Ultra Ethernet
Test Bed Recommendations

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Revision History

Revision	Author	Date	Change Description
0.9	Cliff Tavares	May 16, 2025	Captures the testbed presentation made in the UEC Face to face meeting in Denver. And extracted from the CT Overview to make this section more generally accessible.
0.93	Pinaki Chakrabarti	June 4, 2025	Updated based on TAC feedback - Defined UEC device and Test API - Removed section 2.4, once Congestion checklist is ready, will be revisited - Updated the recommended features of Test-Port for NIC-tests - Added table-2.2 with role of test port for NIC tests - Removed the sample Emulated topology picture
1.0	Pinaki Chakrabarti	June 10, 2025	Formatting change

1 Introduction

This document provides best practice recommendations for jigs and testbeds used in testing for UEC specification compliance. Refer to the published Compliance and Test Profile Matrices and Compliance Checklist documents for the test specifications.

1.1 UET Specific Terminology/Acronyms

Table 1-1 CT Terminology

| Term	Description
Device API	UEC device configuration API, e.g. SAI / Libfabric / libverbs Management configuration API, e.g. redfish Refer to the recommendations from the UE Management working group for more details.
Test API	APIs used to configure the test tool / port
Test Port	Acts the **entry and exit point for traffic** during a compliance test. It allows the tester to **simulate real network conditions**, **measure DUT performance**, and **verify conformance to standards**.
UEC Device	NIC/ Switch Devices compliant to UEC specification.
Fabric End Point (FEP)	A logically addressable entity with a single (assigned) FA. The UEC transport protocol, including the optional security context, terminates at a FEP. A FEP connects to a Fabric using a port and can only be used by a single OSI.

1.2 Scope

The recommendation articulates considerations for the testing of the UE Link, PHY, and parts of the Transport layers. API for setup and tear down are out of scope. Refer to API recommendations from the UE Management Working Group specifications.

Interoperation, system [e.g. stress & scale], and performance testing is out of the scope of this recommendation.

# 2 Recommendations for Test Bed and Instrumentation

2.1 Testbed Topology

This is a generic representation of a testbed used to test UE Devices [NICs, Switches] for compliance. The test instruments may consist of Software Test Ports or Hardware accelerated Test Ports [for UE features that need line rate or high precision measurements].
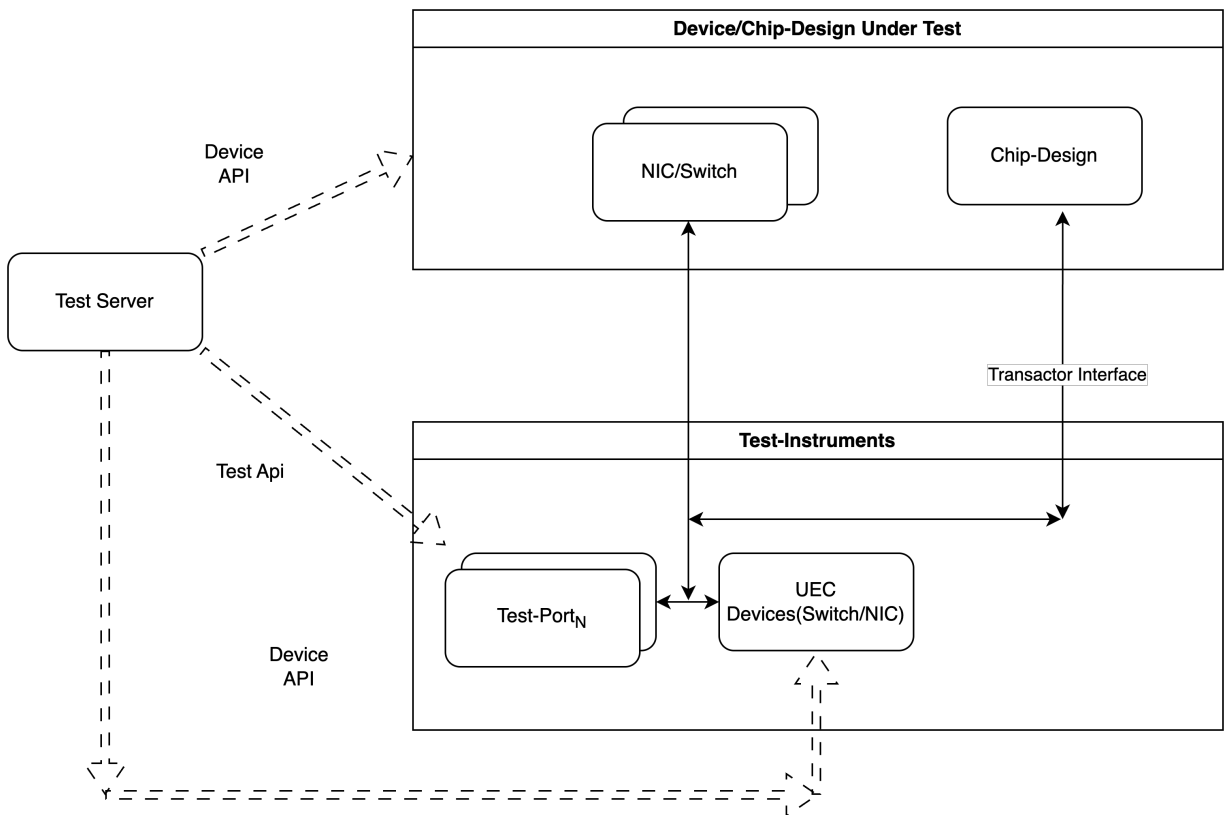
Figure 2-1 – Generic representation of a testbed

