solution brief

the business drivers for building smarter RANs

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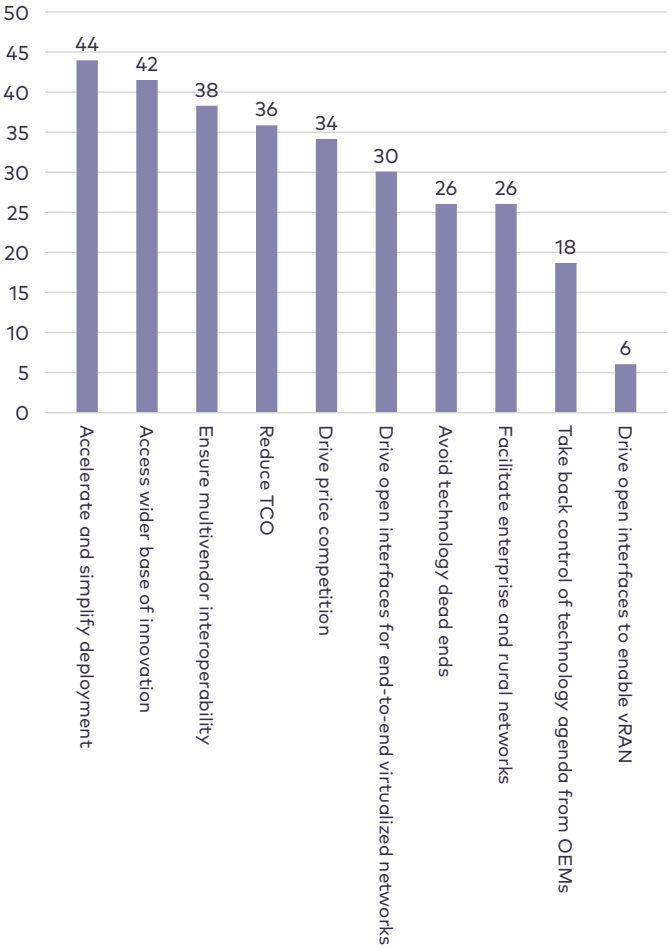
The most significant change to telecom economics in the era of 4G expansion and 5G innovation is network virtualization. Over time, operators have been steadily migrating network functions from single-purpose appliances to running as applications on general purpose cloud infrastructure. For many mobile operators, a virtualized radio access network (vRAN) is the culmination of that process, transforming their ability to deliver unprecedented quality of experience with a wealth of new revenue-generating services.

Operators believe vRAN can transform their customer experience

Mobile operators are targeting a wide range of benefits from vRAN, some of which are cost-related. Indeed, the RAN accounts for up to 70% of mobile network costs, according to the O-RAN Alliance[1], which is developing open specifications to support an interoperable multivendor vRAN.

However, the drivers for taking on the huge challenge of virtualizing the RAN are far broader than cost alone. A recent survey of about 80 MNOs[2] revealed that the top two drivers were the reduced time and complexity to deliver new services, and increased access to a broad base of innovation in all layers of the network.

Figure 1: % of MNOs placing in top 3



These findings go to the heart of the challenge operators are facing in the 2020s. Whether they are deploying 5G or expanding 4G, they are faced with exponentially increasing volumes of data usage, as more and more commercial and personal activities go mobile-first.

In addition, operators are faced with unprecedented customer expectations for an excellent Quality of Experience (QoE). When the RAN is the primary connection for many consumers and businesses, including mission-critical applications, reliability, stability and quality are just as critical as broadband data rates for reducing churn, increasing ARPU and expanding into new enterprise markets.

A vRAN supports these objectives in several ways. It allows resources to be allocated flexibly where they are required and, ensures predictability of experience. Moreover, it facilitates the introduction of flexible development processes such as DevOps and microservices, which in turn allow operators to launch and modify services very quickly to meet dynamic changes in demand, potentially on a daily basis or per-customer basis. Additionally, a software-centric environment built on an open platform greatly expands the ecosystem of suppliers and partners for the operator as it expands its services.

Figure 1: Key drivers for deploying Open RAN networks before 2026 (82 MNOs were asked for a free list of all their Open RAN drivers. Within the 10 most-cited, they were asked to select the 3 most important.)

