *E ether_sat 23:02:34 11/saDbTestSetHelper#1349: Error: SA: Test with Id 1 doesn't exist*
Error: unable set a new value of parameter
Invalid parameter: 00:11:22:33:44:55

Command: **Display Current Test Configuration**
Syntax: **ethersat test config show** <number>
Description: Show test attributes. Displays the existing configuration of a specified test, where:
<**number**> Test number (1-16) to display.

Example: The example below will display the current configuration of test 1:

```
>ethersat test config show 1
Name:                       SaTest1
Profile ID/Name:            1/One
Ingress port:               3
Egress port:                1
Collector's Ingress port: 1
Ingress Encapsulation:      C-tagged
Ingress inner VID/PCP:      1/2
Ingress outer VID/PCP:      1/3
Egress Encapsulation:       Untagged
Egress inner VID/PCP:       1/2
Egress outer VID/PCP:       1/3
Target IP:                  0.0.0.0
CIR:                        500000000 bps
CBS:                        100000 bytes
EIR:                        0 bps
EBS:                        0 bytes
Target Test MAC address:  00:00:00:00:00:ff
EVC/ECE:                    1/1
>
```

Messages: *Error: unable get test with Id 16*
Invalid <number> parameter: 0
Missing <number> parameter

EtherSAT Test Result Commands

This section describes the commands used to display, delete, or export the SA test results. The EtherSAT Test Result commands are:

EtherSAT Test Result Show <number>
EtherSAT Test Throughput Show <number> [<step_number>]
EtherSAT Test Latency Show <number> [<step_number>]
EtherSAT Test Flr Show <number> [<step_number>]
EtherSAT Test Back-to-back Show <number> [<step_number>]
EtherSAT Test Result Export <number> <hostname> <file_name>

Note: All test results are destroyed upon rebooting.

Display Common Test Results
Use the commands below to display the common test results for all steps of a test. Sample test report output is provided in Appendix A: Sample EtherSAT Test Report on page 119.

Command: **Display Common Details**
Syntax: **ethersat test result show** <number>
Description: Displays the common details of results for test, where:
<**number**> Test number (1-16) of the results to display.
Example: The example below will display the common details of results for test 1:

```
>ethersat test result show 1
Status:                    completed
CBS Line Rate:             100 Mbps
Target Frame Loss Ratio:   0.0 %
Ingress port:              1
Egress port:               2
Ingress Encapsulation:     CS-tag
Ingress inner VID/PCP:     100/5
Ingress outer VID/PCP:     200/7
Egress Encapsulation:      CS-tag
Egress inner VID/PCP:      100/5
Egress outer VID/PCP:      200/7
CIR:                       10 Kbps
CBS:                       100000 bytes
EIR:                       5 Kbps
EBS:                       1000000 bytes
Yellow Frames PCP Values:  0 2 5
Frame Size Mix:            64,512,1580
Rate Decrease Step:        10 %
Step Length:               10 sec
Test Mode:                 unidir
Frame Level:               l2
Test Steps:                Throughput, Latency
Last Error:                No response from the peer NID
>
```

Messages: *Error: unable get test with Id 1* (if the test does not exist)

E ether_sat 02:43:14 68/saPeerProtoFreeSession#401: Error: Can't find session with IP 0x0 (if the Collector IP address is mis-configured)

No response from the peer NID (if the required configuration is not in place (e.g., VLAN, EVC/ECE, MEP configuration).

Display Throughput Test Results
Use the commands below to display the throughput test results of test.

Command: **Display Overall Throughput Results**
Syntax: **ethersat test throughput show** <number> [<step number>]
Description: This command displays the overall throughput test results of an existing test, where:
<**number**> Test number (1-16) to display.
[<**step number**>] Step number(s) to display (1-4).
Example: The example below will display the throughput test results of test:

```
>ethersat test throughput show 1
Status:                    pass
Elapsed Time:              20 s

Step |  Dir   | Frame size (byte) | Actual Tx Rate (bps) | Result
-------------------------------------------------------------------
   1 | NE->FE |       128         |    500000000         |  pass
   2 | NE->FE |       128         |    1000000000        |  pass
>
```

Messages: *Error: unable get test with Id 1*

Command: **Display Throughput Step Results**
Syntax: **ethersat test throughput show** <number> [<step number>]
Description: Displays the step results of the throughput test results of a test where:
<**number**> Test number (1-16).
<**step number**> Step number (1-4) of the test.
Example: The example below shows the step results of the throughput test results of a test for step 1.

```
>ethersat test throughput show 1 1
Direction:                              NE->FE
Frame Size:                             128 byte
Actual Tx Rate:                         1000000000 bps
Test step duration:                     10 s
Tx Frames:                              488281
Rx Green Frames:                        488200
Rx Yellow Frames:                       81
Test step result:                       Pass
>
```

Messages: *Error: unable get test with Id 1*

Display Latency Test Results
These commands let you display the latency test results of the specified test.

Command: **Display Overall Latency Results**
Syntax: **ethersat test latency show** <number> [<step number>]
Description: Displays the overall latency test results of an existing test, where:
<**number**> Test number (1-16).
<**step number**> Step number to display. **Note**: The latency is measured in one direction only for uni-directional and bi-directional tests, and is roundtrip for loopback tests.
Note that the Traffic Loss Result and number of rate steps for the Latency test is the same as for the Throughput test.
Example: The example below displays the latency test results:

```
>ethersat test latency show 1
Step |  Dir   | Frame size (byte) | Actual Tx Rate (bps) |  Result
-----------------------------------------------------------------
   1 | NE->FE |  128              |      1000000000      |   Traffic Loss
   2 | NE->FE |  128              |       500000000      |   No Traffic Loss
   3 | NE->FE |  128              |       500000000      |   No Traffic Loss
>
```

Messages:
No results for Latency test (if the test result could not be found)
Error: unable get test with Id 1 (if the test does not exist)

The overall latency test results can include:

Traffic Loss: The latency test completed with some traffic loss.
No Traffic Loss: The latency test completed with no traffic loss.
Not tested: The latency test was not completed.
Fail to execute: the command (**`ethersat test latency show`**) was entered but did not complete.

Note: you must have a PTP clock instance configured for accurate EtherSAT Latency test step timestamps. PTP must be running on both devices to synchronize the Time of Day.

Command: **Display Latency Step Results**
Syntax: **ethersat test latency show** <number> [<step number>]
Description: Displays the step results of the latency test results of a test, where:
<**number**> : Test number (1-16).
<**step number**> : Step number of the test (1-4).
Example: The example below will display the step results of the latency test for step 1:

```
>ethersat test latency show 1 1
Direction:                NE->FE
Frame Size:               128 byte
Actual Tx Rate:           1000000000 bps
Test step duration:       120 s
DM messages sent:         283762
DM messages received:     287263
DM bins counters:
  [0-100]                 82
  [101-200]               111
  [201-300]               2434
  [301-5000]              1393
  [5001-10000]            2343
  [10001- 20000]          2222
  [20001-50000]           3344
  [50001-70000]           8822
  [70001-100000]          4553
  [> 100000]              9022
DVM bins counters:
  [0-10]                  0
  [11-20]                 0
  [21-30]                 5
  [31-50]                 9
  [51-100]                14
  [101-200]               34
  [201-500]               87
  [501-700]               123
  [701-1000]              234
  [ > 1000]               1124
Test step result:         No Traffic Loss
>
```

The latency test results can include:

Traffic Loss: The latency test completed with some traffic loss.
No Traffic Loss: The latency test completed with no traffic loss.
Not tested: The latency test was not completed.
Fail to execute: the command (**`ethersat test latency show`**) was entered but did not complete.

The commands below let you display the FLR test results of the specified test.

Command: **Display FLR Test Results**
Syntax: **ethersat test flr show** <number> [<step number>]
Description: Displays the overall FLR test results of test, where:
<**step number**> : Step number of the test (1-4).
Example 1: The examples below will display the FLR test results of test:

```
>ethersat test flr show 1
Status:                   pass
Elapsed Time:             20 s

Step |  Dir   | Frame size (bytes) | Actual Tx Rate (bps) |  FLR
(%)
-------------------------------------------------------------------
-
   1 | NE->FE |    128             |   1000000000       |    0.00
>
```

Example 2: Results for the Loopback mode:

```
>ethersat test flr show 1
Status:                   pass
Elapsed Time:             20 s

Step |  Dir   | Frame size (bytes) | Actual Tx Rate (bps) |  FLR
(%)
-------------------------------------------------------------------
-
   1 | Lbk    |    128             |    500000000       |    0.00
   2 | Lbk    |    128             |   1000000000       |    5.00
>
```

Messages: *Error: unable get test with Id 1* (if the test does not exist)
No results for FLR test (if the test results could not be found)

Command: **Display FLR Step Results**
Syntax: **ethersat test flr show** <number> [<step number>]
Description: Displays the step results of the FLR test results of test, where:
<**number**> Test number (1-16).
<**step number**> Step number to display.
Example: The example below will display the step results of the FLR test results of test for step 1:

```
>ethersat test flr show 1 1
Direction:                  NE->FE
Actual Tx Rate:             1000000000 bps
Frame Size:                 128 bytes
Test step duration:         20 s
Tx Frames:                  488281
Rx Green Frames:            488005
Rx Yellow Frames:           276
FLR:                        0.00%
Out-of-sequence events:     0
Test step result:           pass
>
```

Messages: *Error: unable get test with Id 1* (if the test does not exist)

Display Back to Back Test Results
The commands below let you display the Back to Back test results of the specified test.

Command: **Display Overall Back to Back Results**
Syntax: **ethersat test back-to-back show** <number> [<step number>]
Description: Displays the overall Back-to-Back test results of test, where:
<**number**> Test number – an integer from 1-16.
Example: The example below will display the Back to Back test results of test #1:

```
>ethersat test back-to-back show 1
Status:                    pass
Elapsed Time:              20 s
CBS Line rate:             100 Mbps
Step |  Dir    | Frame size (bytes) |   Burst size (bytes) | Result
-------------------------------------------------------------------
------------
   1 | NE->FE |       128          | 60000                | pass
   2 | NE->FE |       1024         | 70000                | fail
   3 | FE->NE |       128          | 60000                | pass
   4 | FE->NE |       1024         | 70000                | pass
>
```

Messages:
Error: unable get test with Id 1 (if the test does not exist)
No results for Back-to-back frames test (if the test results could not be found)

Command: **Export EtherSAT Test Result**
Syntax: **etherSAT test result export** <number> <hostname> <file_name>
Description: Export test results to a TFTP server. The TFTP server must be configured and running. See "Appendix A: Sample EtherSAT Test Report" on page 119 for a sample test report output. The parameters are:
<**number**> : The instance number of the report to export (e.g., *1*).
<**hostname**> : The host name or IP address of the TFTP server (e.g., *192.168.1.30*).
<**file_name**> : The name of the file to be exported (e.g., *EsatTst01*).

Example:

```
> etherSAT test result export 1 192.168.1.30 EsatTst01.txt
  Test result for test \"%s\
  The report was generated on %s

  Throughput:
  Latency:
  Frame Loss Rate:
  Back-To-Back Frames

>
```

Messages:
Can't allocate memory
Can't get test result for test id %d
Creating test report failed
create txt file failed\n
DM min/max/avg: %u/%u/%u us\n
No test ID specified
resolving hostname %s failed\n
tftp client put failed: n
E ether_sat 00:47:25 68/saPeerProtoFreeSession#401: Error: Can't find session with IP 0x0
E ether_sat 00:01:44 11/saDbGetTestReportTxt#2503: Error: Can't get test result for test id 1
create txt file failed

TFTP Server Messages:
Connection received from 192.168.1.26 on port 7801 [30/07 15:15:43.548]
Write request for file <EsatTst01.txt>. Mode OCTET [30/07 15:15:43.548]
Using local port 3805 [30/07 15:15:43.548]
<EsatTst01.txt>: rcvd 1 blk, 184 bytes in 0 s. 0 blk resent [30/07 15:15:43.548]

Test Section Descriptions:

Status: Displays the Status Test results. See "EtherSAT Test Commands" on page 73.

Throughput: Displays the Throughput Test results if configured. See "EtherSAT Test Commands" on page 73.

Latency: Displays the Latency Test results if configured. See "EtherSAT Test Commands" on page 73.

Frame Loss Rate: Displays the FLR Test results if configured. See "EtherSAT Test Commands" on page 73.

Back-To-Back Frames: Displays the Back-To-Back Frames Test results if configured. See "EtherSAT Test Commands" on page 73.

Exported EtherSAT Test Result Format

Status: None

System Contact :
System Name :
System Location :

Test result for test "SaTest1".
The test was executed on Thu Jan 01 00:00:01 1970

Status: None

Status: Executed

```
System Contact   :
System Name      :
System Location  :

Test result for test "SaTest1".
The test was executed on Thu Jan 01 00:52:13 1970

Status:                   Unable to Run
CBS Line Rate:            1000 Mbps
Target Frame Loss Ratio:  0.00 %
Ingress port:             2
Egress port:              5
Collector's Ingress port: 3
Ingress Encapsulation:    Untagged
Ingress inner VID/PCP:    0/0
Ingress outer VID/PCP:    0/0
Egress Encapsulation:     Untagged
Egress inner VID/PCP:     0/0
Egress outer VID/PCP:     0/0
CIR:                      500000000 bps
CBS:                      100000 bytes
EIR:                      0 bps
EBS:                      0 bytes
Yellow Frames PCP Values: 0
Frame Size Mix:           64
Rate Decrease Step:       25 %
Step Length:              10 sec
Test Mode:                unidir
Frame Level:              L2
Test Steps:               throughput latency flr back-to-back
Last Error:               No response from the peer NID

-------------------------------------------------------------------------------
Throughput test results:

Status:                   Not tested
Elapsed Time:             0 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   Result
------  ------  ------------------  ---------------------  ------

-------------------------------------------------------------------------------
Latency test results:

Elapsed Time:             0 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)
------  ------  ------------------  --------------------

-------------------------------------------------------------------------------
Frame Loss Rate test results:

Status:                   Not tested
Elapsed Time:             0 ms
```

```
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   FLR (%%)
------  ------  ------------------  ---------------------  --------

-------------------------------------------------------------------------------
Back-To-Back Frames test results:

Status:                   Not tested
Elapsed Time:             0 ms
Step    Dir     Frame size (byte)   Burst Size (bytes)   Result
------  ------  ------------------  -------------------  ------

-------------------------------------------------------------------------------
Frame format:

Level:                    L2
Encapsulation Type:       Custom ETH-TST type
Filling Mode:             PRBS
Frame Payload Pattern:    0x00000000
Custom EthType:           0x0000
LLC/SNAP OUI:             00-00-00
LLC/SNAP Protocol:        0x0000
SOAM MEG Level:           4
```

CLI Command Privilege Levels

The CLI commands are Security Switch Privilege Level Configuration and Security Switch Privilege Level Current.

