Altiostar* Delivers Virtual RAN Solution for MNOs

vRAN solution from Altiostar is based on Open RAN model and includes radio access software that leverages Intel® solutions for baseband units.

The Challenge

The move from 4G to 5G networks is a discontinuity in the business models of mobile network operators (MNOs), who are seeing large numbers of new devices on their networks and significant increases in demand for data services along with throughput.

MNOs are responding by looking to lower network costs and improve network agility by moving from closed appliance-based network systems to open network systems that decouple hardware and software. A key driver for this transformation is virtualization. The radio access network (RAN) is one of the most challenging parts of the network to virtualize, with a need for very low latency and extensive, real-time packet processing requirements. But it also offers significant benefits in terms of reducing costs by pooling baseband processing capabilities in the cloud, eliminating overcapacity. The Open RAN Alliance* was founded by MNOs with a goal to develop fully programmable RAN solutions based on general purpose processing (GPP) platforms and disaggregated software.

Leveraging Open RAN, Intel® Network Builders ecosystem partner Altiostar* has launched its own virtualized RAN (vRAN) solution.

Altiostar Virtual RAN Solution

Altiostar's Open RAN-based virtual RAN (vRAN) solution includes its radio access software platform that works in conjunction with virtualized baseband solutions for deploying radio products that include macrocells and small cells. The solution gives MNOs a fully virtualized RAN solution that is managed by a common software fabric. Figure 1 shows a block diagram of the Altiostar vRAN functions. The value of this software-based OpenRAN implementation is that it can be easily deployed at different locations in the network, allowing CommSPs to build out capacity based on factors such as transport infrastructure, population density, available RAN technology, and others.

Radio Access Software

The Altiostar Radio Access Software is the foundation of the entire Altiostar vRAN solution and is used by MNOs to deploy a wide range of wireless services based on technologies that include LTE-Advanced, Gigabit LTE, Massive MIMO, internet of things (IoT), heterogeneous network (HetNet), 5G NR, network functions virtualization (NFV), orchestration, C-RAN, coordinated multipoint, and others.

The Radio Access Software creates a management fabric that encompasses all the vRAN elements in LTE/4G and 5G networks. The virtualized architecture of the software decouples the vRAN functions from hardware, enabling the use of off-the-shelf servers powered by Intel® Xeon® processors instead of dedicated appliances with application specific integrated circuits (ASICs).
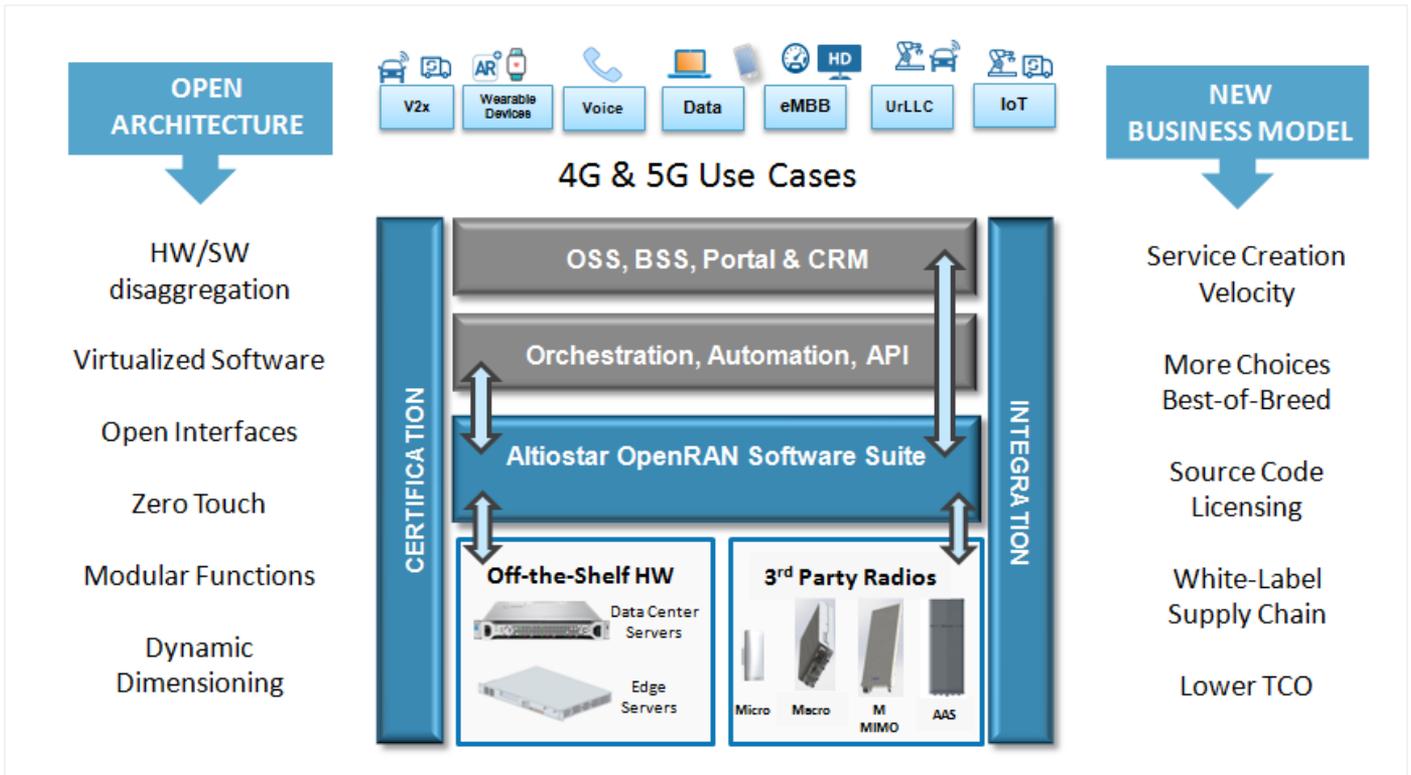
Figure 1. Altiostar vRAN block diagram.[1]