1. Source: O-RAN Alliance 2020
2. Source: Rethink Technology Research survey of 82 MNOs, global, Q4 2020

These objectives require a robust and scalable architecture

Despite all of the potential benefits for portfolio expansion and QoE enhancement, vRAN is not a magic wand. It requires operators to undertake a challenging transformation of their architectures, organizations and supply chains to ensure their customer-facing processes are updated to take full advantage of the new platforms and capabilities.

To achieve this, a robust architecture, capable of meeting 5G performance challenges, is emerging, boosted by a broadening vibrant ecosystem. It includes many players, who are collaborating through organizations like O-RAN Alliance, Telecom Infra Project and Open Networking Foundation to define a carrier-grade vRAN platform in a fast-tracked manner.

The emerging platforms prioritize flexibility and are intentionally disaggregated. Operators can choose key elements such as cloud infrastructure, RAN software and radio/antennas from different interoperable suppliers to pursue a best-of-breed approach and access the latest innovations. They can also place the network functions in a wide variety of locations to achieve optimal performance. Moving forward, operators will be able to enable even greater experiences as a large proportion of vRAN functions begin to be processed on low-latency edge servers very close to the user, thereby supporting very fast response times for applications such as AR/VR gaming or mobile robotics.

The vRAN requires, and enables, a fundamental new approach to optimization

While such architectures will enable many new services and user experiences, it will require a new approach to optimization to manage so many moving parts effectively. It will also enable new strategies for optimization, tapping into huge amounts of data to deliver a superior QoE.

As part of this new approach, three aspects of the vRAN will be particularly significant for optimization. The first is software-based automation. The 5G vRAN is highly distributed, running on many thousands of cell sites and hundreds of edge servers. It is cost-prohibitive to send technicians to each site or carry out manual troubleshooting and adjustments. As such, it is essential to minimize operators' costs by enabling monitoring, management and optimization of all this hardware and software to be performed remotely and automatically. In addition, automated management and optimization of the network is absolutely critical in order to ensure that all edge units, radios and software functions work together with maximum efficiency.

The second aspect is the huge amount of data that is available to the optimization system. Every edge-based baseband and every radio unit (RU) in these dense networks produces large amounts of data that must be constantly analyzed to optimize the network's performance and customer experience.

Automated software-based control in a vRAN extends even to the massive MIMO antennas, and the individual direction of different beams in an antenna array can be adjusted constantly in response to changes in traffic or the requirements of a particular service or network slice. The third aspect is real-time functionality. Architecturally, 5G vRANs are designed to be very flexible. For instance, they can dynamically use the same piece of spectrum for 4G or 5G, depending on the users in a cell at a particular time. However, such functions require vast amounts of data processing in near-real time. In a traditional network, such data would be held within a closed appliance and available only to the RAN vendor. But in an open vRAN, this data is also available to third-party solutions, enabling optimization software to understand the network experience on a minute-by-minute basis and make changes accordingly.

By prioritizing these three aspects, operators can optimize their networks in a granular, real-time manner, thereby delivering a superior user experience – and as a result, enjoy all the associated commercial benefits. Ultimately, the goal of the 5G community is to deploy networks that are fully user-centric, which means the connection is individually optimized for each user and their individual requirements. In turn, this will support a step change in the way operators deliver highly-targeted services and monetize premium connectivity.

Amdocs SmartRAN works with Intel FlexRAN to achieve these benefits

vRAN optimization and automation is a significant step towards that goal. Ultimately, operators will be aiming to create a solution that can analyze data coming from every individual antenna beam and use the information to make instant decisions to address any performance issues before they impact the user experience.

However, challenges remain. To be effective, the system must be highly automated, with open interfaces to access data in every part of the network. It is also essential that the data be available to other operator applications that are dealing with user experience and service delivery. Meanwhile, machine learning (ML) is critical to ensuring that automation is highly intelligent and responsive to changing user needs.

As a pioneer in aligning optimization to customer experience metrics rather than just network performance metrics, Amdocs sought to address these challenges by developing its SmartRAN network optimization and analytics solution. Working within an open vRAN environment, the solution is integrated with Intel's FlexRAN, the leading reference architecture, enabling operators and vendors to quickly develop and deploy vRAN solutions that can deliver full 5G performance running on general purpose Intel Xeon processors.

