CASE STUDY

Communications Service Providers
OpenRAN

Inland Cellular Picks Parallel Wireless' OpenRAN for 4G, 5G

Regional MNO deploys cloud-native OpenRAN from Parallel Wireless running on Intel® architecture servers for cost-effective 4G network services, network interoperability, and for upgradeability to 5G services.

At a Glance: Inland Cellular

- Serving area: 2 states in the inland Northwest
- Number of local customers: 36,000+
- Number of roaming customers: Between 10,000 and 20,000
- Roaming partners: 24

Introduction

Inland Cellular is a regional mobile network operator (MNO) that has established a reputation for delivering great network services and customer support. To maintain its network services edge, Inland Cellular is planning on updating its 4G/LTE network to provide better coverage and enable new services. The network is based on an OpenRAN architecture from Parallel Wireless consisting of OpenRAN hardware: software-defined remote radio head (RRH) and virtualized BBUs (vBBUs) enabled by Parallel Wireless OpenRAN controller. With this addition to its network, Inland Cellular will be able to meet its customer goal of better coverage and service, improve operations of its legacy network equipment, and lay a foundation for future 5G services.

Facing Demand for Seamless Network Service & New Connectivity Needs

Inland Cellular serves communities in the inland Pacific Northwest, encompassing north central Idaho and southeastern Washington. Inland Cellular has more than 36,000 subscribers throughout its serving area as well as thousands of other users from its 24 roaming partners.

The business challenge facing Inland Cellular is to ensure its network provides its customers with the best possible experience, including a seamless roaming experience for its large number of roaming customers—many who come from tier-one MNOs and have high expectations for coverage and services.

The company also wanted to expand its ability to meet new connectivity needs in the community, including smart homes, connected farms, smart enterprises, private LTE, and other services. In addition, the MNO wanted a smart and cost-effective migration path to 5G services that re-used as much of the network as possible to extend the original investment. As a regional MNO, Inland Cellular wanted to leverage virtualized, cloud-native, and software-defined solutions that could meet its criteria for network service quality cost effectively.

Improving Coverage and Preparing for 5G with OpenRAN from Parallel Wireless

Inland Cellular chose Parallel Wireless for its network expansion, which added more 4G/LTE macrocells to the existing network to provide ubiquitous coverage for customers and to set the stage for new network services.

Inland Cellular determined that OpenRAN could be an effective technology to accomplish all of its goals for the network and chose Parallel Wireless, an Intel® Network Builders ecosystem partner, as its main vendor.

Introduction to OpenRAN

OpenRAN is an open standard managed by the Telecom Infra Project (TIP) that implements RAN on general purpose computing platforms to lower the cost of building a network and improve interoperability. TIP members are developing a modular base station software stack with open north- and south-bound interfaces for better interoperability.

This architecture allows an MNO to combine baseband units, radio units, and remote radio heads from any vendor into a single network, replacing the end-to-end vendor lock in that occurs with today's proprietary networks.

Parallel Wireless' OpenRAN controller software delivers orchestration and policy features that manage the radio connection, mobility management, quality of service (QoS) management, edge services, and end user equipment interference management. For controller scalability and performance, Parallel Wireless has de-coupled the control plane and user plane so that each of the components can be located in servers in different parts of the network. For performance, Parallel Wireless has built in support for the open source Data Plane Development Kit (DPDK), a set of data plane libraries and network interface controller drivers that improves packet performance by routing the data around the network operating system.

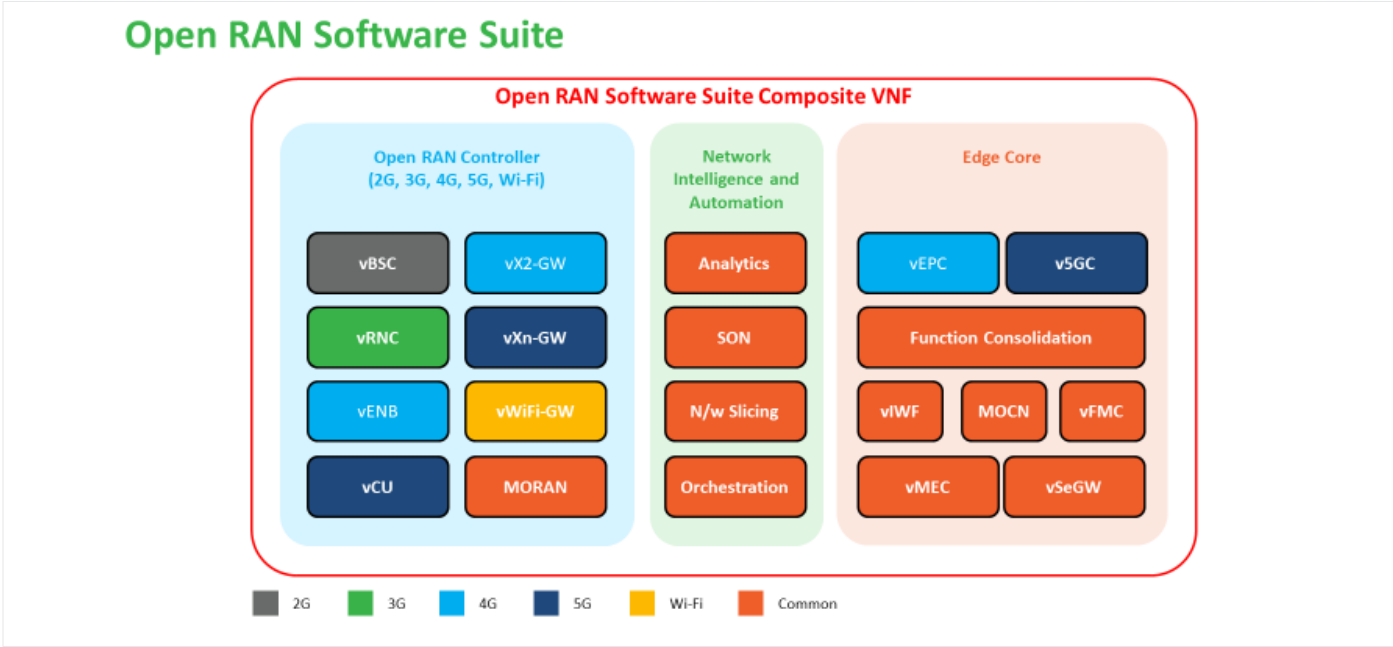

Figure 1. Parallel Wireless' complete OpenRAN software suite.[1]

