



# SUPERMICRO AND IS-WIRELESS ENABLING 5G IN THE OPEN RAN MODEL

*A Collaboration Between Supermicro and IS-Wireless Delivers Complete ORAN Solution*

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*Supermicro SYS-220HE-FTNR*

## Executive Summary

Open RAN is the latest trend in building cellular networks. Open RAN is based on separating software and hardware concept, enabling the use of COTS (Commercial Off The Shelf) servers. Furthermore, it is based on open and standardized interfaces, which grant interoperability. Thus, it enables multiple vendors to provide different parts of hardware and software. This combination of hardware and software allows for lower prices and improving competitiveness, which is crucial for further developing the 5G network. Supermicro servers **SYS-220HE-FTNR** and the Super Server **SYS-E403-9D-14CN-IPD2** are used for Open RAN deployment. IS-Wireless software is responsible for DU (Distributed Unit) and CU (Central Unit) network functionalities deployed as CNF (Cloud Native Network Functions) on top of a container platform. RedHat provides an open, hybrid container/virtual machine infrastructure with Red Hat® OpenShift® Container Platform.

## SUPERMICRO

Supermicro (Nasdaq: SMCI) is the leading innovator in high-performance, high-efficiency server and storage technologies and a premier worldwide provider of advanced server Building Block Solutions® for Enterprise Data Center, Cloud Computing, Artificial Intelligence, and Edge Computing Systems. Supermicro is committed to protecting the environment through its “We Keep IT Green®” initiative by providing customers with the most energy-efficient, environmentally friendly solutions available on the market.

## Traditional Mobile Networks

The telecommunications market is undergoing a revolution. It is not only about introducing 5G networks but also about how the mobile networks infrastructure is developed: the move from closed to open systems. According to some estimates, in less than 5 years, most of the new networks will be built in that model.

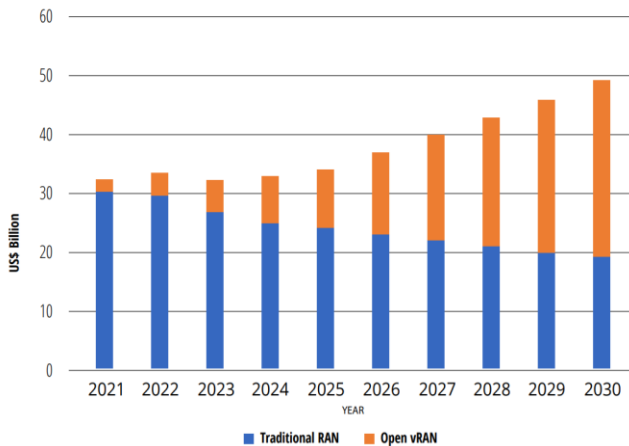


Figure 1 - Source: ABI Research, Revenue forecast comparison for public cellular: traditional RAN and Open RAN

Until recently, the telecommunications market was locked and dominated by just a few global vendors delivering radio networks in a monolithic way - software with dedicated hardware. That is how 2G, 3G, and 4G networks were built. As convenient as it might be, it did come with serious risks. In case of problems with an element from one supplier, it was impossible to replace selected network elements. Due to the lack of interoperability with devices from other suppliers, the entire solution had to be replaced with enormous costs as Radio Access Network is the most expensive part of the mobile network. Not to mention the high pricing in general as a result of virtually no competition on the market. It was clear that changing a model was a matter of time. Also, to build a 5G network offering the quality parameters underlying the 5G standardization, the density of the base stations' grid should be significantly increased while reducing their power. However, densifying the network in the traditional silo model is impossible, as it will be too expensive.

## Moving to open systems

The Open RAN concept is based on open and standardized interfaces, which grant interoperability. Thus, it enables multiple vendors to provide different parts of hardware and software. Although various network elements come from numerous vendors and are proprietary, they are designed to work together with other vendors' products. In addition, open RAN is based on a software and hardware separation concept,

enabling COTS (Commercial Off The Shelf) servers to be used. This open model allows for significant savings, and on the other hand, it enables much more efficient use of available resources such as locations, computing devices, and frequency bands.