With machine learning at its heart, Amdocs SmartRAN leverages the well-established RAN analytics and self-optimizing network (SON) technology of Amdocs ActixONE to support and enhance the vRAN architecture. This enables it to access and use near-real time data from radios units, as well as non-real time data traditionally available for optimization, thereby allowing it to make constant decisions based on data from every network element and antenna beam. The advanced machine learning functionality this requires is enabled by the processing power of the Intel Xeon platform.

The solution is aligned to support the disaggregated and distributed design of the vRAN. It has separate processes to monitor each component of the network such as the edge-based digital functions and the radio unit. This means that wherever operators choose to locate the various elements of their vRANs, and as networks expand with additional units as they are added in future, SmartRAN will adjust to the topology.

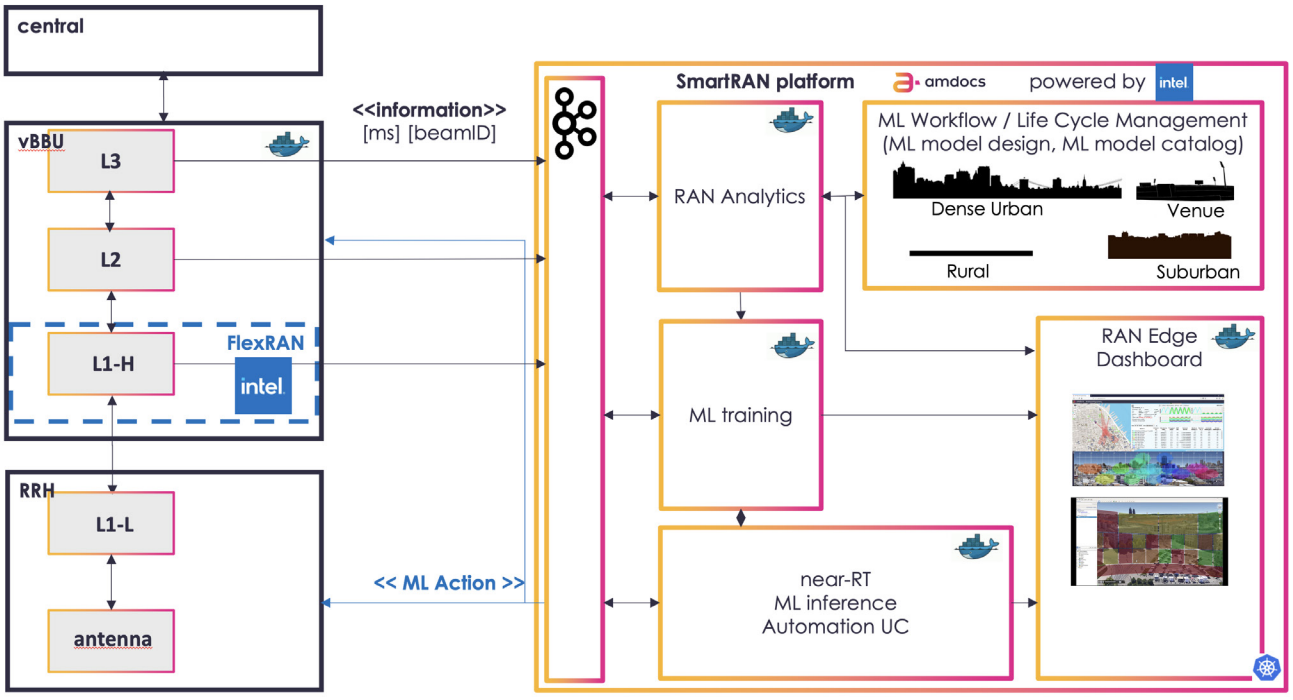


Figure 2. Amdocs SmartRAN solution architecture

With access to the full range of real-time RAN information and the use of advanced machine learning analytics, Amdocs SmartRAN has the capability to make decisions that ensure the best experience even down to individual subscriber level, while also aggregating the results to provide a rich, accurate picture of the whole network. This puts unprecedented knowledge and power in the hands of the operator, allowing them to understand how their new vRANs are affecting user experience, and based on this information, continually improve customer satisfaction and increase revenue growth.

Learn More

Amdocs SmartRAN
2nd generation Intel® Xeon® Scalable processors and 3rd generation Intel® Xeon® Scalable processors: www.intel.com/xeonscalable

FlexRAN
Amdocs is a member of the Intel® Network Builders ecosystem: networkbuilders.intel.com

Amdocs and Intel are members of the O-RAN Alliance and the Telecom Infra Project OpenRAN group

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