Parallel Wireless OpenRAN Controller Overview

OpenRAN Controller

The Parallel Wireless OpenRAN Controller enables OpenRAN solutions. OpenRAN architecture disaggregates hardware and software components functionality that reduces TCO for Customers. Virtualized RAN functions deployed on the controller on the platform, reduces complexity and simplifies network maintenance, consumes optimal resources and reduces total cost of ownership for our customers. Leveraging the ever-growing capacity of COTS x86-based servers and a fully virtualized, hardware agnostic architecture, customers can handle the bigger workloads and stricter requirements of 5G. Parallel Wireless offers the world's first OpenRAN Controller software suite to help Mobile Operators manage and grow their multi-vendor, All-G networks, while enjoying the benefits of lower TCO compared to legacy solutions.

Features and Capabilities

OpenRAN Controller: This software suite is responsible for radio connection management, mobility management, QoS management, edge services, and interference management for the end user experience. As currently released, the OpenRAN controller provides a virtualized 2G BSC, 3G RNC, 4G eNB, X2/S1 Gateway and any combination thereof. The fully virtualized and scalable controller functionality supports ORAN's E2 interface specifications and works with multi-vendor RAN. As a result, it helps create a multi-vendor, open ecosystem of interoperable components for the various RAN elements and from different vendors. It can be software-upgraded to 5G RAN Controller functionality as non-standalone (NSA) and Standalone (SA) as the 5G standards are finalized. Being a 5G-native platform, it provides a smooth migration path to 5G utilizing any migration option.

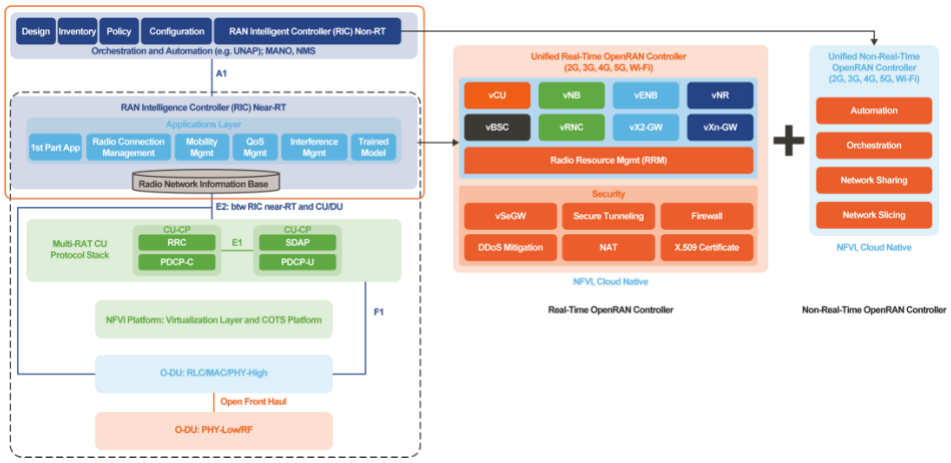

Figure 1: Parallel Wireless Unified OpenRAN Controller Realizing XRAN Controller

Real Time Controller provides OpenRAN defined Near Real-Time RAN Intelligent Controller (RIC) functionality and extends it to real time. It provides complete RAN orchestration, real time SON including self-configuration, self-optimization, and self-healing. All new radio units are self-configured by the software, reducing the need for manual intervention, which will be key for 5G deployments of Massive MIMO and small cells for densification. The self-optimization is responsible for necessary optimization related tasks across different RANs, utilizing available RAN data from all RAN types (macros, Massive MIMO, small cells) from the Analytics Service. The pro-active approach utilized by the Parallel Wireless platform, in contrast to the legacy re-active optimization approach, improves user

experience and increases network resource utilization, key for consistent experience on data intensive 5G networks.

Non-Real time controller function provides OpenRAN defined non Real-Time RAN Intelligent Controller (RIC) functionality such as configuration management, device management, fault management, performance management, lifecycle management for all network elements in the network. Network slicing, Security and Role Based Access Control and RAN Sharing are key aspects that are applicable to all the controller functions across the network. This software suite also provides a layer of intelligence that can be realized across the network by using telemetry information gathered from across the network. By providing timely insights into the network operations, operators can use Non-Real Time Controller to further understand and optimize the network. Fully complements the suite of products that Parallel Wireless offers today to realize, deploy, manage and optimize the entire network with a single pane of glass.