The image explains the main differences between traditional RAN, vRAN, and Open RAN.

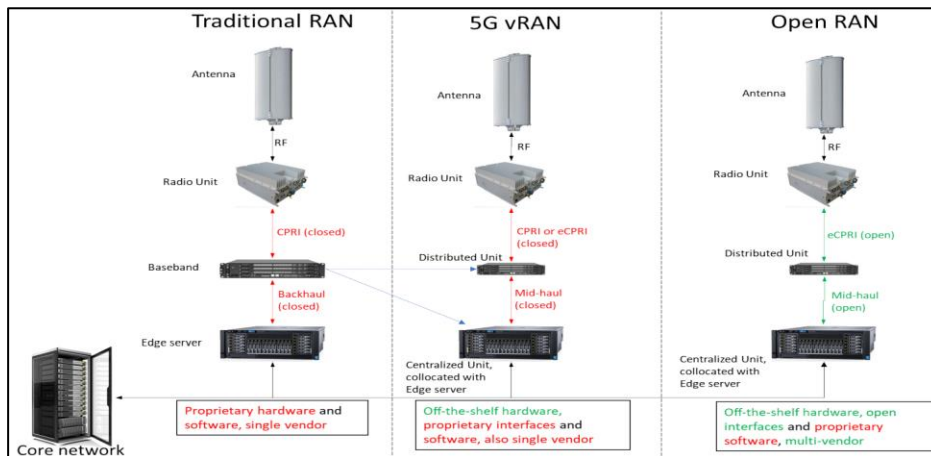


Figure 2 - Source: ABI Research. Examples of traditional RAN, vRAN, and Open RAN deployments.

According to Dell'Oro research, Open RAN will account for 15% of the overall 2G-5G RAN market by 2026. They also estimate that the Open RAN sector is supposed to generate \$15 billion in revenues between 2020 and 2025 globally. Also, the share of mobile networks built in the open model will grow in the following years.

## Solution Overview

The IS-Wireless solution contains software for 4G and 5G RAN (Radio Access Networks): O-RU software (Low PHY), O-DU software (High PHY, MAC, RLC), and O-CU software (PDCP, SDAP, RRC, S1AP, NGAP). The IS-Wireless solution is compliant with the following standards: 3GPP (4G LTE / 5G NR protocol stack and features, integration with EPC/5GC, support standard UE, authentication, ciphering, integrity protection), O-RAN (open interfaces, RAN virtualization, SW/HW separation, COTS HW usage) and ETSI (support NFV concept with VNF/CNF - Virtual/Cloud Native Network Functions).

Thanks to the Open RAN approach and virtualization, software-defined RAN functionalities can be deployed on flexible HW: O-RU hardware (from IS-Wireless partners, i.e., Benetel, Cablefree), O-DU hardware (COTS servers, e.g., Supermicro SYS-E403-9D-14CN-IPD2), and O-CU hardware (COTS servers, e.g., Supermicro SYS-220HE-FTNR). Near-RT RIC (RAN Intelligent Controller) is typically deployed on the same server as O-CU. Core and MANO can be installed in the public cloud or also on CU server (private network deployments).

