

Test the Resiliency of your 5G RAN Fronthaul Solution

The Xena E100q Chimera Network Emulator is a user-friendly and cost-efficient solution for testing the resiliency and performance of 5G networks.

High stakes in 5G means more focus on pre-service testing

5G is being deployed across the globe putting mobile operators under pressure to deliver. According to GSMA Intelligence, mobile operators plan to invest \$620 billion in their networks between 2022 and 2025, and 85% of this will be 5G related. There is little room for error or delays.

The number of Radio Units (RUs) required for 5G is far greater than to 4G, meaning 5G RAN will account for a higher proportion of overall deployment costs than in the past. This is causing some mobile operators to consider sharing RAN costs.

To ensure they can meet Service Level Agreement (SLA) requirements when sharing RAN investments, mobile operators must exhaustively test their RAN solutions before deployment to guarantee performance and resilience.

Vendors of 5G chips, equipment and solutions need to prove their products can meet the demands of 5G mobile operators. Impairment solutions let them test products under extreme scenarios before they are deployed.

Preparing for extreme 5G RAN scenarios with impairment testing

5G needs to support a broad variety of services with individual quality of service requirements. Ultra-low latency requirements are a particular challenge as strict timing and synchronization performance are critical.

As shown in Figure 1, 5G Open RAN allows virtualized Central Units (CUs) and Distributed Units (DUs) to be instantiated either closer to the core for efficiency or closer to the edge for latency-sensitive services. This results in a highly dynamic environment and multiple potential scenarios to be tested.

1. Source: [GSMA | The Mobile Economy - The Mobile Economy](#)

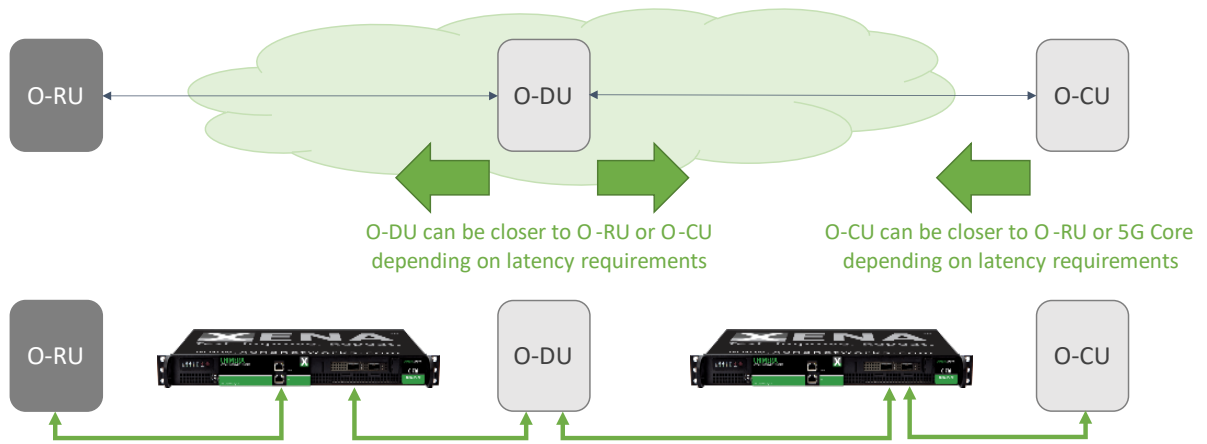


Figure 1: Stand-alone E100q Chimera solution emulating 5G Fronthaul Network

Modern impairment testing solutions, like the E100q Chimera, emulate network conditions in the lab, such as degrading performance with higher jitter, latency, and packet loss to injecting packets to simulate errors. This ensures that behavior under these conditions can be observed and managed before the products are delivered or installed. By documenting impairment testing results, vendors can give mobile operators the assurance they need that the 5G solution is mature and ready for deployment at a fraction of the cost and time.

E100q Chimera 5G RAN impairment testing

E100q Chimera is available as a stand-alone impairment tool or as a test module that integrates seamlessly with Xena Traffic Generators, letting you speed up your workflow by using the same test system to both generate and impair Ethernet traffic.

The E100q Chimera provides true wire-speed impairment at speeds of 10, 25, 40, 50 and 100 GbE. It also provides the highest port density in the industry with the ability to reserve port-pairs without blocking access to other ports.

