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Though originally RIC was defined for 5G OpenRAN only, the industry realizes that for network modernization scenarios with Open RAN, RIC needs to support 2G 3G 4G Open RAN in addition to 5G.

The main takeaway: RIC is a key element to enable best-of-breed Open RAN to support interoperability across different hardware (RU, servers) and software (DU/CU) components, as well as ideal resource optimization for the best subscriber QoS.

What

There are 4 groups in the O-RAN Alliance that help define RIC architecture, real-time and non-real-time functionality, what interface to use and how the elements are supposed to work with each other.

Source: O-RAN Alliance

Working group 1 looks after overall use cases and architecture across not only the architecture itself, but across all of the working groups. W**orking group 2** is responsible for the Non-real-time RAN Intelligent Controller and A1 Interface, with the primary goal that Non-RT RIC is to support non-real-time intelligent radio resource management, higher layer procedure optimization, policy optimization in RAN, and providing AI/ML models to near-

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5G deployments of Massive MIMO and small cells for densification. By providing timely insights into network operations, MNOs use Non-RT RIC to better understand and assess network optimize the network by applying pre-determined service and policy parameters. Its functionality is internal to the SMO in the O-RAN architecture that provides the A1 interface to the Near-Real Time RIC. The primary goal of Non-RT RIC is to support intelligent RAN optimization by providing policy-based guidance, model management and enrichment information to the near-RT RIC function so that the RAN can be optimized. Non-RT RIC can use data analytics and AI/ML training/inference to determine the RAN optimization actions for which it can leverage SMO services such as data collection and provisioning services of the O-RAN nodes.

Trained models and real-time control functions produced in the Non-RT RIC are distributed to the Near-RT RIC for runtime execution. Network slicing, security and role-based Access Control and RAN sharing are key aspects that are enabled by the combined control functions, real-time and non-real-time, across the RAN.

The main takeaway: Near-RT RIC is responsible for creating a software platform for a set of xApps for the RAN; non-RT RIC is responsible for configuration, management and analytics functionality. For Open RAN deployments to be successful, both functions need to work together.

How

O-RAN defined overall RIC architecture consists of four functional software elements: DU software function, multi-RAT CU protocol stack, the near-real time RIC itself, and orchestration/NMS layer with Non-Real Time RIC. They all are deployed as VNFs or containers to distribute capacity across

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Parallel Wireless is another vendor that has developed RIC, near-RT and non-RT. What makes their approach different is that the controller works not only for 5G, but also for legacy Gs: 2G, 3G, and 4G. Their xApps or microservices are virtualized functions of BSC for 2G, RNC for 3G, x2 gateway for 4G among others.

Source: Parallel Wireless

As a result of having 2G 3G 4G and 5G related xApps, 5G-like features can be delivered today to 2G, 3G, and 4G networks utilizing this RIC including: 1. Ultra-low latency and high reliability for coverage or capacity use cases. 2. Ultra-high throughput for consumer applications such as real-time gaming. 3. Scaling from millions to billions of transactions, with voice and data handling that seamlessly scales up from gigabytes to petabytes in real-time, with consistent end user experience for all types of traffic. The solution is a pre-standard near real-time RAN Intelligent Controller (RIC) and will adapt O-RAN open interfaces with the required enhancements and can be upgraded to them via a software upgrade. This will enable real-time radio resource management capabilities to be delivered as applications on the platform.

Main takeaway: The RIC platform provides a set of functions via xApps and using pre-defined interfaces that allow for increased optimizations in Near-RT RIC through policy-driven, closed loop automation, which leads to faster and more flexible service deployments and programmability within the RAN. It also helps strengthen a multi-vendor open ecosystem of interoperable components for a disaggregated and truly open RAN.

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