Table 1. CLI Command Privilege Levels

Level 15 Commands	Levels 10-14	Levels 5-9	Levels 1-4
1. EtherSAT Loopback Configuration	x		
2. EtherSAT Loopback SMAC	x		
3. EtherSAT Loopback State	x		
4. EtherSAT Loopback Status	x		
5. EtherSAT Loopback TestSidePort	x		
6. EtherSAT Loopback Timeout	x		
7. EtherSAT Loopback VID	x		
8. EtherSAT Collector	x		
9. EtherSAT PTPClock [<ptp_clock>]	x		
10. EtherSAT PeerProto	x		
11. EtherSAT Config Show	x		
12. EtherSAT Profile New	x		
13. EtherSAT Profile Delete	x		
14. EtherSAT Profile Show	x		
15. EtherSAT Profile Name Set	x		
16. EtherSAT Profile Flr Set	x		
17. EtherSAT Profile Linerate Set	x		
18. EtherSAT Profile YellowPCP Set	x		
19. EtherSAT Profile YellowPCPmask Set	x		
20. EtherSAT Profile Sizemix Set	x		
21. EtherSAT Profile RateDecStep Set	x		
22. EtherSAT Profile StepLength Set	x		
23. EtherSAT Profile Testmode Set	x		
24. EtherSAT Profile FrameEncaps Set	x		
25. EtherSAT Profile Framefill Set	x		
26. EtherSAT Profile Frameethtyp Set	x		
27. EtherSAT Profile Framellcsnap Set	x		
28. EtherSAT Profile Framemeglevel Set	x		
29. EtherSAT Profile FrameIP Set	x		
30. EtherSAT Profile FrameUDP Set	x		
31. EtherSAT Profile FrameTCP Set	x		
32. EtherSAT Profile Teststep Set	x		
33. EtherSAT Profile Dmthr Insert	x		
34. EtherSAT Profile Dmthr Remove	x		
35. EtherSAT Profile Dmvthr Insert	x		
36. EtherSAT Profile Dmvthr Remove	x		
37. EtherSAT Profile Config Show	x		

38. EtherSAT Profile Frameformat Show	x		
39. EtherSAT **Test** New	x		
40. EtherSAT Test Delete	x		
41. EtherSAT Test Start	x		
42. EtherSAT Test Stop	x		
43. EtherSAT Test Show	x		
44. EtherSAT Test Name Set	x		
45. EtherSAT Test Profile Set	x		
46. EtherSAT Test Ingress Set	x		
47. EtherSAT Test Egress Set	x		
48. EtherSAT Test Address Set	x		
49. EtherSAT Test CIR Set	x		
50. EtherSAT Test CBS Set	x		
51. EtherSAT Test EIR Set	x		
52. EtherSAT Test BwParams Set	x		
53. EtherSAT Test EBS Set	x		
54. EtherSAT Test Testmacaddr Set	x		
55. EtherSAT Test Config Show	x		
56. EtherSAT Test Result Show	x		
57. EtherSAT Test Throughput Show	x		
58. EtherSAT Test Latency Show	x		
59. EtherSAT Test Flr Show	x		
60. EtherSAT Test Back-to-back Show	x		
61. EtherSAT Test Result Export	x		

Example:

```
>Security Switch Privilege Level Config

Privilege Level Configuration:
==============================

Privilege Current Level: 15
Group Name         Privilege Level
                                    CRO    CRW    SRO    SRW
-------------------------------- --- --- --- --------------------
Aggregation        5     10    5     10
Diagnostics        5     10    5     10
EPS                5     10    5     10
ERPS               5     10    5     10
ETHER_SAT          5     10    5     10
```

Example:

```
>Security Switch Privilege Level Current
Privilege Current Level: 15
>
```

EtherSAT Example (CLI)

This section provides an example of RFC 2455 functionality on the S3280-TST NID via the CLI (using only uni-directional procedures). (For the equivalent test example run via the Web GUI see "EtherSAT Example (Web GUI)" on page 48.)

The setup consists of two TN 3280 NIDs (Unit L and Unit R), connected to traffic generators (SB1 and SB2) as shown below. A third unit (or a third party device capable of performing VLAN level policing) is used as en emulator for the network.

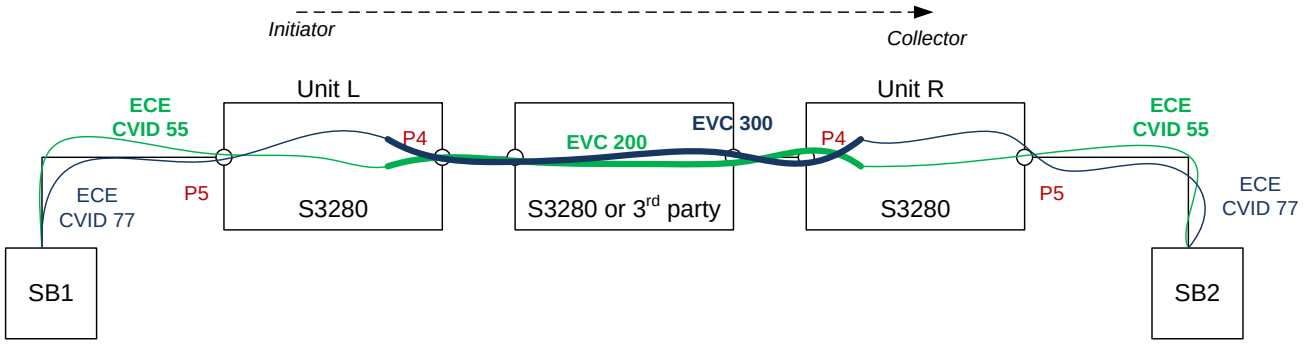


Figure 4. EtherSAT Example (CLI)

There are two EVCs configured across the network, each with one ECE. The configuration is symmetric between S3280-TST Unit L and Unit R.

EVC 300 (blue) carrying CVID 77 is not subject to EtherSAT tests. Traffic is sent continuously on that EVC, and will not be affected by the EtherSAT operations.

1. Unit L (SAT Test Initiator) Configuration Commands

a) **Create EVCs and ECEs**:

```
evc add 1 200 200 4 enable
evc add 2 300 300 4 enable

evc ece add 1 uni 5 tag tagged 55 all evc 1
evc ece add 2 uni 5 tag tagged 77 all evc 2
```

b) **Set Port Type to C-Port** (not unaware) and set Ingress filtering to *enabled*:

```
vlan porttype 5 c-port
vlan ingressfilter 5 enable
```

c) **Setup PTP between the initiator and collector**. For this test, the initiator is configured as master while the collector is configured as slave. (PTP connection is on port 4.)

On the Initiator S3280-TST (Unit L):

```
PTP ClockCreate 0 mst
PTP PortState 0 4 enable
mac learn 4 disable
```

d) **Create Three EtherSAT Profiles**:

Three S3280-TST profiles that are created, one profile for tests with 3 frame sizes, one profile for tests for Jumbo frames, and a third profile for yellow frames.
All tests use L2 frames, running all 4 tests (throughput, latency, flr, back-to-back). The test steps are 15 second in length and the rate decrease step is 10%.

The DM buckets are configured as:

0 - 10ms
10ms – 20ms
20ms – 30ms
30ms – 40ms
40ms - 100ms
100ms – 5sec
>5sec

(The expected one way delay is approx 20-30 ms.)

DMV buckets are configured in 100usec steps:

```
ethersat profile new 1 test3FrameSizes
ethersat profile linerate set 1 1000
ethersat profile sizemix set 1 64 128 256
ethersat profile ratedecstep set 1 10
ethersat profile steplength set 1 15
ethersat profile testmode set 1 unidir
ethersat profile frameencaps set 1 l2 ethtst
ethersat profile teststep set 1 throughput latency flr back-to-back
ethersat profile dmthr insert 1 10000
ethersat profile dmthr insert 1 20000
ethersat profile dmthr insert 1 30000
ethersat profile dmthr insert 1 40000
ethersat profile dmthr insert 1 100000
ethersat profile dmvthr insert 1 100
ethersat profile dmvthr insert 1 200
ethersat profile dmvthr insert 1 500
ethersat profile dmvthr insert 1 1000
ethersat profile dmvthr insert 1 10000

ethersat profile new 2 testJumboFrames
ethersat profile linerate set 2 1000
ethersat profile sizemix set 2 9600
ethersat profile ratedecstep set 2 10
ethersat profile steplength set 2 15
ethersat profile testmode set 2 unidir
ethersat profile frameencaps set 2 l2 ethtst
ethersat profile teststep set 2 throughput latency flr back-to-back
ethersat profile dmthr insert 2 10000
ethersat profile dmthr insert 2 20000
ethersat profile dmthr insert 2 30000
ethersat profile dmthr insert 2 40000
ethersat profile dmthr insert 2 100000
ethersat profile dmvthr insert 2 100
ethersat profile dmvthr insert 2 200
ethersat profile dmvthr insert 2 500
ethersat profile dmvthr insert 2 1000
ethersat profile dmvthr insert 2 10000
```

```
ethersat profile new 3 testBack2Back
ethersat profile linerate set 3 1000
ethersat profile sizemix set 3 64 128 512 1024
ethersat profile ratedecstep set 3 10
ethersat profile steplength set 3 15
ethersat profile testmode set 3 unidir
ethersat profile frameencaps set 3 l2 ethtst
ethersat profile teststep set 3 back-to-back
ethersat profile dmthr insert 3 10000
ethersat profile dmthr insert 3 20000
ethersat profile dmthr insert 3 30000
ethersat profile dmthr insert 3 40000
ethersat profile dmthr insert 3 100000
ethersat profile dmvthr insert 3 100
ethersat profile dmvthr insert 3 200
ethersat profile dmvthr insert 3 500
ethersat profile dmvthr insert 3 1000
ethersat profile dmvthr insert 3 10000
```

e) **Create Three Test Records**:

The first two tests correspond to the two profiles described above. The tests are run for these traffic parameters:

CIR = 100Mbps
CBS = 64Kbytes
EIR = 0
EBS = 0

The fourth test will demonstrate the back-to-back procedures. Hence, the CBS for the back-to-back test is larger (CBS = 256Kbytes).

All tests will run on ingress port P5 and Ingress C-VID 55 and ingress PCP 2.

```
ethersat test new 1 1 192.168.91.68 5 5 c-tag 55 2 0 0
ethersat test cir set 1 100000000
ethersat test cbs set 1 64000
ethersat test eir set 1 0
ethersat test eir set 1 0

ethersat test new 2 2 192.168.91.68 5 5 c-tag 55 3 0 0
ethersat test cir set 2 100000000
ethersat test cbs set 2 64000
ethersat test eir set 2 0
ethersat test eir set 2 0

ethersat test new 3 3 192.168.91.68 5 5 c-tag 55 4 0 0
ethersat test cir set 3 100000000
ethersat test cbs set 3 100000
ethersat test eir set 3 0
ethersat test eir set 3 0
```

2. Unit R (SAT Collector) Configuration Commands

a) Create EVCs and ECEs (symmetric configuration):

```
evc add 1 200 200 4 enable
evc add 2 300 300 4 enable

evc ece add 1 uni 5 tag tagged 55 all evc 1
evc ece add 2 uni 5 tag tagged 77 all evc 2
```

b) Set Port Type to C-Port (not unaware) and Ingress filtering to enabled:

```
vlan porttype 5 c-port
vlan ingressfilter 5 enable
```

c) Enable SAT collector on S3280-TST Unit R:

```
ethersat collector enable
ethersat peerproto enable
```

d) Setup PTP (as a slave on collector):

```
PTP ClockCreate 0 slv
PTP PortState 0 4 enable
mac learn 4 disable
```

Check that the PTP synchronization is completed between the devices.

3. Sample Procedure

1. **Verify end-to-end connectivity**

   From the test generator SB1 (connected to S3280-TST Unit L) start traffic on VLAN 55 and VLAN 77, at 100 Mbps each, with frame size of 128 bytes. The traffic should be received at SB2 without loss.
   Keep the traffic running for the duration of the test.