The Parallel Wireless OpenRAN controller is part of a larger software suite (see Figure 1) that spans the controller, network intelligence, and the edge core for every network generation (2G, 3G, 4G, 5G and Wi-Fi).

In the Inland Cellular network, the use of the controller enables an "edge-centric" network architecture with each base station communicating with the edge-deployed controller. Inland Cellular's deployment with Parallel brings more processing power to the edge of the network, which is an architectural shift that is being adopted in anticipation of 5G.

Parallel Wireless OpenRAN flexible and scalable architecture delivers disaggregation of hardware and software, along with decoupling of central unit and distributed unit (CU/DU) functionality and support for any 3GPP compliant split. The network utilizes Parallel Wireless' RRH operating in Band 71 (600 MHz) connected to commercial off-the-shelf (COTS)-based vBBU. The RRH is software defined, allowing a pure 4G implementation, but as 5G grows in popularity, the radio hardware can be reconfigured to support both 4G and 5G and, eventually, a pure 5G implementation—all without new hardware. The vBBU runs on Intel® architecture-based servers and supports a future-ready architecture of DUs and CUs with resource sharing and pooling. This evolution is enabled by network software to make the network cloud-based, easy and cost-effective to deploy, and 5G ready.

In addition to increasing the coverage area and improving the LTE network performance with more base stations and vBBUs, the network was updated to provide customers with voice over LTE (VoLTE) capabilities. Utilizing the latest further enhanced intercell interference coordination (FeICIC) and enhanced control, orchestration, management, and policy (eCoMP) platforms in conjunction with centralized orchestration on Parallel Wireless OpenRAN software will reduce cell interference and will improve overall end-user throughput across the densified VoLTE coverage area. Utilizing all these techniques can guarantee acceptable QoS for real-time VoLTE service across the network. This new approach is based on software-based architectures with integrated orchestration and optimization capabilities. The Parallel Wireless OpenRAN controller makes these deployments a reality with reasonable capital and operational expenditures.

The increased base station density also will help with IoT applications because the small, battery-powered IoT sensors will always be within the signal range of a base station.

Another important element of the Parallel Wireless solution for Inland Cellular has been the self-organizing network (SON) capabilities. The OpenRAN Controller's orchestration capabilities provide self-configuration and self-optimization of the base stations along with self-healing if one component

should fail. The SON components help to mitigate interference from overlapping or different radio frequency (RF) signals, which is a challenge in network densification projects.

When setting up the network, the software configures the radio capacity and alleviates any signal overlap that can cause interference. Once the network is up and running, Parallel Wireless' predictive management approach reacts automatically to changes in the network to optimize the signal strength and network resource utilization.

The Parallel Wireless OpenRAN Controller supports the multi operator radio access network (MORAN) and multi operator core network (MOCN) open standards for RAN sharing. This provides flexibility in 5G networks to route traffic from different networks to the proper core for processing. All the Parallel Wireless OpenRAN controller needs is a connection to the network and it will perform all of the data routing.

Inland Cellular New RAN Runs on Intel® Xeon® D Processor-Based Servers

The choice of servers used in the RAN depends on the size of the served area as measured by the number of sectors it covers. A RAN covering three sectors might be able to utilize a server powered by an Intel® Xeon® D-2100 processor. A RAN implementation serving six sectors or more will need the additional performance of an Intel Xeon Scalable processor to run vBBU functionality.

To power its OpenRAN implementation, Inland Cellular chose servers that utilize the Intel Xeon D-2100 processors. Intel Xeon D-2100 processors deliver the performance of the Intel Xeon Scalable processor architecture for applications that have space and power constraints, including intelligent edge applications. Intel Xeon D processors are system on a chip processors that support high-density, single-socket network, storage, and cloud edge computing solutions with a range of integrated security, network, and acceleration capabilities.

Conclusion

Inland Cellular successfully improved its network and set a foundation for future 5G services with its new software-based 4G/LTE macrocell OpenRAN solution. With a solution provided by Parallel Wireless, the MNO was able to improve its network coverage and quality, and add interoperability to its existing network equipment. The software-defined RRH that is a part of the new network can be software updated to support 5G without a hardware change. The vBBUs are Intel architecture-based and can deliver significant capacity and throughout. The network helped the regional MNO to fulfill its commitment to high-quality network services now and in the future.

About Parallel Wireless

Parallel Wireless offers a unified 2G/3G/4G/5G software-enabled solution based on OpenRAN. This cloud-native network architecture redefines network economics for global MNOs in coverage and capacity deployments while paving the way to 5G efficiently and cost effectively. The company is engaged with many leading operators worldwide and has been named as a best performing vendor by Telefonica and Vodafone. Parallel Wireless' innovation and excellence in multi-technology Open virtualized RAN solutions has been recognized with 65+ industry awards. More information on Parallel Wireless is at https://www.parallelwireless.com.

About Intel® Network Builders

Intel Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at http://networkbuilders.intel.com.

[1] Figure provided courtesy of Parallel Wireless.