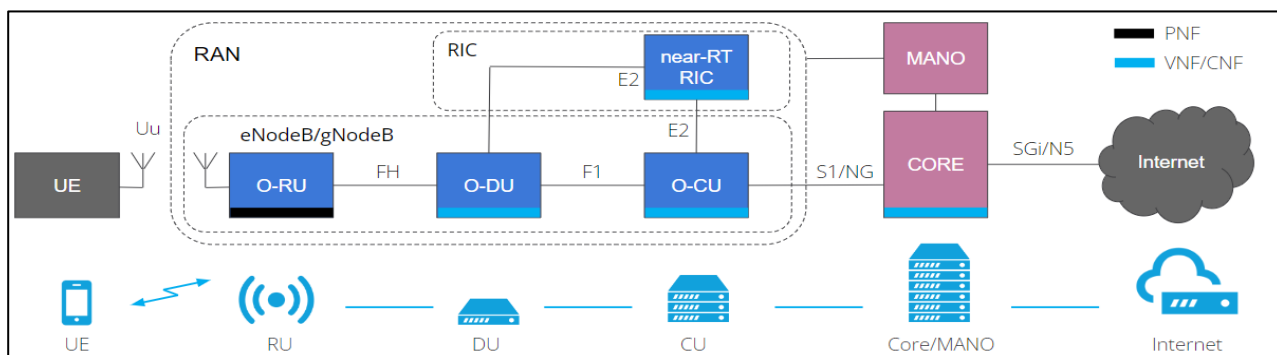


Figure 3 - IS-Wireless Open RAN solution architecture overview.

IS-Wireless integrated and tested their main product (5G RAN) on Supermicro servers - one unit of SYS-E403-9D-14CN-IPD2 and three units of SYS-220HE-FTNR. The servers have been tested with IS-Wireless 5G RAN software (DU and CU network functionalities) on top of the Red Hat® OpenShift® platform).

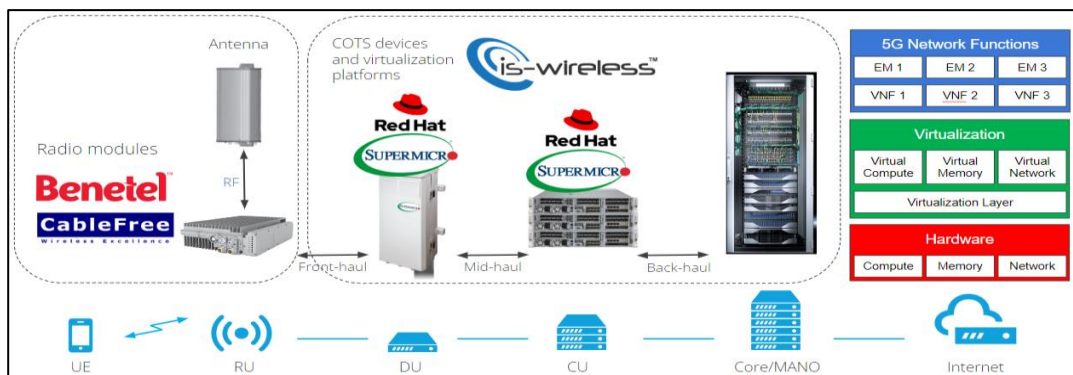


Figure 4 - The IS-Wireless solution deployed on Supermicro servers with RedHat operating system and virtualization platform.

O-RAN Alliance defines an O-RAN ecosystem with different scenarios for Macro distributed, Macro centralized, RAN sharing / MORAN - distributed, RAN sharing / MORAN - centralized. Due to a disaggregated and virtualized RAN solution, IS-Wireless can test all use cases below in Open RAN scenarios 1,2,3,4,7,8 and 10.