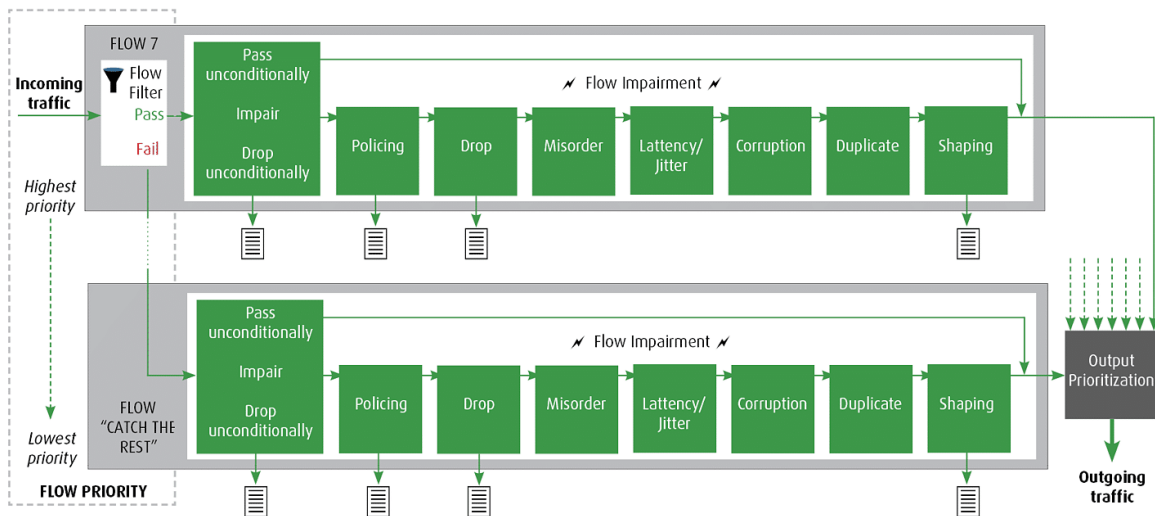


Figure 2: Xena E100q Chimera Impairment Solution

The E100q Chimera makes it easy to add a broad range of impairments to incoming traffic to emulate various conditions. Each traffic flow is prioritized and processed in order of priority, as shown in Figure 2.

The E100q Chimera also includes a Command Line Interface (CLI) for automated scripting supporting multiple concurrent sessions. In addition to CLI, Xena OpenAutomation (XOA) provides native support for 5G O-RAN test cases, enabling easy integration into third party test systems or automated test environments.

E100q Chimera supports O-RAN test cases

The E100q Chimera allows a broad range of 5G RAN test cases that can be automated for concurrent testing. The test system creates network impairments so test engineers can monitor how the network equipment or applications perform and respond. This can be used to test virtual functions, like CUs and DUs, and their performance under various conditions.

O-RAN Alliance mention in their specifications O-RAN.TIFG.E2E-Test.0-v03.00¹ and O-RAN.WG5.IOT.0-v05.00² the use of network impairment emulators for effective testing. Some of the test cases in O-RAN.TIFG.E2E-Test.0-v03.00 using impairment testing are

- 5.11 Impact of fronthaul latency on downlink peak throughput
- 5.12 Impact of fronthaul latency on uplink peak throughput
- 5.13 Impact of mid-haul latency on downlink peak throughput
- 5.14 Impact of mid-haul latency on uplink peak throughput

These directly relate to latency testing of the Open Fronthaul interface between the O-RU to O-DU and the mid-haul interface between the O-DU and O-CU. These test cases determine the impact on network throughput as the network delay increases. The test system increases the network delay to find when the throughput drops to 30% of the peak throughput.

Take your O-RAN testing to the next level with E100q Chimera

The deployment of 5G networks is a radical departure from the appliance-based networks of the past where real-life scenarios and conditions are hard to predict in advance. It is therefore important to stress test the resiliency of solutions before deployment.

The E100q Chimera is a compact, but scalable impairment testing solution with proven high accuracy performance. It supports O-RAN test cases and can exceed these requirements so solutions can be tested under abnormal or extreme conditions.

Multiple impairments can be applied simultaneously with unrestricted concurrent testing on several ports at the same time.

Testing can be fully automated with CLI scripting (e.g., Tcl, Telnet, Bash, Python), XOA scripting (Python) or XOA REST APIs.

2. O-RAN.TIFG.E2E-Test.0-v03.00: O-RAN ALLIANCE Test and Integration Focus Group End-to-end Test Specification

3. O-RAN.WG5.IOT.0-v05.00: O-RAN ALLIANCE FI/WI/X2/Xn Interface Working Group Interoperability Test Specification (IOT)

Pairing the E100q Chimera with e.g. the Xena Z400 Loki Traffic Generators lets test engineers use one GUI to both generate and impair traffic i.e., a complete test environment to be controlled via a single user interface.

The E100q Chimera provides the flexibility, scalability, and automation needed from an impairment testing solution at a price-point below equivalent solutions on the market today without compromising on performance, port-speed, or capabilities.

Leading global O-RAN vendors, system integrators and service providers trust the E100q Chimera to provide the assurance they and their customers need to deliver reliable performance.



Figure 4: Xena E100q Chimera Network Emulator



Figure 3: Stand-alone desktop version

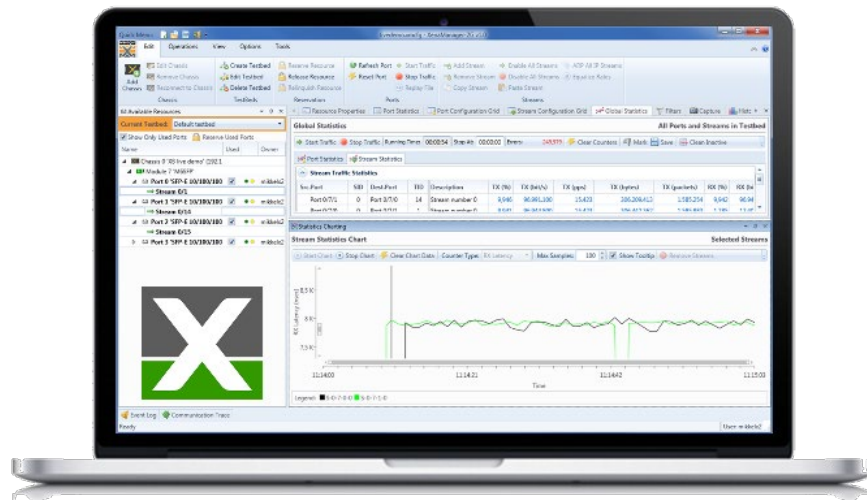


Figure 5: Same software used for traffic generation and network emulation