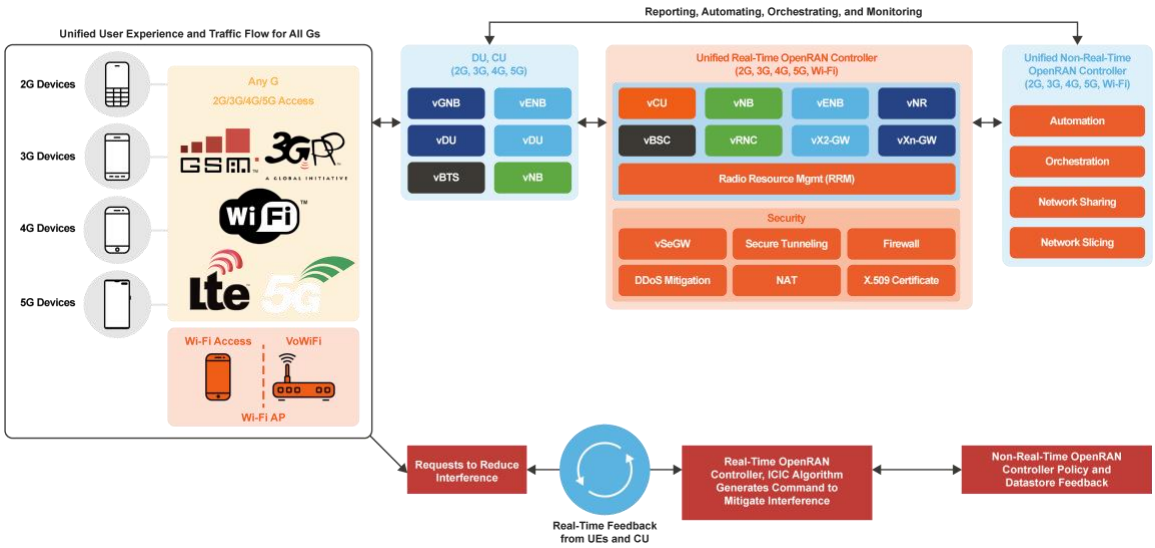

Figure 2: Network Intelligence Enabled by OpenRAN Controller

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Benefits

By disaggregating hardware and virtualized software, the Parallel Wireless OpenRAN software suite creates a unified architecture through abstraction of traditional RAN and core network functions on a COTS server for all outdoor or indoor deployment scenarios. It brings 5G software benefits (i.e. low latency and network slicing) across the network for ALL G (2G/3G/4G/5G), resulting in:

- Unified OpenRAN Controller for 2G/3G/4G/5G, Unlicensed, Wi-Fi: a unified software-enabled architecture for past, present, and future Gs
- Deployment flexibility for 5G, 4G, 4G, 2G through consolidation of network functions and RAN/core interfaces
- End to End Network Slicing for all technologies: enables Mobile Operators to offers differentiated services to their different customers and markets, with specific SLA, QoS in an economically viable way through across RAN and core through fully 3GPP-compliant interfaces and functionality, enabling interoperability across multiple vendors and allowing for modernization of networks or selection of best of breed for 5G
- Cloud-Native deployments: Parallel Wireless fully virtualized, datacenter agnostic and cloud-native architecture allows Mobile Operators to take advantage of the most

modern Web-Scale technologies, including hyperscaling, to support the demands and new Use Cases of upcoming 5G and Wi-Fi6 networks

- Real-time responsiveness to subscriber needs through edge-centric architecture to deliver best performance for voice and data, outdoors or indoors, across 2G/3G/4G/5G
- Ease of deployment, faster time to market through network automation: with plug-n-play configuration and intelligent network optimization, mobile operators are enabled to follow the “fail fast” model to try multiple Use Cases with much shorter implementation times.
- Reduction in CapEx and OpEx: professional services spent on deployment or maintenance can be reduced by up to 80%. Overall project TCO can see reductions of 60%, when considering lower CapEx and OpEx.

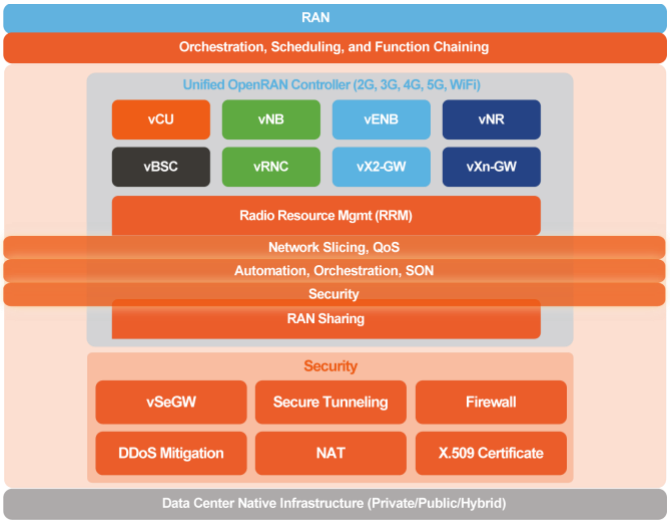

Figure 3: Multi-Technology OpenRAN Controller

Deployment Options

The Parallel Wireless OpenRAN Controller (both Real Time and Non-Real Time) can be deployed as a VNF (it is a Composite VNF, namely a federation of VMs or Containers behaving like a single logical entity). The overall solution is compliant with ETSI’s NFVI architecture, agnostic to the underlying data center infrastructure so can use any Intel x86 server. The solution has been certified and deployed with all major market leading hypervisors. It can be managed via any standards-compliant VNF Manager (VNFM) and NFV Orchestrator (NFVO). Parallel Wireless has a strong Partnerships ecosystem in place with all leading vendors in virtualization space.

Examples of deployment scenarios:

- Coverage: providing new RAN coverage to areas without mobile service
- Capacity / Densification: adding capacity to existing 2G/3G/4G networks
- Network modernization: replacing outdated legacy technologies (i.e.: 2G, 3G) with newly virtualized functions, along with newer technologies like 4G and 5G, all with the same architecture
- Network expansion: A use Case scenario where a mobile operator deploys Parallel Wireless OpenRAN solution to extend and expand coverage as an addition to an existing network