2.2 Switch test
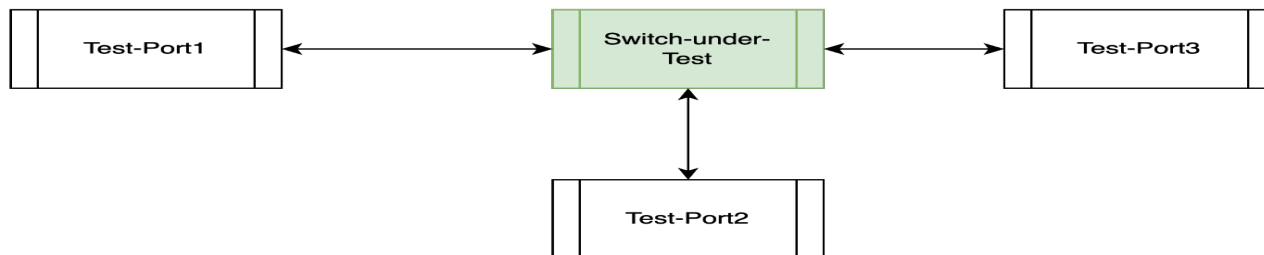
Figure 2-2 – Testbed for Switch Testing

This topology would allow for the testing of UE PHY, Link layers as well as the trimming functions.

Feature	Role of Test-Port1	Role of Test-Port2	Role of Test-Port3
PHY	Link partner for Link establishment Drive Traffic	Validate the Traffic	Inactive
LLDP [in conjunction with LLR or CBFC]	LLDP peer Validate configuration with traffic	Drive Traffic	Inactive or Drive Traffic
LLR	LLR peer Drive Traffic	Validate the Traffic	Inactive
CBFC	Queue setup Drive Traffic towards Test-Port3 [create congestion] Validate the backpressure	Queue setup Drive Traffic towards Test-Port3 [create congestion] Validate the backpressure	Validate Traffic
Trimming	Drive Traffic towards Test-Port3 [create congestion]	Drive Traffic towards Test-Port3 [create congestion]	Validate Traffic [check for trimmed packet]

Table 2-1 Role of test ports in Switch Testing

Note that from a test perspective it is encouraged for implementors to allow LLR and CBFC to be enabled through management without the use of LLDP. This will separate any dependencies/failures in LLDP to impact LLR or CBFC testing.

Recommended Features of Test Ports

- Line rate capture and analysis
- PCS [CtlOS] and Preamble Capture capability
- Error injection
- Drive and process line rate flows
- Generate traffic, packet and payload mixes

Depending on the capability/features of the Switch, some compliance tests could be performed using a single Test-Port.

2.3 NIC test

Test-Port1 ←→ NIC-Under-Test

Figure 2-3 – Testbed for NIC testing

This topology would allow for the testing of the UE Transport SES, PDS, trimming, and congestion functions and aspects of UE PHY and Link layers.

Feature	Role of Test-Port1
PHY	Link partner for Link establishment
	Drive Traffic
LLDP [in conjunction with LLR or CBFC]	LLDP peer
	Validate configuration with traffic
LLR	LLR peer
	Drive Traffic
CBFC	Queue setup
	Drive Traffic
	Validate the backpressure
PDS	PDC Endpoint
	Drive and Analyze UET traffic
	Simulate congestion by ECN Marking, Trimming, Delaying, Dropping UET packets.
Trimming	Work in Progress
SES	Will be added in future
Congestion	Will be added in future
Security	Will be added in future

Table 2-2 Role of test port in NIC Testing

Recommended Features of Test Ports

- Line rate capture and analysis
- PCS [CtlOS] and Preamble Capture capability
- Error injection in Link/PHY/Transport
- Drive high speed UET Traffic, capture and analysis
- Orchestrate UET Flows
- Emulate a network consisted of multiple NICs and switches
- Mimic a switch behavior by introducing delay, updating ECN bits, trimming and dropping packets