2. **Run a test without policing in the middle**

   On S3280-TST Unit L, start test 1.

```
ethersat test start 1
```

   Periodically check test status. Test status displays '*In progress*' for a while.

```
>EtherSAT test result show 1
Status:                   In Progress
CBS Line Rate:            1000000000 bps
Target Frame Loss Ratio:  0.00 %
Ingress Encapsulation:    C-tagged
Ingress inner VID/PCP:    55/2
Ingress outer VID/PCP:    0/0
Egress Encapsulation:     C-tagged
Egress inner VID/PCP:     55/2
Egress outer VID/PCP:     0/0
CIR:                      100000000 bps
CBS:                      64000 bytes
EIR:                      0 bps
EBS:                      0 bytes
Yellow Frames PCP Values:
Frame Size Mix:           64 128 256
Rate Decrease Step:       10 %
Step Length:              15 sec
Test Mode:                unidir
Frame Level:              L2
Test Steps:               throughput latency flr back-to-back
Last Error:               OK
```

   When all four tests complete execution, the status changes to "*Completed*".
   On SB2, check that traffic from CVID 77 is not disturbed while the test is in progress.
   Check that the traffic for CVID 55 is blocked while the test is in progress, and it resumes after the test completes.

```
>EtherSAT test result show 1
Status:                   Completed
CBS Line Rate:            1000000000 bps
..
Frame Level:              L2
Test Steps:               throughput latency flr back-to-back
Last Error:               No response from the peer NID
>
```

Verify the results for all four tests:

- ***Throughput test***

```
>ethersat test throughput show 1
Status:                    Pass
Elapsed Time:              108600 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   Result
------  ------  ------------------  ---------------------  ------
   1    NE->FE           64                100000000          pass
   2    NE->FE           64                100000000          pass
   3    NE->FE          128                100000000          pass
   4    NE->FE          128                100000000          pass
   5    NE->FE          256                100000000          pass
   6    NE->FE          256                100000000          pass
```

And for an individual step:

```
>ethersat test throughput show 1 3
Direction:                          NE->FE
Frame Size:                         128 byte
Actual Tx Rate:                     100000000 bps
Test step duration:                 18100 ms
Tx Frames:                          1420454
Rx Green Frames:                    1420454
Rx Yellow Frames:                   0
Test step result:                   pass
>
```

- ***Frame loss test***

```
>ethersat test flr show 1
Status:                    Pass
Elapsed Time:              108600 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   FLR (%%)
------  ------  ------------------  ---------------------  --------
   1   NE->FE           64                100000000          0.00
   2   NE->FE           64                100000000          0.00
   3   NE->FE          128                100000000          0.00
   4   NE->FE          128                100000000          0.00
   5   NE->FE          256                100000000          0.00
   6   NE->FE          256                100000000          0.00
```

Similarly, you can view individual steps:

```
>ethersat test flr show 1 1
Direction:                          NE->FE
Frame Size:                         64 byte
Actual Tx Rate:                     100000000 bps
Test step duration:                 18100 ms
Tx Frames:                          2757352
Rx Green Frames:                    2757352
Rx Yellow Frames:                   0
Frame Loss ratio:                   0.00
Out-of-sequence events:             0
Test step result:                   pass
```

- ***Latency test***

```
>ethersat test latency show 1
Elapsed Time:              0 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)
------  ------  ------------------  --------------------
   1   NE->FE            64                 100000000
   2   NE->FE            64                 100000000
   3   NE->FE           128                 100000000
   4   NE->FE           128                 100000000
   5   NE->FE           256                 100000000
   6   NE->FE           256                 100000000
```

Latency results are reported for each of the throughput steps:

```
>ethersat test latency show 1 1
Direction:                              NE->FE
Frame Size:                             64 byte
Actual Tx Rate:                         100000000 bps
Test step duration:                     18100 ms
DM bins:
                           [      0 - 10000  ] : 0
                           [  10001 - 20000  ] : 0
                           [  20001 - 30000  ] : 0
                           [  30001 - 40000  ] : 0
                           [  40001 - 100000 ] : 0
                           [ 100001 - 5000000] : 0
                           [        > 5000000] : 150
DMV bins:
                           [      0 - 100    ] : 149
                           [    101 - 200    ] : 0
                           [    201 - 500    ] : 0
                           [    501 - 1000   ] : 0
                           [   1001 - 10000  ] : 0
                           [  10001 - 5000000] : 0
                           [        > 5000000] : 5
Test step result:                          pass
```

- ***Back to back test***

```
>ethersat test back-to-back show 1
Status:                    Pass
Elapsed Time:              120840 ms
Step    Dir      Frame size (byte)   Burst Size (bytes)   Result
------  ------   -----------------   ------------------   ------
   1    NE->FE           64                    63360      pass
   2    NE->FE           64                    63360      pass
   3    NE->FE          128                    63360      pass
   4    NE->FE          128                    63360      pass
   5    NE->FE          256                    63360      pass
   6    NE->FE          256                    63360      pass
```

And individual steps:

```
>ethersat test back-to-back show 1 4
Direction:                          NE->FE
Frame Size:                         128 byte
Burst size:                         63360 bytes
Test step duration:                 15360 ms
Tx Frames:                          1421386
Rx Green Frames:                    1421386
Rx Yellow Frames:                   0
Frame Loss ratio:                   0.00 %
Test step result:                   pass
```

3. Enable a policer in the middle device

Enable two VLAN level policers, one for VLAN 200 and another for VLAN 300 in the middle device.
Set the policers to CIR = 80 Mbps, CBS = 64000 bytes.
Verify that the traffic rate on SB2 is approximately 75 Mbps for each stream (since the 80Mbps policer applies to the outer-tagged frames of the EVC).

4. Run tests with policer enabled in the middle

Restart test 1 on S3280-TST Unit L, and check periodically for its completion.

```
>ethersat test start 1
```

The test will complete this time with the result *Failed*:

```
>EtherSAT test result show 1
Status:                    Failed
CBS Line Rate:             1000000000 bps
..
```

Check test results for individual tests. As the throughput test failed, no test is executed for the back-to-back test.

```
>ethersat test throughput show 1
Status:                    Fail NE
Elapsed Time:              271530 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   Result
------  ------  ------------------  ---------------------  ------
   1    NE->FE          64                 100000000          fail
   2    NE->FE          64                  90000000          fail
   3    NE->FE          64                  80000000          fail
   4    NE->FE          64                  70000000          pass
   5    NE->FE          64                  70000000          pass
   6    NE->FE         128                 100000000          fail
   7    NE->FE         128                  90000000          fail
   8    NE->FE         128                  80000000          fail
   9    NE->FE         128                  70000000          pass
  10    NE->FE         128                  70000000          pass
  11    NE->FE         256                 100000000          fail
  12    NE->FE         256                  90000000          fail
  13    NE->FE         256                  80000000          fail
  14    NE->FE         256                  70000000          pass
  15    NE->FE         256                  70000000          pass

>ethersat test throughput show 1 3
Direction:                          NE->FE
Frame Size:                         64 byte
Actual Tx Rate:                     80000000 bps
Test step duration:                 18110 ms
Tx Frames:                          2205882
Rx Green Frames:                    2022953
Rx Yellow Frames:                   0
Test step result:                   fail
```

```
>ethersat test latency show 1
Elapsed Time:              271530 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)
------  ------  ------------------  ---------------------
   1   NE->FE          64                 100000000
   2   NE->FE          64                  90000000
   3   NE->FE          64                  80000000
   4   NE->FE          64                  70000000
   5   NE->FE          64                  70000000
   6   NE->FE         128                 100000000
   7   NE->FE         128                  90000000
   8   NE->FE         128                  80000000
   9   NE->FE         128                  70000000
  10   NE->FE         128                  70000000
  11   NE->FE         256                 100000000
  12   NE->FE         256                  90000000
  13   NE->FE         256                  80000000
  14   NE->FE         256                  70000000
  15   NE->FE         256                  70000000
```

```
>ethersat test latency show 1 5
Direction:                              NE->FE
Frame Size:                             64 byte
Actual Tx Rate:                         70000000 bps
Test step duration:                     18100 ms
DM bins:
                          [      0 - 10000  ] : 0
                          [  10001 - 20000  ] : 0
                          [  20001 - 30000  ] : 0
                          [  30001 - 40000  ] : 0
                          [  40001 - 100000 ] : 0
                          [ 100001 - 5000000] : 0
                          [        > 5000000] : 150
DMV bins:
                          [      0 - 100    ] : 149
                          [    101 - 200    ] : 0
                          [    201 - 500    ] : 0
                          [    501 - 1000   ] : 0
                          [   1001 - 10000  ] : 0
                          [  10001 - 5000000] : 0
                          [        > 5000000] : 0
Test step result:                       pass
```

```
>ethersat test flr show 1
Status:                   Fail NE
Elapsed Time:             271530 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   FLR (%%)
------  ------  ------------------  ---------------------  --------
   1   NE->FE           64                 100000000          27.19
   2   NE->FE           64                  90000000          18.58
   3   NE->FE           64                  80000000          8.29
   4   NE->FE           64                  70000000          0.00
   5   NE->FE           64                  70000000          0.00
   6   NE->FE          128                 100000000          25.11
   7   NE->FE          128                  90000000          16.58
   8   NE->FE          128                  80000000          5.69
   9   NE->FE          128                  70000000          0.00
  10   NE->FE          128                  70000000          0.00
  11   NE->FE          256                 100000000          21.18
  12   NE->FE          256                  90000000          15.34
  13   NE->FE          256                  80000000          4.35
  14   NE->FE          256                  70000000          0.00
  15   NE->FE          256                  70000000          0.00
```

Check detailed Frame Loss results, which will show the number of out-of-sequence frames received.

```
>ethersat test flr show 1 11
Direction:                              NE->FE
Frame Size:                             256 byte
Actual Tx Rate:                         100000000 bps
Test step duration:                     19140 ms
Tx Frames:                              721153
Rx Green Frames:                        568424
Rx Yellow Frames:                       0
Frame Loss ratio:                       21.18
Out-of-sequence events:                 152695
Test step result:                       fail
```

The back-to-back test is marked as ‘Not Tested’.

```
>ethersat test back-to-back show 1
Status:                   Not tested
```

Check on SB2 that the traffic for CVID 55 is blocked while the test is in progress and restored after the test completes.

5. Run the jumbo frame test with the policers enabled

On S3280-TST Unit L, start test 2.

```
>ethersat test start 2
```

Wait for the test to complete, and check the results. The test will complete with *Failed* status (due to the policers being enabled):

```
>ethersat test throughput show 2
Status:                   Fail NE
Elapsed Time:             90500 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   Result
------  ------  ------------------  ---------------------  ------
   1    NE->FE        9600                100000000          fail
   2    NE->FE        9600                 90000000          fail
   3    NE->FE        9600                 80000000          fail
   4    NE->FE        9584                 70000000          pass
   5    NE->FE        9584                 70000000          pass
>ethersat test throughput show 2 1
Direction:                          NE->FE
Frame Size:                         9584 byte
Actual Tx Rate:                     100000000 bps
Test step duration:                 18100 ms
Tx Frames:                          19555
Rx Green Frames:                    15643
Rx Yellow Frames:                   0
Test step result:                   fail
```

6. Run the back-to-back test with extended steps

For this step, configure the policers in the middle box with CIR = 120 Mbps, CBS = 16000 bytes (or the lowest supported CBS). Check that the traffic for C-VID 55 and C-VID 77 is received by SB2 without any loss.

On Unit L, start test 3.

```
>ethersat test start 3
```

Wait for the test to complete, and check the results. The test will complete with the *Failed* status (due to the CBS loss).

Check the back-to-back results and the intermediate steps.

```
>ethersat test result show 3
Status:                    Failed
CBS Line Rate:             1000000000 bps
Target Frame Loss Ratio:   0.00 %
Ingress Encapsulation:     C-tagged
Ingress inner VID/PCP:     57/4
Ingress outer VID/PCP:     0/0
Egress Encapsulation:      C-tagged
Egress inner VID/PCP:      57/4
Egress outer VID/PCP:      0/0
CIR:                       100000000 bps
CBS:                       100000 bytes
EIR:                       0 bps
EBS:                       0 bytes
Yellow Frames PCP Values:
Frame Size Mix:            64 128 512 1024
Rate Decrease Step:        10 %
Step Length:               15 sec
Test Mode:                 unidir
Frame Level:               L2
Test Steps:                back-to-back
Last Error:                OK
>
```

```
>ethersat test back-to-back show 3
Status:                    Fail NE
Elapsed Time:              931460 ms
Step    Dir     Frame size (byte)   Burst Size (bytes)   Result
------  ------  ------------------  -------------------  ------
   1    NE->FE            64                   100000      fail
   2    NE->FE            64                    90000      fail
   3    NE->FE            64                    80000      fail
   4    NE->FE            64                    70000      fail
   5    NE->FE            64                    60000      fail
   6    NE->FE            64                    50000      fail
   7    NE->FE            64                    40000      fail
   8    NE->FE            64                    30000      fail
   9    NE->FE            64                    20000      fail
  10    NE->FE            64                    10000      pass
  11    NE->FE            64                    10000      pass
  12    NE->FE           128                   100000      fail
  13    NE->FE           128                    90000      fail
  14    NE->FE           128                    80000      fail
  15    NE->FE           128                    70000      fail
  16    NE->FE           128                    60000      fail
  17    NE->FE           128                    50000      fail
  18    NE->FE           128                    40000      fail
  19    NE->FE           128                    30000      fail
  20    NE->FE           128                    20000      fail
  21    NE->FE           128                    10000      pass
  22    NE->FE           128                    10000      pass
  23    NE->FE           512                   100000      fail
  24    NE->FE           512                    90000      fail
  25    NE->FE           512                    80000      fail
  26    NE->FE           512                    70000      fail
  27    NE->FE           512                    60000      fail
  28    NE->FE           512                    50000      fail
  29    NE->FE           512                    40000      fail
  30    NE->FE           512                    30000      fail
  31    NE->FE           512                    20000      fail
  32    NE->FE           512                    10000      pass
  33    NE->FE           512                    10000      pass
  34    NE->FE          1024                   100000      fail
  35    NE->FE          1024                    90000      fail
  36    NE->FE          1024                    80000      fail
  37    NE->FE          1024                    70000      fail
  38    NE->FE          1024                    60000      fail
  39    NE->FE          1024                    50000      fail
  40    NE->FE          1024                    40000      fail
  41    NE->FE          1024                    30000      fail
  42    NE->FE          1024                    20000      fail
  43    NE->FE          1024                    10000      pass
  44    NE->FE          1024                    10000      pass
```

Display test details for individual steps.

6. Troubleshooting and Messages

General Troubleshooting

1. Check the S3280-TST or S4xxx Back Panel Connections (see the related Install Guide manual).
2. Verify the Installation. Check the Operating System, Web Browser, Telnet Client, and/or Terminal Emulation package support (see the related Install Guide manual).
3. Make sure your particular model supports the function attempted.
4. Check the S3280-TST or S4xxx Front Panel Connectors and LEDs (see the related Install Guide manual).
5. Respond to any S3280-TST or S4xxx CLI error messages (see below).
6. Run the S3280-TST or S4xxx Diagnostics tests and verification functions (e.g., EtherSAT Loopback, Ping). See the related section of this manual or the “Diagnostics” sub-menu section in the related User Guide manual.
7. Perform the S3280-TST or S4140 troubleshooting and service functions (e.g., Restart Device, Reset to Factory Defaults). See the “Maintenance” section in the related User Guide manual.
8. Check the S3280-TST or S4140 operating parameters (e.g., Information, Detailed Log). See the “Monitor” section in the related User Guide.

EtherSAT Test Troubleshooting

EtherSAT requires the standard frame sizes (64, 128, 256, 512, 1024, 1280 and 1518 byte) to be tested for a certain length of time and a certain number of times, because these frame sizes are all used in the network, and so the results for each must be known. The tests that are mentioned in EtherSAT are Throughput, Latency, Frame Loss and Back-to-back frames.

Back-to-back frame testing involves sending a burst of frames with minimum inter-frame gaps to the DUT and count the number of frames forwarded by the DUT. If the transmitted frames count is equal to the number of frames forwarded, then the burst length is increased and the test is run again.

