



## **Overview of Open Testing and Integration Centre (OTIC) and O-RAN Certification and Badging Program**

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## Introduction

The O-RAN ALLIANCE's mission is to re-shape the RAN industry towards more intelligent, open, virtualized, and interoperable networks. To achieve its mission, it embarks on three main streams of work:

1. Specification effort
2. O-RAN Software Community
3. Testing and Integration

As part of the Testing and Integration stream, Open Testing and Integration Centres (OTICs) and the O-RAN Certification and Badging program are key pillars that support the ecosystem in achieving the mission of O-RAN. This white paper provides an overview of these two key pillars, what they are, how they operate, and their key objectives.

## Open Testing and Integration Centre (OTIC)

The O-RAN ALLIANCE qualified Open Testing and Integration Centre (OTIC) provides a collaborative, open, vendor-independent, and impartial working environment to any potential client/customer that is interested in testing its products and solutions.

Any O-RAN Member and/or Contributor that exhibit vendor neutrality can apply to host an OTIC, and each OTIC may be hosted by one or more hosts. The host(s) coordinates and is fully responsible for all the activities in an OTIC.

Each OTIC may focus on different activities and services such as:

- Awarding O-RAN certificates and/or badges
- Hosting O-RAN PlugFests to accelerate the maturity of products and solutions based on O-RAN specifications [2]
- Conformance, interoperability and/or end-to-end testing of O-RAN products and solutions
- Reference setups and testbed
- Supporting wide adoption of O-RAN specifications and promote the openness of the O-RAN ecosystem via demos, community events (e.g., speaker sessions, workshops, tutorials), lab and field trials, etc.
- Fostering and developing technical skills of the O-RAN community via workshops, tutorials, etc.
- Providing feedback to the O-RAN community about the experiences with O-RAN specifications acquired during the testing, to encourage and enable implementation-driven specifications

There is no minimum set of activities and services required from an OTIC, and each OTIC may select any combination of services based on its own capability and business objectives.

Currently, there are eleven qualified OTICs worldwide as shown in Figure 1.

- European OTIC in Berlin
- European OTIC in Torino
- Auray OTIC and Security lab
- European OTIC in Paris
- European OTIC in Madrid
- Asia & Pacific OTIC in PRC
- Kyrio O-RAN Test and Integration Lab
- North American OTIC in NYC Metro Area/East (COSMOS)
- Japan OTIC
- Asia & Pacific OTIC by ritt7layers
- Asia & Pacific OTIC in Singapore



Figure 1. List of OTICs worldwide

The basic (non-sensitive) information about all qualified OTICs is listed in the public catalogue at <https://www.o-ran.org>. The submitted OTIC applications are available to all O-RAN entities and can be found in the O-RAN internal wiki.

Further details about OTICs can be found in the Criteria and Guidelines of Open Testing and Integration Centre [1] which is published by the O-RAN ALLIANCE.

## O-RAN Certification and Badging Program

The O-RAN certification and badging program represents a comprehensive mechanism to ensure confidence in O-RAN based products and solutions for both the operator and vendor communities. The O-RAN certification and badging program aims to minimize repetition of fundamental and common tests performed to verify and validate O-RAN based products and solutions before their deployment in operator networks. This will help reduce test efforts conducted by network operators and promote vendors' O-RAN based products and solutions. Additionally, it will create an opportunity for interoperability among different vendors and acceptance from other vendors.

O-RAN certification and badging should not be used as a substitute for operator-specific testing of O-RAN based products and solutions prior to deployment in operator networks. A O-RAN certificate and badge do not mean all the necessary tests have been performed and passed, and an O-RAN certified/badged product or solution should not be assumed to be automatically deployable in an operator network without any additional testing. Rather, O-RAN certification and badging can improve operator confidence in their chosen O-RAN based blueprint and can reduce the complexity and duration of pre-deployment testing.

The O-RAN certification and badging defines and unifies processes, procedures, templates, data format, etc. which are provided to ensure sharing of the test results and repeatability of the executed tests. The O-RAN certification and badging does not define any specific certification or badging test but refers to tests defined in O-RAN test specifications produced by related O-RAN Work/Focus Groups. The O-RAN certification and badging describe the processes and associated technical procedures in conformance certification, IOT badging and E2E badging which are discussed further in the following.

The purpose of **O-RAN certification** is to verify that a vendor's product is compliant to O-RAN specifications using a set of O-RAN defined conformance tests. The O-RAN certificate is awarded to a product for one or more O-RAN specified or O-RAN profiled interfaces (e.g., O-RU Open Fronthaul, O-DU O1).

The purpose of **O-RAN interoperability (IOT) badging** is to prove interoperability of a pair of products connected via an O-RAN interface or O-RAN profiled 3GPP interface using a set of O-RAN defined interoperability tests. The O-RAN IOT badge is awarded to both products in the pair and is applicable for an O-RAN specified or O-RAN profiled interface (e.g., O-RU and O-DU connected via Open Fronthaul).

