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How O-RAN Delivers Sustainable, Economical Mobile Connectivity Everywhere

By: [Yong Hoon Kang, Ph.D, Chief Technology Officer - SOLiD Americas](#)

Escalating demand for fast, reliable, always-on connectivity continues to drive 5G adoption. In fact, 5G connections are expected to reach [7.9 billion](#) worldwide by 2028. With outdoor wide-area network deployments becoming increasingly dense, many mobile network operators (MNOs) are turning their attention to improving capacity and coverage throughout event venues, commercial buildings, retail properties, and across campuses.



Today's mobile subscribers expect outstanding quality of service (QoS) everywhere, and they are not willing to settle for spotty coverage, lack of internet access, or dropped calls indoors. This growing demand for improved 5G in-building service has raised the question of optimizing QoS as sustainably and economically as possible to maintain profitability and a competitive edge. As MNOs embrace open network technologies such as Open RAN, the versatility, scalability, and cost-efficiency of these architectures provide innovative new possibilities to answer this question.

Open to Network Evolution

The ongoing evolution to Open RAN is revolutionizing traditional RAN architecture with the capability to choose components from various suppliers. By breaking the vendor lock-in, Open RAN enables a more competitive and diverse marketplace, significantly reducing the cost of network deployment and maintenance. With advancements in standardization, such as the [O-RAN ALLIANCE](#), MNOs can rely on seamless interoperability between multi-vendor hardware and software for greater agility, scalability, and performance.



To date, much of the focus on Open RAN prioritized public outdoor networks over in-building coverage. However, the escalating adoption of Open RAN technology enables greater interoperability among in-building network components as well. The benefits of Open RAN infrastructure provide significant value for MNOs interested in delivering an optimized customer experience indoors, where up to [80 percent](#) of all mobile data traffic occurs.

In fact, Open RAN advancements are driving the evolution of indoor wireless network architecture toward a convergence between 5G Open RAN technology and neutral-host [distributed antenna system](#) (DAS) in-building infrastructure. This converged infrastructure approach offers several benefits, from improved cost efficiencies to reduced environmental impacts.

Get to the Source

With the growing imperative for MNOs to increase efficiency and reduce costs, fundamental changes in how networks are built and operated extend beyond hardware and software. This includes a rising interest in more efficient radio frequency (RF) spectrum use through active RAN sharing, which helps reduce costs and avoids potential problems caused by over-building the network. A particularly promising active

RAN sharing method is the multi-operator RAN (MORAN) architecture. Due to the promise of this shared RAN technology, as well as the [convergence of Open RAN and DAS infrastructure](#), the U.S. National Telecommunications and Information Administration (NTIA) recently awarded a [\\$27.68 million Public Wireless Supply Chain Innovation Fund grant](#) to SOLiD to develop a MORAN-capable O-RU point of interface for multi-vendor DAS platforms. The resulting MORAN O-RU signal source will enable multiple operators to access in-building configurations simultaneously, advancing open networks for neutral-host, indoor 5G service. In this way, MNOs can leverage simple and economical use of the 5G spectrum for more efficient, scalable, and cost-effective design, deployment, and maintenance of in-building networks.

In the Real World

As the evolution of neutral-host RAN sharing infrastructure advances interoperability between Open RAN and DAS technologies, [O-RAN signal sources](#) will reduce power consumption and space

requirements while simplifying and accelerating deployments. This evolution will allow MNOs to deliver scalable, high-performance, seamless connectivity at a lower total cost of ownership (TCO). A case in point is a recent Open RAN deployment in the largest football stadium in Germany.

Mobile service infrastructure was recently upgraded at Signal Iduna Park in Dortmund, Germany, in advance of the stadium's 50th anniversary. With four MNOs providing service to the stadium, this landmark project was designed to provide seamless 5G and 4G coverage for more than 80,000 spectators, bringing football fans an exceptional, high-speed, digital experience at every seat.

Three of the MNOs deployed traditional 5G RAN signal source configurations, while one deployed an Open RAN configuration. This deployment included a SOLiD O-RU signal source paired with DAS and massive MIMO (mMIMO) antennas to deliver improved 4G and 5G QoS throughout the stadium. In the Open RAN configuration, the DAS interface unit (DIU) signal sources for both 4G and 5G required only two racks, whereas the other three MNOs each required 300 square feet to contain their infrastructure.

Yet, this innovative advancement not only drastically decreases the equipment footprint, it also reduces hardware costs and power consumption. In fact, the nominal power budget for the Open RAN signal sources was approximately 80 percent less than the average of the other three MNOs deploying traditional RAN signal sources. While these savings are impressive for a single MNO, a Multi-Operator Open RAN DIU signal source will allow the benefits to be significantly multiplied, reducing TCO and further improving sustainability.

With ongoing development, MORAN signal sources will provide several bands for multiple network operators. This will further reduce the hardware, power, and cooling costs, as well as the total footprint. For example, in the case of the Signal Iduna Park [stadium deployment](#), the equipment footprint could be reduced from 1,200 square feet to four racks, representing a substantial improvement in how real estate is used for even more significant cost savings.

Sustainable Progress

As the industry continues to advance open, shared infrastructure such as converged Open RAN and MORAN architectures, MNOs will have ready access to a range of flexible configuration options from minimum to maximum sharing. This technological evolution will empower improved cost efficiencies and reduce environmental impacts while enabling faster, simpler in-building coverage deployments to create a truly seamless 5G experience that is as sustainable and economical as possible.