If the number of forwarded frames is less than the number transmitted, the length of the burst is decreased, and the test is run again. The back-to-back value is the number of frames in the longest burst that the DUT will handle without the loss of any frames. The EtherSAT test asks for the results of all these tests to be recorded both in text and graphical formats. The results can then give accurate performance data for both service provider and customer.

1. Verify the installation and check LED status; see the related Install Guide manual.
2. Check configuration (e.g., that Autonegotiation is set the same on both sides, SFPs are correct types, VLAN IDs/mapping, IP /default gateway addresses, subnet mask, etc.).
3. Verify that cabling is correct and to industry standards and best practices (no Multi-mode to Single-mode connections). If connecting different core sized cables (Multi-mode to Multi-mode, Single-mode to Single-mode) you will experience loss.
4. Verify a clean cable connection / no dirty connectors, etc. Use Dust caps to protect the fiber end face, and verify they are not the source of contamination. Inspect both sides of the fiber interconnect (patch cord “male” and bulkhead “female”).
5. For additional RFC 2544 information see IETF RFC 2544 Benchmarking Methodology for Network Interconnect Devices at http://www6.ietf.org/rfc/rfc2544.

Messages and Recovery

The S3280-TST and S4xxx display error and information messages from the CLI and Web interface. This section lists the CLI messages, provides examples, and discusses the message meaning of and possible recovery steps. For web interface messages, refer to the related Web User Guide manual.

For many messages, recovery involves reviewing the command/function description and verifying the entry selection/syntax. For example, for many CLI messages, the first recovery step would be to refer to the applicable Command section (e.g., “System” or “IP” or “Ports”) or the related CLI Command Group or specific CLI command for syntax /instructions.

For any error condition, you can check the TN Tech Support web site for possible solutions. For any problem that persists, contact TN Tech Support in the US or Canada at 1-800-260-1312, International at 00-1-952-941-7600; via fax at +1 952-941-2322; or via Email at techsupport@transition.com.

Basic Recovery Steps

You entered a command, but the operation failed or is still in process.

1. Wait for a few moments for the operation to complete.
2. Use the **Help** or **?** command to get assistance (help) on a group of commands or on a specific command.
3. Make sure this is the command you want and that the device/port/configuration supports this command.
4. Make sure this device/port supports the function attempted. Use the **go** command to switch locations.
5. Verify the command syntax and re-enter the command. See the related section of the manual for specifics.
6. Try using the Web interface to perform the function.
7. If the “continue **y**(es) **n**(o) prompt” displays, type **y** and press **Enter** to continue.
8. If the problem persists, contact TN Tech Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600; TN Tech Support web; fax: +1 952-941-2322; Email: techsupport@transition.com.

Web GUI Messages

Message: *Error occurred in policer id parsing.*
Error: Can't get Policer configuration.
Meaning: Invalid or unrecognized Policer configuration.
Recovery:
1. Verify the profile settings and test settings.
2. See "Configuration > Service Activation > Profiles" on page 29 or "Configuration > Service Activation > Tests" on page 34.

Message: *CIR is out of range.*
EIR is out of range.
CBS is out of range.
EBS is out of range.
Meaning: BW settings - invalid entry at CIR, EIR, CBS, or EBS.
Recovery:
1. Verify the test settings (e.g., eir > (1000000000 / bps_to_kbps); cbs > 100000; ebs > 100000; cir * 1000; eir * 1000).
2. See the related test function in the web GUI or CLI section.

Message: *Service Activation Error*
Meaning: An error occurred during Ether SAT configuration / operation.
Recovery:
1. Verify the operating parameters.
2. Retry the operation.

Message: *Invalid character in profile name.*
Meaning: Profile name validation error.
Recovery: 1. Enter a Profile name using the valid character set:
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890_~!@#$(){}[]<>.
2. See "Configuration > Service Activation > Profiles" on page 29.

Message: *Invalid character in test name.*
Create a new test
Meaning: Test name validation error.
Recovery: 1. Enter a Test name using the valid character set:
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890_-
2. See "EtherSAT Test Commands".

Message: *Can't set FPGA port promiscuous mode*

Meaning: An error occurred during Loopback operation.

Recovery:

1. Verify the operating parameters.
2. Retry the test operation.

Message: *FPGA version v2.x is required*

Meaning: At **Ethernet Service Activation Testing** the function failed because the FPGA firmware is outdated.

Recovery:

1. Upgrade the FPGA firmware to the latest version.
2. See the "**Maintenance** > **Software** > **Peripheral Device Firmware Update**" menu path.

Message: *W sa 00:00:10 70/fpga_init: Warning: FPGA_ID value 0x19 is wrong or unreadable!*

Meaning: FGPA code is newer than main (device) firmware.

Recovery:

1. Update the main (device) firmware to eliminate the warning message.
2. See the Firmware Upgrade section of the related device user guide or CLI reference manual.

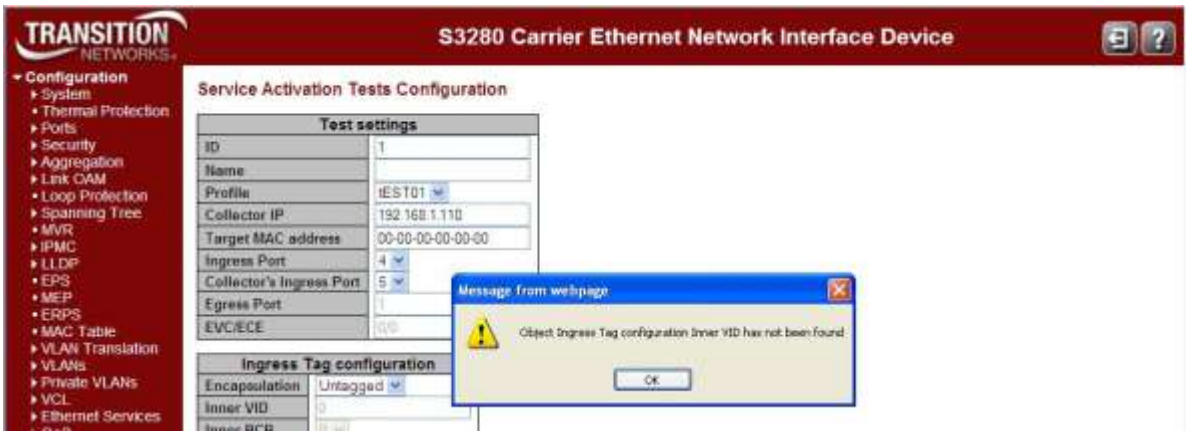
Message: *Cannot run tests on the inband management VLAN!*

Meaning: The test was configured incorrectly.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Verify the operating parameters. See "Configuration > Service Activation > Tests" on page 34.
3. Retry the Test operation.

Message: *Object Ingress Tag Config Inner VID has not been found*

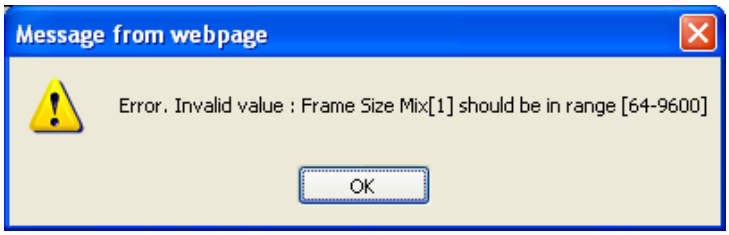


Meaning: SAT message indicating an invalid ingress Tag parameter was selected.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Verify the operating parameters. See the "Test settings" section of the "Configuration > Service Activation > Tests" on page 34.

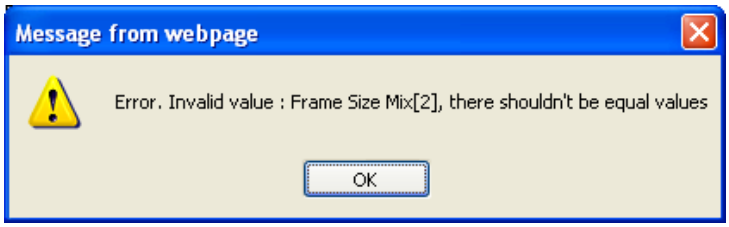
Message:
Error. Invalid value : First Frame Size Mix shouldn't be equal 0
Error. Invalid value : Frame Size Mix[1] should be in the range [64-9600]
Error. Invalid value : Frame Size Mix[0] should be multiple of 4



Meaning: At the Service Activation Profiles Configuration table, you entered an invalid "Frame Size Mix" value.
Recovery:

1. Click the **OK** button to clear the webpage message.
2. Enter a valid "Frame Size Mix" value at the Service Activation Profiles Configuration table.

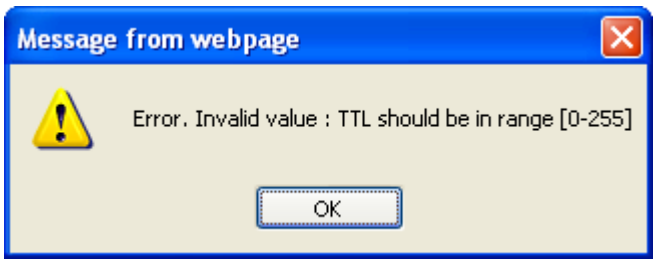
Message: *Error. Invalid value : Frame Size Mix[2], there shouldn't be equal values*



Meaning: At the Service Activation Profiles Configuration table, you entered two equal Frame Size Mix values, which is invalid.
Recovery:

1. Click the **OK** button to clear the webpage message.
2. Enter a two different Frame Size Mix values at the Service Activation Profiles Configuration table.

Message: *Error. Invalid value : TTL should be in the range [0-255]*

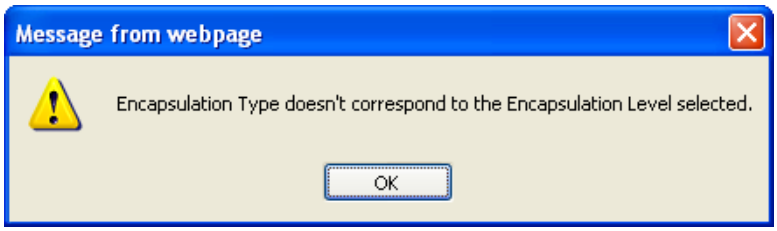


Meaning: At the **Configuration** > **Service Activation** > **Profiles** menu path in the Test Frame Configuration table, you entered a Time To Live (TTL) value outside of the valid range.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Enter a valid TTL value in the Test Frame Configuration table.

Message: *Encapsulation Type doesn't correspond to the Encapsulation Level selected.*



Meaning: At the **Configuration** > **Service Activation** > **Profiles** menu path in the Test Frame Configuration table, your combination of Encapsulation Type and Encapsulation Level is not a valid selection.
For example you can only select "LLC/SNAP Protocol" as the Encapsulation Level if "LLC SNAP" was selected as "Encapsulation Type".

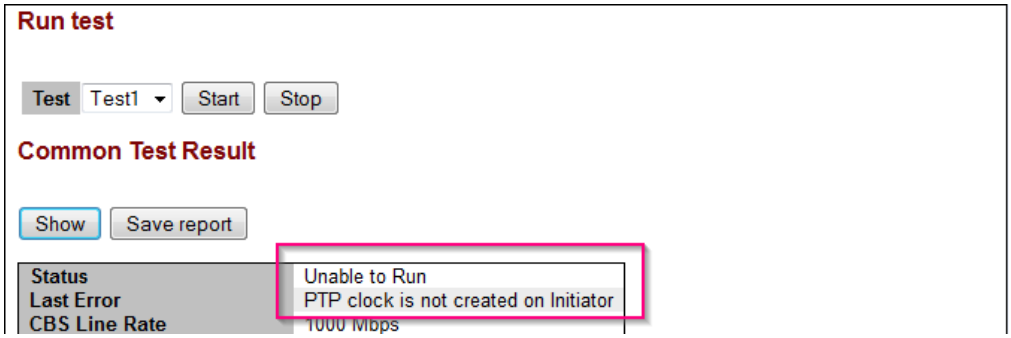
Recovery:
1. Click the **OK** button to clear the webpage message.
2. Enter a valid combination of Encapsulation Type and Encapsulation Level.

Message: *Service Activation Error*
Min frame size for TCP encapsulation is: 68 bytes

Meaning: At the **Configuration** > **Service Activation** > **Profiles** menu path in the **Profile setting** table, you entered an invalid "Frame Size Mix (bytes)" parameter.
Recovery:
1. Click the browser back button to return to the Service Activation Profiles Configuration table.
2. Enter a "Frame Size Mix (bytes)" value of 64-9600 bytes.
3. Click the **Save** button.

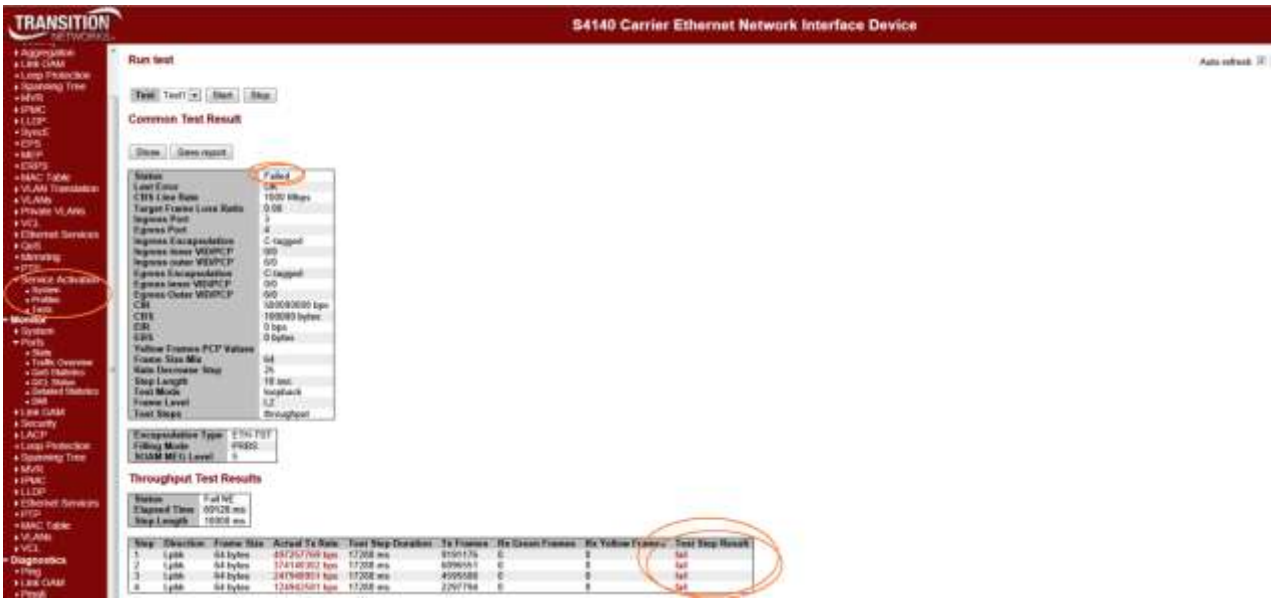
Messages:
af_fpga_extra_init failed
af_fpga_read_sa_version failed
FPGA_ID is unreadable
FPGA_ID is bad
SA version is incompatible
Meaning: The version for Service Activation (SA) is now 0xAMMMNNNN, where 0xA is a check, 0xMMM is the major version number, and 0xNNNN is the minor version number (e.g., current version is v0.40).
Recovery:
1. Check the S3280-TST version numbers and upgrade if required.
2. Verify theoperation in light of the "Meaning" information above.
3. Contact TN Technical Support for more information.