The purpose of **O-RAN end-to-end (E2E) badging** is to demonstrate and validate that an end-to-end system or subsystem meets minimum requirements in terms of functionality and security and other mandatory end-to-end

functionalities using O-RAN defined end-to-end tests. In addition, O-RAN E2E badging can also provide an indication of end-to-end performance and other optional end-to-end functionalities. The O-RAN E2E badge is awarded to all products in the end-to-end system or subsystem.

An O-RAN certificate or badge can be awarded only to product (Device Under Test or DUT) representing O-RAN network function(s) (such as Near-RT RIC, O-CU-CP, O-CU-UP, O-DU, O-RU, etc.) with O-RAN interface(s) (such as Open Fronthaul, O1, A1, etc.) as defined in the O-RAN architecture [3], or to 3GPP function(s) (such as eNB, gNB-CU, gNB-DU, etc.) with O-RAN profiled 3GPP interfaces (such as Xn, F1, etc.).

Currently, the O-RAN certificates, IOT badges and E2E badges have been defined for the following products (and interfaces), and these products can be awarded by O-RAN certificates and badges.

- O-RAN certificates for
  - O-RU with Open Fronthaul interface
  - O-DU (or combined O-DU/O-CU) with Open Fronthaul interface
- O-RAN IOT badges for
  - O-RU and O-DU (or combined O-DU/O-CU) connected via Open Fronthaul interface
  - eNB and en-gNB connected via X2 interface
  - gNB-DU and gNB-CU connected via F1-C interface
  - two gNBs connected via Xn-C interface
- O-RAN E2E badges for
  - O-RU, O-DU and O-CU (or their combinations) included in the end-to-end system or subsystem

O-RAN certificates or badges issued by OTICs are comprised of:

- Logo of the O-RAN Certificate, IOT Badge or E2E Badge (see Figure 2), which the product that is awarded the certificate or badge can display on the product or in corresponding marketing material, e.g., website, brochure, etc.,
- Summary report providing a summary of O-RAN certification or badging testing. The unified format of document is used to ensure reusability and sharing of the information,
- Test report providing details of O-RAN certification or badging testing. The unified format of document is used to ensure reusability and sharing of the information,
- Detailed measurement results providing a collection of detailed measurement results collected during the certification or badging including logs, screenshots, packet captures, etc. which are captured from devices under test or/and from test and measurement equipment and tools. The file format of measurement results is not specified and unified.



Figure 2 Logos of O-RAN Certificate, IOT Badge and E2E Badge

O-RAN certification and badging can only be performed by OTICs, and consequently the O-RAN certificates and badges can only be issued by OTICs. The O-RAN certificates and badges can only be awarded to a product provided by O-RAN entities.

The basic (non-sensitive) information about all awarded O-RAN certificates and badges are listed in the centralized catalogue which is publicly available at <https://www.o-ran.org>. Upon request, the OTIC shall share the summary reports and test reports (associated with O-RAN certificates and badges issued by the OTIC) only with O-RAN members (i.e., mobile network operators) and O-RAN Office. The OTIC shall not share the summary reports and test reports with other O-RAN entities (i.e., O-RAN contributors and academic contributors) as well as non-ORAN entities without the written permission of all copyright holders (i.e., the OTIC and all vendors participated in the certification or badging testing).

## Summary

In this White Paper, we outlined the two key initiatives that support the broader O-RAN ecosystem in their testing and integration efforts, namely the Open Testing and Integration Centres (OTICs) and the O-RAN certification and badging Program. Through the combination of the OTICs and the O-RAN certification and badging program, any O-RAN vendor regardless of their size can have an opportunity to showcase their products and solutions, improve interoperability, and ultimately increase vendor diversity and supply chain resilience for operators embracing open RAN.

## References

- [1] O-RAN.TIFG.CGofOTIC.0-v05.00: O-RAN ALLIANCE Test and Integration Focus Group, Criteria and Guidelines of Open Testing and Integration Centre, Version 05.00, March 2023, available at <https://www.o-ran.org/specifications>
- [2] O-RAN Global PlugFests, PlugFest virtual showcases, available at <https://plugfestvirtualshowcase.o-ran.org>
- [3] O-RAN.WG1.O-RAN-Architecture-Description.v08.00: O-RAN ALLIANCE Working Group 1, O-RAN Architecture Description, Version 8.0, March 2023, available at <https://www.o-ran.org/specifications>
- [4] O-RAN.TIFG.Cert-Badge.0-R003-v06.00: O-RAN ALLIANCE Test and Integration Focus Group, O-RAN Certification and Badging Processes and Procedures, Version 6.0, March 2023, available at <https://www.o-ran.org/specifications>