The radio access software delivers network programmability and automation and is used to remotely deploy new services on already installed hardware allowing rapid ramp up of new services to meet consumer demand. With open interfaces and APIs, the Altiostar Radio Access Software allows MNOs to build complete solutions using third-party hardware and software products.

The software platform runs as virtual network functions (VNFs) and provides the basis for which the separation of the control plane and data plane can be achieved so that each can be scaled independently based on network needs.

Baseband Unit

Altiostar's virtualized baseband unit (BBU) takes advantage of the high-performance Intel Xeon processor-based servers to perform statistical multiplexing and pool baseband processing for use by multiple base stations. The BBU also offers a scalable range of carrier configuration requirements that covers all LTE bandwidths, and emerging multiple input multiple output (MIMO) antenna options.

Traditionally, the RRU and BBU have a costly, dedicated fiber cable connection to minimize latency. Altiostar's vBBU features a flexible approach that can leverage different 3GPP* split options to allow for efficient use of the fiber optic transport infrastructure.

The scalable Altiostar architecture allows system aggregation and the support for pooling of baseband resources to be utilized across thousands of eNodeBs in a geographical area. This reduces the cost and equipment that need to be in place to support a large-scale 5G roll out and also reduces the need to pre-provision hardware for future expansions.

Remote Radio Unit (RRU)

Altiostar, through the Open RAN ecosystem, can offer a wide family of RRUs with features for massive MIMO, macrocells and small cell deployments across all frequency bands and 4G/5G configurations. Through the use of the Radio Access Software, deployments of all sizes can be coordinated, simplifying the vRAN deployment.

Massive MIMO Radios

Massive MIMO allows MNO networks to benefit from as many as 128 antennas per base station. With a MIMO implementation, MNOs can deliver the broad coverage across a macrocell, while also dedicating some of the antennas to specific high traffic hot spots, or to provide high speed fixed wireless access (FWA) or enhanced Mobile Broadband Access (eMBB) services. Altiostar vRAN solutions can support multiple different Massive MIMO configurations.

Macrocell Remote Radio Unit (RRU)

Macrocell radios can be used with panel or sector antennas to provide high power, wide area (3GPP WA) coverage. The macrocell RRUs can be deployed in various RAN configurations, including:

- The baseband and the RRU co-located at the cell site.

- The baseband aggregated in data centers with a minimal footprint of hardware equipment at the cell site.

The software can be configured for various bandwidths, leverage advanced algorithms like inter-site carrier aggregation or uplink CoMP, and utilize self-organizing network (SON) software for easy network planning.

Small Cell RRUs

Altiostar's common baseband and management software simplifies HetNet deployments because it supports both micro and macro RRUs on the same network. Small cell can be deployed to fill in network dead spots or to add additional capacity to high traffic areas. Picocells or femtocells can be used for indoor use in a home or small office environments.

Figure 2. Altiostar small cell products.

Powered by Intel® Xeon® Processors

Altiostar's virtualized solution leverages Intel Xeon processor-based servers and is able to run on a wide range of Intel CPUs, including the Intel Xeon E5 processor and Intel Xeon Gold 6148 processor. The commonality between Intel Xeon processors allows the software to be deployed on a wide range of already installed servers and, at the same time, to take advantage of the latest servers using Intel Xeon processors for new build outs. Intel Xeon Gold processors are designed for high-performance data center and cloud computing applications.

While most L1 functionality is processed on the Intel Xeon processor, some functions do need real-time processing of some L1 functionality. To accelerate the processing of these functions, the Altiostar vRAN solution can make use of the performance of the Intel® Arria® 10 FPGA. The Intel Arria FPGAs are power efficient and improve core performance significantly.

For remote locations, Altiostar specifies servers running Intel Xeon D processors, which are 64-bit systems on chips (SoCs) with scalability from two to 16 cores and offer low-power performance for services deployed at the network edge at an extended temperature range. The Intel Xeon D processor-based servers are used in remote locations, but the software can also be deployed in a virtualized environment running in a distributed NFV environment using Intel Xeon Scalable processor-based servers. This cost/processing power flexibility allows customers to leverage advances in performance, features, and instruction sets from next-generation CPUs. These solutions get added performance boosts from Intel® Advanced Vector Extensions 2 (Intel® AVX2) which speeds up various packet manipulations and data structure look-up functions to improve the performance of certain functions.