Message: *Unable to Run*
PTP clock is not created on Initiator.

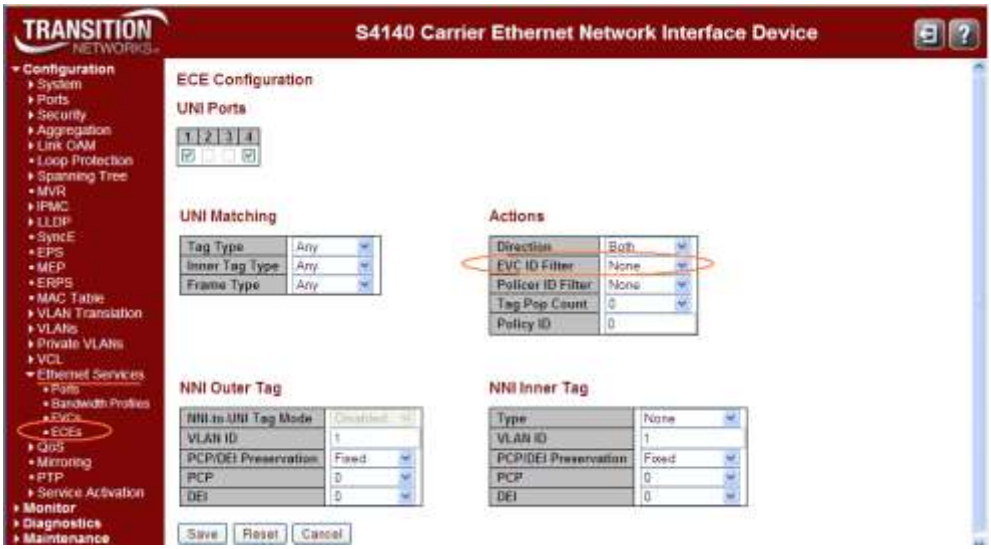


Meaning: You must have a PTP clock instance configured for accurate EtherSAT Latency test step timestamps. This occurs for the "Latency" test step only.
Recovery:
1. Configure PTP on both devices to synchronize the Time of Day. See the related *Web User Guide* for IEE 1588 PTP configuration information.
2. Retry the operation.

Problem: Common Test Result Status displays '*Failed*'
Meaning: Service Activation Test fails due to ECE configuration. The Status - Failed message displays due to the ECE configuration setting. The S4140 checks the ECE before checking the loopback test.
The Common Test Result Status at **Configuration** > **Service Activation** > **Tests** displays '***Failed***'.



Recovery:
1. Set the EVC ID Filter to "None" (at **Configuration** > **Ethernet Services** > **ECEs**).



2. Re-try the failed EtherSAT test. See the **Diagnostics** > **Service Activation** > **Test** section of the related *User Guide* manual.

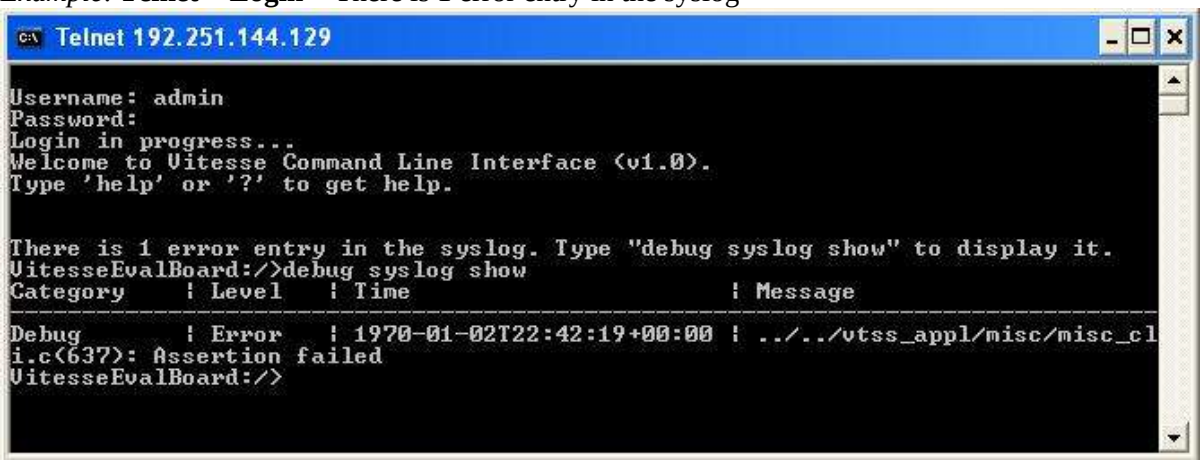
Message: *Can't register ACL rule for SAT*

Meaning: A problem exists with EtherSAT and ACL rule interaction.

Recovery: 1. Change the EtherSAT or ACL rule configuration. 2. Re-try the operation.

CLI Messages

Message: **There is 1 error entry in the syslog - Assertion failed**
Example: **Telnet** > **Login** > There is 1 error entry in the syslog



Meaning: You logged in successfully, an error occurred and this message displayed.
Recovery:
1. Follow the on-screen prompts to display the error, or press **Enter** to display the commands Help screen.
2. If the problem persists, contact TN Tech Support.

Message:
Unable set the port xx to blocked state
Unable set the port xx to forwarding state
Can't get SM for Port:xx, Link status
Meaning: A link state error or inconsistency exists.
Recovery:
1. Check the MVR configuration.
2. See the S3280-TST CLI Reference for MVR command information.
3. See "EtherSAT Test Commands" on page 73 or "EtherSAT Test Result Commands" on page 79.

Message: *Cannot run tests on the inband management VLAN!*
Meaning: The test was configured incorrectly.
Recovery:
1. Hit the Enter key to clear the message.
2. Verify the operating parameters. See "EtherSAT Test Commands" on page 73 or "EtherSAT Test Result Commands" on page 79.
3. Retry the Test operation.

Message:
E sa 04:08:24 11/saTestObjDelete#178: Error: SA: The test is running.
E sa 04:08:24 11/SA_conf_apply#194: Error: Cannot apply new configuration!
Meaning: The test was configured with a test actively running.
Recovery:
1. Hit the Enter key to clear the message.
2. Verify the operating parameters. See "EtherSAT Test Commands" on page 73 or "EtherSAT Test Result Commands" on page 79.

Message:

altera_present(TN_SPI_GPIO_CS_ET_FPGA)
Could not open device
EtherSAT Loopback Active Time Remaining: %d\n
EtherSAT Loopback Port: %u\n
EtherSAT Loopback SMAC: %02X-%02X-%02X-%02X-%02X-%02X\n
EtherSAT Loopback State: %s\n
EtherSAT Loopback Timeout: %d\n
EtherSAT Loopback VID: %d\n
'EVC Port Tag' must be set to outer for Port\n
'EVC Port Addr' must be set to source for Port\n
Feature not present
FIFO contains %d bytes, but expected 4
FPGA is not present
FPGA is not present: exiting
FPGA version v%d.x is required
loopback is now active
Loopback must be inactive to change parameters\n
Not present (FPGA is not present)

Meaning: 1. You tried to enter an EthernetSAT command, but the device does not support the EtherSAT feature. 2. Information or status message (not an error – no recovery needed).

The *tn_ether_sat_fpga_present* checked for the FPGA using the Board ID but none was found.

Recovery: 1. Try another command. 2. Try the command on another device.

Message:

altera_spi_app_loopback_setup failed: %d
exit
enter
port_mgmt_counters_get failed
tn_ether_sat_lb_fpga_ace_del failed: %d
tn_ether_sat_lb_tsp_ace_del failed: %d
tn_ether_sat_lb_tsp_ace_add failed: %d
tn_ether_sat_lb_fpga_ace_add failed: %d
tn_ether_sat_lb_tsp_ace_add failed: %d
tn_ether_sat_lb_fpga_ace_add failed: %d
tn_ether_sat_lb_conf_get failed
tn_ether_sat_lb_conf_set failed
vtss_switch_port_mode_ena_set failed

Meaning: The EtherSAT loopback is in progress or has failed.

1. Determine the point of failure based on the error message returned.
2. Retry the failed procedure with the corrected parameter.
3. See “EtherSAT Loopback Configuration Commands” on page 54 for more information.

Message:
HPIC control data not present
HPIC usb data not present
SMAC address' is not valid. The format is 'xx-xx-xx-xx-xx-xx' or 'xx.xx.xx.xx.xx.xx' or 'xxxxxxxxxxxx' (x is a hexadecimal digit).
Warning: 'Configuration > Ethernet Services > Port Configuration > Tag Mode' should be set to Outer for Port
Warning: 'Configuration > Ethernet Services > Port Configuration > Address Mode' should be set to Source for Port
Warning: 'EVC Port Tag' should be set to outer for Port
Warning: 'EVC Port Addr' should be set to source for Port
Warning: Policy ID (%d) is in use by ECE
Warning: Policy ID (%d) is in use by ACL Port
Warning: VLAN %d not found
Meaning: The EtherSAT loopback is in progress or has failed.
1. Determine the point of failure based on the error message returned.
2. Retry the failed procedure with the corrected parameter.
3. See "EtherSAT Loopback Configuration Commands" on page 54 for more information. See the S3280-TST User Guide "ACL Ports Configuration" section for more information.

Messages:
EtherSAT Loopback Active Time Remaining: n
EtherSAT Loopback Port: n
EtherSAT Loopback SMAC: %02X-%02X-%02X-%02X-%02X-%02X\n lb_conf.smac.addr[0], lb_conf.smac.addr[1], lb_conf.smac.addr[2], lb_conf.smac.addr[3], lb_conf.smac.addr[4], lb_conf.smac.addr[5]);
EtherSAT Loopback State: "Inactive" or "Active"
EtherSAT Loopback TestSidePort: n
Meaning: The EtherSAT loopback is in progress or has failed.
Recovery:
1. Wait for the procedure to successfully complete.
2. Determine the point of failure based on the error message returned.
3. Retry the failed procedure with the corrected parameter.
4. See "EtherSAT Loopback Configuration Commands" on page 54 for more information.

Message: *E ether_sat 00:02:33 67/saPeerProtoNewSession#274: Error: saPeerProtoNewSession(): session already exists!*
Meaning: Error displays on Collector CLI when the EtherSAT test starts. This error is displayed on the Collector CLI when the test is initiated (passing or failing).
Recovery:
1. Wait for the procedure to successfully complete.
2. Retry the failed procedure with the corrected parameter.
3. See the "EtherSAT Test Commands" on page 73.

Message:

Can't init Peer proto session
No PTP clock for the given instance created
Clock Compensation is not actuated
Clock compensation is not actuated on Initiator
Clock compensation is not actuated on Collector
FPGA clock initialization in progress, please try again
Collector's FPGA clock initialization in progress, please try again

Meaning: A clock, sync, or peer proto error occurred.

1. afErrSaPeerProto = 9
2. afErrSaPtpSync = 10
3. afErrSaClockCompensation = 11

Recovery:

1. Verify the Peer Protocol setup. See "Peer Protocol" on page 133.
2. Verify the PTP Clock setup. See "PTP Configuration for EtherSAT" on page 8.
3. See "Dependencies and Prerequisites" on page 6.
4. See the "EtherSAT Engine Commands" section on page 57.

Message: Test result for test "SaTest1".
Status: Unable to Run
Last Error: Clock compensation is not actuated on Initiator
FPGA clock initialization in progress, please try again
Meaning: The FPGA clock is not corrected yet. The device must wait 1-2 minutes after restart. Clock compensation has poll period 30 seconds.
Recovery: Wait for 1-2 minutes for the function to complete.

Message:
Last Error: Peer protocol timeout
Meaning: A problem exists with the management connection between Initiator and Collector (e.g. there is a loop between the devices).
Recovery: If you use PTP, the frames should be in a separate VLAN, since PTP uses the Management MAC and can relearn the MAC table entries.

Message:
Status: Failed
Last Error: OK
Meaning: An unknown error occurred during the test.
Recovery: 1. Check the test parameters. 2. Check the peer device. 3. Re-run the test.

Message:
Last Error: No response from the peer NID
Meaning: The peer device was not able to respond to this test.
Recovery: 1. Check the peer device. 2 Check the test parameters. 3. Re-run the test.

Messages:
Username: E ether_sat 00:00:07 29/saTestCreate#864: Error: SA: Inner VID/PCP must be specified only for double tagged frames
E ether_sat 00:00:07 29/saDbApplyConfig#2324: Error: SA: Can't create a new test 1
E ether_sat 00:00:07 29/SA_conf_apply#155: Error: Cannot apply new configuration!
Meaning: An EtherSAT configuration error occurred.
Recovery:
1. Navigate to the **Configuration** > **Service Activation** menu path.
2. Select the desired option (System, Profiles, or Tests).
3. Re-try the failed SAT operation. See "EtherSAT Test Commands" on page 73.

Message: Common Test Result Status displays 'Failed'
Meaning: Service Activation Test fails due to ECE configuration. The Status - Failed message displays due to the ECE configuration setting. The S4140 checks the ECE before checking the loopback test.
Recovery:
1. Delete the EVC using the "**evc ece del**" command.
2. Add a new EVC using the "**evc ece add x none**" command (where x is the ECE instance).
3. Run the "evc ece lookup" command to verify the ECE configuration.
4. Re-try the EtherSAT test. See the test commands section of the related *User Guide* manual.

General Test Problems

Problem: *EtherSAT test Actual TX rate is less than desired TX rate.*
Meaning: The Actual TX rate varies from one test to the next.
Example 1: Configured TX rate is 100,000,000 bps;
Actual TX rate is 99,991,787 bps
Example 2: Configured TX rate is 1,000,000,000 bps;
First test failed, so TX rate is reduced by 10% to 900,000,000 bps;
Actual TX rate is 897,688,976 bps
Recovery: None - This is hardware limitation - the generator has a 50 Mhz clock (20 per tick) so the actual interframe latency is rounded to multiple of 20 ns.

Problem: *Bidirectional FE--> NE tests sometimes fail, RX Green frames limited to 100*
Meaning: When the EtherSAT test is Bidirectional, sometimes the FE --> NE tests fail, because all except 100 packets are dropped by the NNI port of the Initiator. Dropped packets are identical to NE --> FE packets that passed, but with the source and destination MACs swapped. The only difference between these passing and failing configs is that on Unit L, Tests are set to C tag when failing, and CC tag when passing.
Recovery: None - the configuration is not valid. The test traffic has encapsulation SOAM EthTst. But since MEP is configured on level 4 that intercepts all SOAM frames with level 4 or lower, the test traffic should have MEG level 5 or more. Or use different encapsulation (LLC/SNAP, L3).
Example: Initiator has MEP on level 4:

```
mep conf
MEP Configuration is:
Inst Mode Direction Port Dom Level Format Name Meg id Mep id Vid Flow Eps MAC
1 Mep Down 4 Port 4 ITU ICC TRNSTN meg000 1 200 4 0 00-C0-F2-21-DE-17
```

Problem: *DM & DMV bins do not appear to be catching all traffic*. The "99" and "98" in the bins indicate that all counters for each measurement do not add up to 100%. (At **Latency Test Results** > **DM Bin Counters** and **DMV Bin Counters**.)
Meaning: The rate of DM frames is fixed to approximately one every 100ms. So the DM packet rate is about 10 packets per second. The “99” means that test step length was 10 seconds, so the number of DM results must be ~100 frames. The number of DMV results must be one less then DM since it calculates differences between two delays (per the EtherSAT design).
Recovery: None required.

Problem: *Receiving an "unrealistic number of RX Green frames".*
Meaning: This is a SPI-related problem; it sometimes returns a register value with a random bit set.
Recovery: Since the problem cannot usually be reproduced it, maybe it linked with some specific devices. Verify device operation. Check with TN Tech Support for resolution if the problem persists.

Problem: After initial configuration, even though the units are configured correctly, the EtherSAT tests will fail as shown:

Throughput Test Results

Status	Fail NE
Elapsed Time	56080 ms
Step Length	10000 ms

Step	Direction	Frame Size	Actual Tx Rate	Test Step Duration	Tx Frames	Rx Green Frames	Rx Yellow Frames	Test Step Result
1	NE->FE	64 bytes	494546454 bps	14020 ms	9191176	0	0	fail
2	NE->FE	64 bytes	372602739 bps	14020 ms	6896551	0	0	fail
3	NE->FE	64 bytes	249541284 bps	14020 ms	4595588	0	0	fail
4	NE->FE	64 bytes	124770642 bps	14020 ms	2297794	0	0	fail

Meaning: If this happens, the tests will keep failing until the Collector is rebooted. During failure, the Collector appears to be filtering all test packets:

Port Statistics Overview Auto-refresh

Port	Packets		Bytes		Errors		Drops		Filtered
	Received	Transmitted	Received	Transmitted	Received	Transmitted	Received	Transmitted	Received
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	22982361	9561	1654761482	738219	0	0	0	0	22980713
5	0	1427	0	174097	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0

Recovery:
1. Try reconfiguring and power cycling and the tests will pass.
2. Reboot the S3280-TST or S4xxx.
3. Upgrade your S3280-TST or S4xxx software.

Problem: Several packet sizes fail when running S3280-TST EtherSAT tests at 100% throughput using third-party equipment to generate tests.

Problem: The results of EtherSAT throughout and back to back tests with a third-party tester "failed" because they only did 99.999% (not 100%).

Meaning: A configuration prerequisite exists for running EtherSAT using S3280-TST. Spanning Tree is enabled by default on the S3280-TST. When enabled, the S3280-TST periodically sends Spanning Tree packets on all ports. The spanning tree packets take from the available bandwidth that is needed to pass the test.

Recovery:

1. Disable STP if running "collector" or "initiator" mode on the S3280-TST.
2. Disable Spanning Tree on the S3280-TST for any EtherSAT tests that is running 100% port utilization.
3. Via web GUI: at the **Configuration** > **Spanning Tree** > **CIST Ports** menu path, uncheck the "STP Enabled" checkbox for the related ports.
4. Via CLI: use the "**stp port mode**" command to disable STP for the related ports (e.g., "**stp port mode 1,4 disable**"). Use the "**stp port mode**" command to display the current settings (enabled or disabled).

Note: you may want to disable STP globally, depending on your test configuration and maintenance concerns.

Problem: EtherSAT test packets are sent at the wrong frame rate.

Meaning: Frames are sent at a rate that is ideal for frames 16 bits smaller than configured.

Work-around: For example, if you want to fill a 100Mb link with 80-byte packets, then configure a frame size of 80 bytes and a CIR of 80,000,000 bps. The resulting frame rate should be 125,000 pps, but it's actually 148,810 pps. A 148,810 bps frame-rate would fill a 100 Mbps link with 64-bit frames.

Problem: CIR overhead not included in the EtherSAT throughput test.

Meaning: You can not configure a test to check an array of frame sizes at their maximum possible frame rate. For example, the theoretical maximum bit-rate for 64-bit frames on a 1Gb link is 761,904,762 bps. Setting the CIR to that would test 64-bit frames at 100% line-rate on a 1Gb link, but only push 1518-byte frames to 77% of line-rate. This is a known limitation with the current implementation.

Work-around: To test 1518-byte frames at line-rate on the same 1Gb link, you must run another test with the CIR set to 986,996,098 (i.e., you must set up a new test with a new bit-rate for each frame size and calculate the overhead for each frame size).

Appendix A: Sample EtherSAT Test Report

This appendix provides a sample exported test results to a TFTP server using the CLI command **EtherSAT Test Result Export** <number> <hostname> <file_name>.

System Contact :
System Name : Device74
System Location : TN

Test result for test "SA_Test1_all".
The report was generated on Thu Jan 01 00:13:24 1970

Status: Completed
CBS Line Rate: 1000 Mbps
Target Frame Loss Ratio: 0.00 %
Ingress port: 1
Egress port: 2
Collector's Ingress port: 1
Ingress Encapsulation: C-tagged
Ingress inner VID/PCP: 0/0
Ingress outer VID/PCP: 100/0
Egress Encapsulation: C-tagged
Egress inner VID/PCP: 0/0
Egress outer VID/PCP: 100/0
CIR: 500000000 bps
CBS: 100000 bytes
EIR: 0 bps
EBS: 0 bytes
Yellow Frames PCP Values:
Frame Size Mix: 128
Rate Decrease Step: 90 %
Step Length: 10 sec
Test Mode: bidir
Frame Level: L2
Test Steps: throughput latency flr back-to-back
Last Error: OK

Throughput test results:

Status: Pass
Elapsed Time: 51580 ms

Step	Dir	Frame size (byte)	Actual Tx Rate (bps)	Result
1	NE->FE	128	498113207	pass
2	NE->FE	128	498113207	pass
3	FE->NE	128	498113207	pass
4	FE->NE	128	498113207	pass

Step 1

Direction: NE->FE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 14030 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Test step result: pass

Step 2

Direction: NE->FE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 14030 ms
Tx Frames: 4734848

Rx Green Frames: 4734848
Rx Yellow Frames: 0
Test step result: pass

Step 3

Direction: FE->NE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 11760 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Test step result: pass

Step 4

Direction: FE->NE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 11760 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Test step result: pass

Latency test results:

Status: No Traffic Loss
Elapsed Time: 51580 ms

Step	Dir	Frame size (byte)	Actual Tx Rate (bps)	Result
1	NE->FE	128	498113207	No Traffic Loss
2	NE->FE	128	498113207	No Traffic Loss
3	FE->NE	128	498113207	No Traffic Loss
4	FE->NE	128	498113207	No Traffic Loss

Step 1

Direction: NE->FE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 14030 ms
DM bins:
[0 - 10000] : 99
[10001 - 20000] : 0
[20001 - 50000] : 0
[50001 - 100000] : 0
[100001 - 5000000] : 0
[> 5000000] : 0
DM min/max/avg: 0/0/0 us
DMV bins:
[0 - 10] : 98
[11 - 100] : 0
[101 - 5000000] : 0
[> 5000000] : 0
DMV min/max/avg: 0/0/0 us
Test step result: pass

Step 2

Direction: NE->FE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 14030 ms
DM bins:
[0 - 10000] : 99

```
                [  10001 - 20000  ] : 0
                [  20001 - 50000  ] : 0
                [  50001 - 100000 ] : 0
                [ 100001 - 5000000] : 0
                [       > 5000000] : 0
DM min/max/avg:                 0/0/0 us
DMV bins:
                [      0 - 10     ] : 98
                [     11 - 100    ] : 0
                [    101 - 5000000] : 0
                [       > 5000000] : 0
DMV min/max/avg:                0/0/0 us
Test step result:               pass


Step 3

Direction:                      FE->NE
Frame Size:                     128 byte
Actual Tx Rate:                 498113207 bps
Test step duration:             11760 ms
DM bins:
                [      0 - 10000  ] : 99
                [  10001 - 20000  ] : 0
                [  20001 - 50000  ] : 0
                [  50001 - 100000 ] : 0
                [ 100001 - 5000000] : 0
                [       > 5000000] : 0
DM min/max/avg:                 0/0/0 us
DMV bins:
                [      0 - 10     ] : 98
                [     11 - 100    ] : 0
                [    101 - 5000000] : 0
                [       > 5000000] : 0
DMV min/max/avg:                0/0/0 us
Test step result:               pass


Step 4

Direction:                      FE->NE
Frame Size:                     128 byte
Actual Tx Rate:                 498113207 bps
Test step duration:             11760 ms
DM bins:
                [      0 - 10000  ] : 99
                [  10001 - 20000  ] : 0
                [  20001 - 50000  ] : 0
                [  50001 - 100000 ] : 0
                [ 100001 - 5000000] : 0
                [       > 5000000] : 0
DM min/max/avg:                 0/0/0 us
DMV bins:
                [      0 - 10     ] : 98
                [     11 - 100    ] : 0
                [    101 - 5000000] : 0
                [       > 5000000] : 0
DMV min/max/avg:                0/0/0 us
Test step result:               pass

-------------------------------------------------------------------------------
Frame Loss Rate test results:

Status:                 Pass
Elapsed Time:           51580 ms
Step    Dir     Frame size (byte)   Actual Tx Rate (bps)   FLR (%%)
------  ------  ------------------  ---------------------  --------
  1   NE->FE        128                 498113207          0.00
  2   NE->FE        128                 498113207          0.00
  3   FE->NE        128                 498113207          0.00
  4   FE->NE        128                 498113207          0.00
```

Step 1

Direction: NE->FE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 14030 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Frame Loss ratio: 0.00
Out-of-sequence events: 0
Test step result: pass

Step 2

Direction: NE->FE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 14030 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Frame Loss ratio: 0.00
Out-of-sequence events: 0
Test step result: pass

Step 3

Direction: FE->NE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 11760 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Frame Loss ratio: 0.00
Out-of-sequence events: 0
Test step result: pass

Step 4

Direction: FE->NE
Frame Size: 128 byte
Actual Tx Rate: 498113207 bps
Test step duration: 11760 ms
Tx Frames: 4734848
Rx Green Frames: 4734848
Rx Yellow Frames: 0
Frame Loss ratio: 0.00
Out-of-sequence events: 0
Test step result: pass

Back-To-Back Frames test results:

Status: Pass
Elapsed Time: 55690 ms

Step	Dir	Frame size (byte)	Burst Size (bytes)	Result
1	NE->FE	128	100000	pass
2	NE->FE	128	100000	pass
3	FE->NE	128	100000	pass
4	FE->NE	128	100000	pass

Step 1

Direction: NE->FE

Frame Size: 128 byte
Burst size: 100000 bytes
Test step duration: 11280 ms
Tx Frames: 4736616
Rx Green Frames: 4736616
Rx Yellow Frames: 0
Frame Loss ratio: 0.00 %
Test step result: pass

Step 2

Direction: NE->FE
Frame Size: 128 byte
Burst size: 100000 bytes
Test step duration: 11280 ms
Tx Frames: 4736616
Rx Green Frames: 4736616
Rx Yellow Frames: 0
Frame Loss ratio: 0.00 %
Test step result: pass

Step 3

Direction: FE->NE
Frame Size: 128 byte
Burst size: 100000 bytes
Test step duration: 11250 ms
Tx Frames: 4736616
Rx Green Frames: 4736616
Rx Yellow Frames: 0
Frame Loss ratio: 0.00 %
Test step result: pass

Step 4

Direction: FE->NE
Frame Size: 128 byte
Burst size: 100000 bytes
Test step duration: 11250 ms
Tx Frames: 4736616
Rx Green Frames: 4736616
Rx Yellow Frames: 0
Frame Loss ratio: 0.00 %
Test step result: pass

Frame format:

Level: L2
Encapsulation Type: ETH-TST
Filling Mode: PRBS
Frame Payload Pattern: 0x00000000
Custom EthType: 0x0000
LLC/SNAP OUI: 00-00-00
LLC/SNAP Protocol: 0x0000
SOAM MEG Level: 5

Appendix B: Configuration Model Details

The EtherSAT tests provided by the S3280-TST (or S4xxx) are used to validate that a newly established end-to-end service has been properly configured and that it meets the required SLA. The tests typically run before the service is delivered to the customer.

From a configuration model perspective, the EtherSAT tests are modeled by two entities:

a) The EtherSAT test profile, and
b) The EtherSAT test record.

EtherSAT Test Profile

An EtherSAT test profile is a passive record that contains the attributes common to the RFC tests.
A 'Profile' is basically a 'Test' that is saved and re-used, saving the time it takes to repeatedly configure a test with the same parameter settings. EtherSAT profiles can be modified or deleted only if they are not in use by the EtherSAT test record.