With utilization of Intel processors combined with virtualization for radio access networks, operators can now deploy truly end-to-end web scale cloud native networks. The benefits of IT infrastructure and management can be leveraged for mobile networks. Deployment of the network, operation and management, automation and services roll-out becomes simpler with this paradigm shift.

Conclusion

Virtual RAN systems are essential for the MNO that wants to adopt new services and business models to profit from the challenges brought about by 5G networks. With performance from Intel processor-based servers, and openness from the Open RAN architecture, Altiostar's vRAN solution replaces fixed-configuration, appliance-based RAN with a new high performance and flexible system that is the foundation for next generation networks.
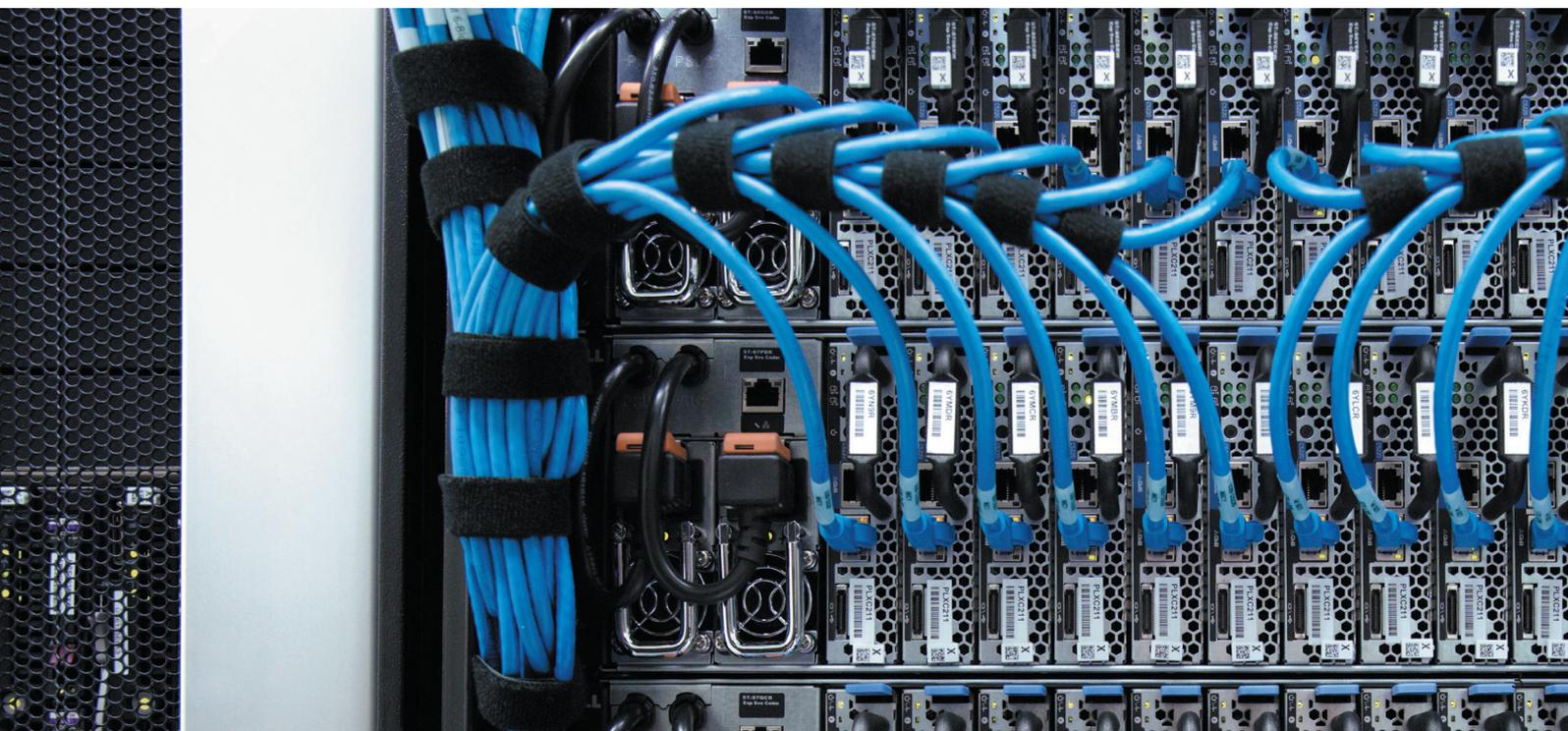
About Altiostar

Altiostar provides a 5G-ready virtualized RAN software solution that supports open interfaces and disaggregates the hardware from the software to build an open multi-vendor web-scale network. This solution supports macro and small cells, indoor and outdoor, enabling interference management, carrier aggregation and dual reception to improve the efficiency of the network and enhances the Quality of Experience for the user while providing broadband speeds. Operators can add intelligence, quickly adapt the software for different services and automate operations to rapidly scale the network. www.altiostar.com or follow us on Twitter @altiostar.

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.