An EtherSAT profile contains the following attributes:

a) Profile ID in the range 1-16 alphanumeric characters.
b) Profile name, up to 32 alphanumeric characters.
c) Acceptable frame loss ratio (expressed in the percentage in the range of 0.00–100.00).
d) Line rate at which burst traffic should be sent for the Back-to-Back frames test. This parameter should be the lowest line rate available on the paths between the Initiator and Collector NIDs.
e) Test frame sizes. The frame sizes sequence may include up to 10 frame sizes. The same frame size should not appear more than once in the sequence. The frame sizes should be ordered from the smallest to the largest. The available frame sizes are discussed on page 8 below.
f) Frame format and frame payload pattern for the tests, based on the rules discussed in "Commands" on page 51. The Layer 2 and Layer 3 frame formats are supported.
g) Rate decrease step size, in percentages. The valid range is 10%–90%. The default value is 25%. This attribute is used to repeat a failed test step with a lower traffic rate. See "4. Web Interface" on page 26.
h) Rate step length, in seconds. The valid range is 10 –300 seconds. The default value is 10 seconds.
i) Yellow PCP list.
j) Nine DM thresholds in microseconds that define 10 DM bins as follows:
   - DM bin 0 - Number of DM packets received with frame delays <= DM threshold 0.
   - DM bin 1 - Number of DM packets received with a delay:
     DM threshold 0 < Delay <= DM threshold 1.
   - …
   - DM bin 9 - Number of DM packets received with a delay:
     Delay > DM threshold 8.
k) Nine DMV thresholds in microseconds that define 10 DMV bins as follows:
   - DMV bin 0 - Number of DM packets received with frame delay variations <= DMV threshold 0.
   - DMV bin 1 - Number of DM packets received with a delay variation:
     DMV threshold 0 < Delay Variation <= DMV threshold 1.
   - …
   - DMV bin 9 - Number of DMV packets received with a delay variation:
     Delay Variation > DMV threshold 8.

l) Test steps (the Throughput test, Latency test, Back-to-Back test, or Frame Loss test) to be executed as part of the EtherSAT testing. This attribute indicates, for each of the test steps, whether they are included in the testing. By default, all the test steps are included. Since the Latency test is not a separate test, it is always assumed that the Throughput test will be executed instead with a DM/DMV results calculation.

The following parameters describe the general behavior of the test:

m) Directionality of the tests: uni-directional, bi-directional, or loopback:
   a. Uni-directional tests are executed in one direction only: from the originator toward the peer.
   b. Bi-directional tests are executed independently from both directions, using the same set of SLA target parameters and bandwidth attributes.
   c. Loopback test traffic is initiated from the local end, with the expectation that the far end will simply loop back the traffic and swap the source MAC address with the destination MAC address, and all measurements will be performed at the near end. No peer communication protocol is used in this case, and target Test MAC address must be provided in the EtherSAT Test record.

EtherSAT Test Frame Sizes

The EtherSAT tests support any frame size from 64 - 9600 bytes (64-10056 bytes on S4140), in increments of 4 bytes. The sizes do not include any VLAN tagging, but include the CRC, per the standard. The FPGA calculates the frame sizes as being without the CRC field. So when you specify a 64-byte frame and traffic is single-tagged, the actual frame size configured in the FPGA will be the same 64 bytes (include 4 bytes for the C-VLAN tag, but minus 4 bytes for CRC). Similarly, if traffic is untagged, the actual size in the FPGA will be 60 bytes. If traffic is double-tagged, the actual size in the FPGA will be 68 bytes.

For a particular test, you may choose any combination of up to 10 sizes in the sequence.

Frame Encapsulations and Format

Different packet formats may be used for the test frames. The frame format is defined by these attributes:

a) L2 or L3 frame (the default is L2)
b) Header encapsulations
c) Payload filler

The tests can support either L2 or L3 frames, as described below.

L2 Frames

The EtherSAT module is configured with a Test MAC address, unique per NID. The Test MAC address is different from the MAC addresses that are used by the physical ports or from the Management MAC address.
L2 frames use this Test MAC address as the source address, and use the Test MAC address of the destination NID as the destination MAC.

The L2 frames have a VLAN encapsulation specific to the service under test. Untagged, single-tagged, and double-tagged frames are supported.

The remainder of the frame (after the inner C-VLAN tag) can support the following formats:

a) An ETH-TST frame.
b) An ETH-TST frame with a customized EthType. This option lets you specify a different EthType (other than 0x8902) for the frame, but the remaining frame format is the same as for the ETH-TST frame. This option should be used when intermediate devices on the network may capture SOAM frames based on the EthType and do further determination only in the slow path. Such devices will undermine the results of high-capacity tests.
c) An LLC/SNAP-based encapsulation, using user-provided OUIs and a protocol identifier.

Note that internally the frames have a sequence number field used for the out-of-order counters. However, the location and identification of this field is not reported.

L3 Frames
The test frames may use L3/L4 (UDP/IP or TCP/IP) encapsulation. The frames use the Test MAC address of the originating NID as the source address and the Test MAC address of the destination NID as the destination MAC, and have a VLAN encapsulation specific to the service under test.

The following header fields are configurable:

IP headers:
- Destination IP address
- Source IP address
- DSCP (default 0)
- ECN (default 0)
- Flags (default 0)
- TTL (default 64)
- Next protocol – UDP or TCP (default UDP)

UDP headers:
- Source port (default 0)
- Destination port (default 0)

TCP headers:
- Source port (default 0)
- Destination port (default 0)
- Sequence number (note that the sequence number is NOT incremented in transmission) (default 16)
- ACK number (default 16)
- Flags (default SYN/ACK)
- Window size (default 16)
- Urgent Pointer (default 0)

All the other fields, such as the header checksums, are filled in by the software.

Payload Filler
You can specify how the remainder of the packet (after the configured headers) will be filled, up to the maximum frame size for the test.

The following payload fillers are supported:
- **PRBS** (pseudo-random bit stream) pattern.
- **Fixed** pattern (4 octets). The pattern value is defined in a separate 32-bit FPGA register.

EtherSAT Test Record

An EtherSAT test record contains test-specific attributes (ingress VLANs/PCPs, target device identification, the most recent test results). The EtherSAT Test record binds an EtherSAT profile to a specific ingress traffic flow and bandwidth parameters.

Test Attributes

An EtherSAT test record contains the following attributes (only one test record can be in the system):

a) Test name of up to 32 characters.
b) An EtherSAT profile reference.
c) Ingress port. The test frames are generated by the FPGA and processed by the S3280-TST"as if" real frames are received on a specified ingress port. The frames received on the actual ingress port for the CVID under test will be dropped while the test is running.
d) Egress port. This parameter indicates the network port from which the test frames will be sent. This value is 'read-only' and is taken as an NNI port from the corresponding EVC record. The EVC record is taken from the ECE record for which the UNI port is the same as the Test Ingress port and VLAN-ID value is the same as the Ingress C-VID.
e) Ingress encapsulation: Untagged/C-Tagged/CS-Tagged/CC-Tagged.
f) Egress encapsulation: Untagged/C-Tagged/CS-Tagged/CC-Tagged.
g) If frames are tagged, the Ingress CVID/PCP on which the test will be executed. The default PCP value is 3.
h) If frames are double-tagged, the Ingress outer tag VID/PCP.
i) If frames are tagged, the Egress CVID/PCP on which the test frames will be sent from the peer NID to the user. By default, these values are the same as ingress values.
j) If frames are double-tagged, the Egress outer VID/PCP.
k) Management IP of the peer NID.
l) Bandwidth profile parameters: CIR, EIR, CBS, and EBS.
m) Target Test MAC address for the Loopback test.

Only one EtherSAT test record may be configured in the device.

Test Status

The status of an EtherSAT test is a run-time attribute that can be:

(a) **None** (the test has never been run since the device or service was brought online).
(b) **In progress**.
(c) **Failed**.
(d) **Unable To Run** (the requested test cannot be executed, for example, a problem with the connection to the peer NID).
(e) **Aborted** (due to a manual stop request).
(f) **Completed** (all the test steps in the EtherSAT test have passed).
(g) **Unknown** (This state indicates the test result state is currently unknown).

Individual tests display specific results (e.g., the Latency test can display **Traffic Loss**, **No Traffic Loss**, **Not tested**, or **Fail to execute**).

Test Start/Test Stop

You can start an EtherSAT test or stop an EtherSAT test in progress. A stopped test is moved into an "aborted" state. Any step that is in progress when the user stops a test will complete the rest of its configured duration before stopping (e.g., if the test length is configured to 300 seconds (5 minotes), and you stop the test 30 seconds into the test, it will continue to run for 4.5 minutes (270 seconds) before stopping.

Identification of the Peer NID

For the purposes of EtherSAT tests, the peer NIDs are identified by their Management IP address.
Note: The management IP address is used only for the control protocol between the near end and far end, and NOT for the test traffic.

EtherSAT Test System-Level Configuration

At the system (NID) level, EtherSAT tests are managed through the following configuration attributes:

a) Enable/disable EtherSAT collector role. A NID can enable or disable acceptance of EtherSAT requests initiated by a far end NID. If this attribute is changed to "disabled" while remotely initiated EtherSAT tests are in progress, all existing tests are dropped.
b) Test MAC address that will be used as the source MAC for test frames.
c) MEG level for ETH-TST/1DM frames.
d) Enable/disable the peer communication protocol. If this attribute is disabled, a NID is unable to support unidirectional and bidirectional EtherSAT tests (both as Initiator and Collector) since it cannot communicate with the far end. Only loopback tests can be executed in this case.

The following status and read-only attributes are exposed to the user:

a) The list of remotely initiated tests. Each entry in the list includes:
   - The IP address of the originating NID.
   - The local VLANs ID of the service under test.
   - The local PCPs of the service under test.
   - An indication of whether the test is unidirectional or bi-directional.

EtherSAT Test Report

After the completion of each test, a test report will be generated. The last test report is kept and can be retrieved until a new test begins. See "Appendix A: Sample EtherSAT Test Report" on page 119 for a sample test report.

The test report contains full details of the EtherSAT profile used at the time of the test, including:

a) An overall test result (completed, failed, aborted, or none).
b) For each individual test step, the test report includes a qualitative (and sometimes quantitative) test result. (See section "4. Web Interface" on page 26 for a full description of the test steps.)
c) Details about the ingress CE-VLAN, ingress PCP, egress CE-VLAN, and egress PCP.

Test Results for the Throughput Test

The test report for the Throughput test contains the following information:

a) Pass/fail result (***fail NE***, or ***fail FE***, or ***fail NE&FE***)
b) Total elapsed time
c) For each frame size and rate step, in each of the tested directions, indicate:
   - Frame size.
   - The actual rate for the step.
   - The test step duration.
   - Transmitted Frames (calculated from the configured test duration, rate, and frame size).
   - Received Green and Yellow Frames (calculated from PCP counters).
   - Test step result: pass or fail.

The step results are ordered by frame size first and then by transmitted rate. The order of the frame sizes is the same as the one that was specified in the EtherSAT profile:

Frame size: 64, rate: 1000000000 bps, …
Frame size: 64, rate: 500000000 bps, …
Frame size: 512, rate: 1000000000 bps, …
Frame size: 512, rate: 500000000 bps, …

Test Results for the Latency Test

The test report for the Latency test contains the following information:

a) Pass/fail result (***No Traffic Loss*** or ***Traffic Loss***)
b) Total elapsed time
c) For each frame size and throughput rate, in each of the tested directions, indicate:
   - Frame size.
   - Rate for the step.
   - The test step duration.
   - Counters for the 10 DM and 10 DVM bins.
   - Test step result: pass or fail.

Test Results for the Frame Loss Test

The test report for the Frame Loss test contains the following information:

a) Pass/fail result (*fail NE*, or *fail FE*, or *fail NE&FE*)
b) Total elapsed time
c) For each frame size and rate step, in each of the tested directions, indicate:
   - The actual rate for the step.
   - Frame size.
   - The test step duration.
   - Transmitted Frames (calculated from the configured test duration, rate, and frame size).
   - Received Green and Yellow frames (calculated from PCP counters).
   - Calculated frame loss ratio (see the "EtherSAT Test Commands" or "Configuration > Service Activation > Tests" for details).
   - Out-of-sequence events counter.
   - Test step result: pass or fail.

The step results are ordered by frame size first and then by transmitted rate. The order of the frame sizes is the same as the one that was specified in the EtherSAT profile:

Frame size: 64, rate: 1000000000 bps, …
Frame size: 64, rate: 500000000 bps, …
Frame size: 512, rate: 1000000000 bps, …
Frame size: 512, rate: 500000000 bps, …

Test Results for the Back-to-Back Test

The test report for the Back-to-Back Frames test contains the following information:

a) Pass/fail result (*fail NE*, or *fail FE*, or *fail NE&FE*)
b) Total elapsed time
c) For each Burst size step, in each of the tested directions, indicate:
   - The actual rate for the step.
   - Frame size.
   - The test step duration.
   - Transmitted Frames accounting for the Burst traffic (calculated from the configured test duration, rate, and frame size).
   - Received Green and Yellow frames (calculated from PCP counters).
   - Calculated frame loss ratio (see chapter 3.4 for details).
   - Test step result: pass/fail
   - Burst size in bytes. See the "(see the "EtherSAT Test Commands" or "Configuration > Service Activation > Tests" for details.

Relationship to the Y.1564 SAM Tests

This table is for information purposes only.

Table 2. Relationship between EtherSAT Tests and Y.1564 SAM Tests

EtherSAT test	Equivalent Y.1564 SAM test
Throughput test (Use EIR + CIR as a target throughput)	CIR Step test: use CIR +EIR as a target throughput (without Frame Delay/FDV criteria)
Latency	CIR Step test with latency reporting (displays only latency reports)
Frame Loss Rate (Use EIR + CIR as a target throughput)	CIR test: If it is not required to specify the largest frame loss gap (that is, rely on the sequence number to report how many consecutive frames have been lost)
Back-to-Back Frames	CBS test: With an incremental decrease of the length of a burst.

EtherSAT Test Mechanisms

Deployment Scenarios

This section describes the implementation of the EtherSAT procedures discussed above.

The EtherSAT tests can run between:

a) Two peer S3280-TST or S4xxx devices (Figure 1 below).

b) An S3280-TST or S4xxx device as the Generator (Initiator) and a third-party device as the Loopback (Reflector) (Figure 2 below). In this case, it is assumed that the far end (the third-party device) is able to execute a loopback with the MAC swap procedures on a specified VLAN.

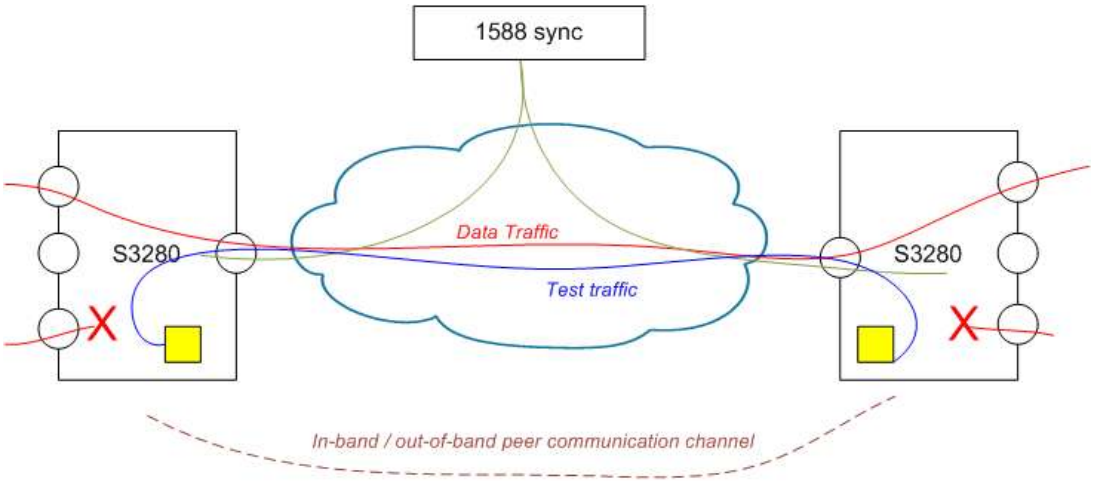


Figure 5. EtherSAT Test between Two S3280-TST NIDs

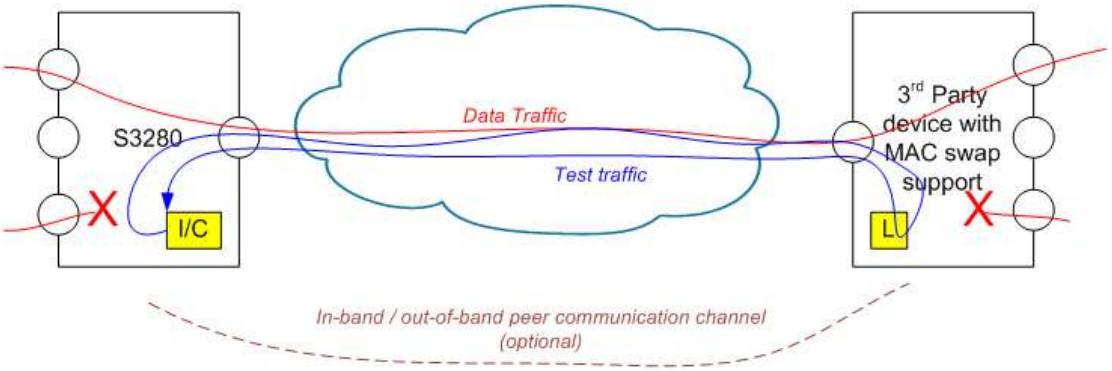


Figure 6: EtherSAT Test between an S3280-TST NID and a Third-party Device

NID Roles: Generator, Collector, and Loopback

Within the EtherSAT tests a NID can be either the *Generator* (in the sense that it originates an EtherSAT test), or the *Collector* (in the sense that it becomes the peer of an originator NID). Note that the roles are specific at the service level. In other words, a NID can be the Initiator in relation to a particular service, while being the Collector for another service.

A NID can be the Generator and Collector for the same service at the same time during the Loopback test.

There is a system-level flag to enable or disable the Collector role for the NID. If the Collector role is disabled, the NID will not accept EtherSAT test requests from a far-end NID. If the Collector role is enabled, the NID displays the CE VLANs for which it acts as the Collector.

A *Loopback* NID that is in VLAN loopback mode cannot act as the *Generator*, and the other way around.

Otherwise a one system-level flag to enable or disable a peer communication channel is implemented:

- If enabled, the NID can support EtherSAT tests.
- If disabled, the NID is unable to support an EtherSAT test either as the Generator or the Collector; only Loopback mode is supported in this case since it does not use the communication channel.

Only one test can be executed on a NID, either as the Collector or Initiator.

Processing in loopback mode – no peer protocol: The loopback mode test requires that the far end be in the MAC/VLAN loopback mode, so the far end device is provisioned in loopback mode out of band (i.e., manually by the operator). Since no communication messages are used in this mode, neither handshake nor “Test Start” messages are sent to the far end. The destination Test MAC address must be specified in the EtherSAT Test profile. Upon beginning of the test, all statistics counters to be used as a baseline will be read for the service under test before traffic generation begins. The NID begins generating traffic and collecting statistics in parallel; that is, it performs the Initiator and Collector roles at the same time. Upon completion of the frame transmission, the near end compares the local statistics counters with the expected results and declares the test step as pass or fail.

Bi-directional tests: The bi-directional tests require that the far end initiate the same procedure in the reverse direction. In other words, test frames are sent from the far end towards the near end, and the statistics collection is performed at the near end.

The tests are still “owned” by the near end; to avoid deadlocks, the far end simply executes the requests initiated by the near end.

The near end sends a “Test start” message, upon receiving “Ack” from the far end the near end will read the counters to be used as a baseline (since the counters are not clear on read [5]), and begin a statistics collection cycle. The far end sends the requested traffic, using its own SAT engine in the FPGA. After the traffic generation is completed, the far-end sends its results to the near end (transmitted frames counter, an error indication if any). Upon receipt of the test results, the near end finishes statistics collection and processes the test results. Based on those results, the near end declares the test passed or failed.

Delay Measurement Procedures

The EtherSAT Latency test requires Delay Measurement (DM) and Delay Variation Measurements (DVM) to be conducted in parallel to the throughout traffic. The FPGA engine executes DM and DVM as following:

a) Test frames are interleaved with DM frames (Y.1731 1DM-like frames) for the same VLANs and PCPs as the test traffic. Note that a DM frame may be encapsulated into an IP header, if the test frame format is L3. The rate of DM frames is fixed, roughly one every 100ms (expressed in a number of consecutive test frames after which a DM frame is inserted).
b) The DM results are collected into the 10 DM bins and 10 DMV bins.
c) The DM frame size should be the same as the test frame size (between 64 and 9600 bytes.

There is no dedicated DM module required in the software. Upon beginning of the test, the FPGA is configured for both the test traffic generation and the DM procedures.

Currently, the “MEP” module configures a filter for SOAM (by EthType 0x8902) packets, so to enable the S3280-TST to forward 1DM/ETH-TST frames to the FPGA port, a new ACL rule must be added to redirect SOAM frames to the FPGA port with a given Ethtype and a Destination MAC, which is the same as the local NID Test MAC address.

Clock synchronization: IEEE 1588-based clock synchronization must be running on the S3280-TST. The 1588 packets are sent periodically (every 5 minutes) from the internally when the tests are not running. Frame encapsulation is L2 with EthType 0x88F7 and Broadcast Destination MAC. The PTP message type is “SYNC”. Only the originTimestamp field is actual.

Peer Protocol

The EtherSAT test record in the Initiator identifies the target S3280-TST for each test by using the target device’s Management IP address. So in order to establish communication, both devices (the Initiator and the Collector) must have the Management IP address enabled on the S3280-TST and similar VLAN tag encapsulations for management traffic. Management traffic must have a VLAN-ID other than the VLAN-ID under test.

Both devices must see each other by the Management IP; the Initiator must be able to ping its Collector by the Management IP address (in-band or out-of-band). For each test, the peer devices exchange the following information necessary to identify the service under test:

- The Test MAC address of the unit (must NOT be used by the port), which will be used as the Source and Destination MAC addresses for test frames.
- The Ingress CE VLAN ID (at the Initiator) and Egress CE-VLAN ID (at the Collector), as well as the ingress PCP and egress PCP.

Other parameters are exchanged for individual tests.

Test MAC Address

There is a Test MAC address available for testing purposes; a system MAC address that is not in use by a port is used.

Peer Protocol Encapsulation

The SA module is ‘agnostic’ about peer protocol encapsulation; it only forwards and receives protocol data that can be carried over any encapsulation type and communication method. For the current release, the communication is implemented via TCP/IP messages. This means that on each S3280-TST, a Server task will be executing that listens for incoming connections from the Initiator (if a peer protocol is enabled by the configuration) on a specific TCP port. The TCP port number should be 23040. When a test starts, a new connection is established between the two 3280-TSTs, and a new task is created to handle that connection. This new task runs only for the duration of the EtherSAT test.

Appendix C: Service, Warranty & Compliance

Service

See the "Service" section in the online device User Guide manual for regulatory agency compliance information.

Warranty

See the "Warranty" section in the online device User Guide manual for regulatory agency compliance information.

Compliance Information

See the "Compliance Information" section in the online device User Guide manual for regulatory agency compliance information.

Cautions and Warnings

Definitions

Cautions indicate that there is the possibility of poor equipment performance or potential damage to the equipment. Warnings indicate that there is the possibility of injury to a person.

Cautions and Warnings appear here and may appear throughout this manual where appropriate. Failure to read and understand the information identified by this symbol could result in poor equipment performance, damage to the equipment, or injury to persons.

See "Electrical Safety Warnings" in the online device User Guide manual for Electrical Safety Warnings translated into multiple languages.

Glossary of EtherSAT Terms

This section describes many of the terms and mnemonics used in this manual. Note that the use of or description of a term does not in any way imply support of that feature or of any related function(s). See the related User Guide for descriptions of terms other than these related to EtherSAT.

CIR
(Committed Information Rate) the Bandwidth Profile parameter that defines the average rate in bits/s of Frames at an EI up to which the network delivers Frames, and is committed to meeting the performance objectives defined by the CoS Service Attribute.

Color Mode (CM)
Per MEF 33, a Bandwidth Profile parameter. The Color Mode parameter indicates whether the color-aware or color-blind property is employed by the Bandwidth Profile. It takes a value of “color-blind” or “color-aware” only. In color aware mode, a pre-determined level of Bandwidth Profile compliance for each Service or ENNI Frame is taken into account when determining the level of compliance for each Service Frame.

Color Identifier for Service Frame (UNI)
Per MEF 33, the mechanism and/or values of the parameters in the mechanism used to identify the Color that applies to the frame at a given UNI. A particular Color ID value may indicate Color instance of Green or Yellow for a Service Frame. PCP and DSCP may indicate both CoS Name and Color. Information derivable from a) a set of one or more C-Tag PCP values or b) a set of one or more DSCP values.

DM
Delay measurement.

DMV
Delay measurement variation.

DUT
Device under test.

EBS
(Excess Burst Size) a Bandwidth Profile parameter that limits the maximum number of bytes available for a burst of Frames sent at the EI speed to remain EIR-conformant.

EIR
(Excess Information Rate) a Bandwidth Profile parameter that defines the average rate in bits/s of Frames up to which the network may deliver Frames but without any performance objectives.

Far-end device
The peer NID device where traffic is counted and/or optionally looped back. AKA “FE device”. Contrast “Near End device (NE)”.

FLR
(Frame Loss Ratio) a measure of the number of lost frames between the ingress UNI and the egress UNI. Frame Loss Ratio is expressed as a percentage. See MEF 10.2 19, 10, 14, and 15. FLR is replaced by “Frame Loss Ratio Performance” in MEF 10.2.

FPGA
A field-programmable gate array (FPGA) is an integrated circuit designed to be configured by a customer or designer after it is manufactured.

Frame Delay
The time required to transmit a Service Frame from ingress UNI to egress UNI. Note: Replaced by “Frame Delay Performance” in MEF 10.2. See MEF 6.1, 10.1, 19, 10, 14, and 15.

Frame Delay Performance
A measure of the delays experienced by different Service Frames belonging to the same CoS instance. Refer to MEF 10.2, 14, 15, and 19.

Frame Delay Range
The difference between the Frame Delay Performance values corresponding to two different percentiles.

Frame Delay Range Performance
A measure of the extent of delay variability experienced by different Service Frames belonging to the same CoS instance.

Frame Loss Ratio Performance
Frame Loss Ratio is a measure of the number of lost frames between the ingress UNI and the egress UNI. Frame Loss Ratio is expressed as a percentage. See MEF 10.2.

Near-end device
The NID on which a test operation is initiated by the user. AKA “NE device”. Contrast “Far End device (FE)”.

RFC 2544
IETF de facto methodology that outlines the tests required to measure and to prove performance criteria for carrier Ethernet networks. It provides an out-of-service benchmarking methodology to evaluate the performance of network devices using throughput, back-to-back, frame loss and latency tests. Each standard test validates a specific part of a SLA. See http://www.ietf.org/rfc/rfc2544 for specifics.

EtherSAT Test Setup
The ideal way to implement this series of tests is to use a tester with both transmitting and receiving ports. Connections are made from the sending ports of the tester to the receiving ports of the DUT and from the sending ports of the DUT back to the tester. Since the tester both sends the test traffic and receives it back, after the traffic has been forwarded but the DUT, the tester can easily determine if all of the transmitted packets were received and verify that the correct packets were received. The same functionality can be obtained with separate transmitting and receiving devices but unless they are remotely controlled by some computer in a way that simulates the single tester, the labor required to accurately perform some of the tests (particularly the throughput test) can be prohibitive. Note that two different setups could be used to test a DUT which is used in real-world networks to connect networks of differing media type, local Ethernet to a backbone FDDI ring for example. The tester could support both media types. Two identical DUTs are used in the other test set up. Frame sizes to be used for Ethernet are 64, 128, 256, 512, 1024, 1280, and 1518. These sizes include the maximum and minimum frame sizes permitted by the Ethernet standard and a selection of sizes between these extremes with a finer granularity for the smaller frame sizes and higher frame rates.

RFC 3544
IETF standard that defines a specific set of tests that vendors can use to measure and report the performance characteristics of network devices. The results of these tests provide comparable data from different vendors with which to evaluate these devices.

SLA
Service Level Agreement; initially defined in MEF 2. See also MEF 3, 6.1, 7, 10.2, 14, 15, 17, and 19.

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