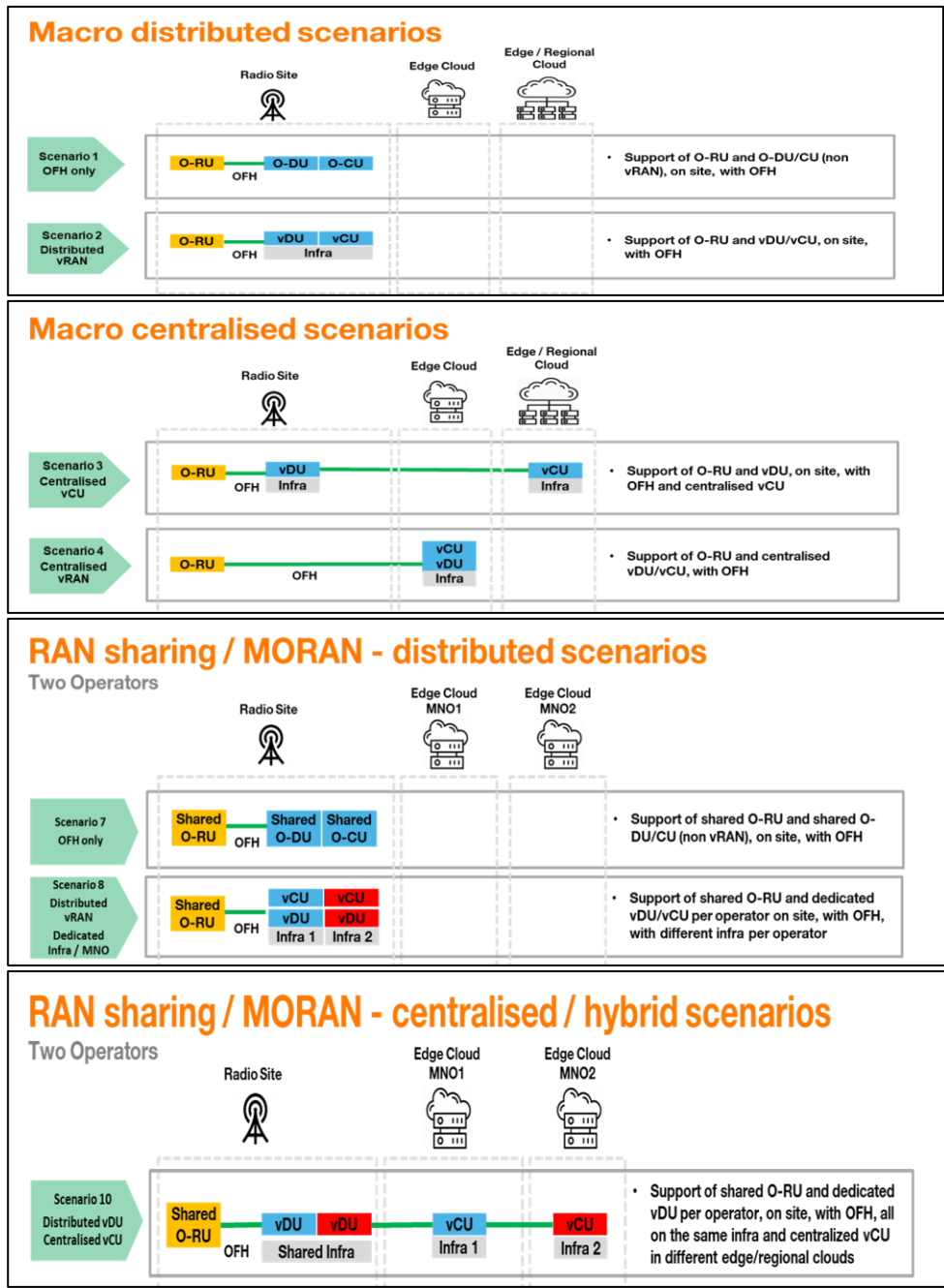


Figure 5 - O-RAN ecosystem - example scenarios (Source: <https://www.o-ran.org/o-ran-ecosystem>)

Supermicro servers with RedHat OpenShift and IS-Wireless software can be used to test multiple configurations:

- Single-node with both the control plane and worker functions in a smaller footprint.
- Triple-node clusters of combined control plane and worker nodes.
- Remote worker configurations where only the worker nodes are deployed at the edge.

IS-Wireless tested interoperability with Supermicro and RedHat in two options:

- Single-node (DU/CU on a single server - typical scenario)
- Triple-node (DU/CU on cluster made from three servers - high-reliability scenario).

From an IS-Wireless perspective, it is key that the equipment is future-proof and allows scaling up the network. The company also values the performance of Supermicro servers, short lead time, and attractive commercial conditions. All of this makes Supermicro an ideal partner for the solution. On top of this, the pole-mounted server solution provides additional significant benefits for ORAN deployment with limited floor space. Where COTS hardware working as DU (Distributed Unit) can be installed close to the RU (Radio Unit) to reduce latency for uRRLC (ultra-Reliable and Low Latency Communications) services like V2X (Vehicle-to-Everything).

After performing tests, IS-Wireless declares that Supermicro servers are very well suited for 5G mobile networks deployed in the Open RAN model.

## Why Supermicro

“Supermicro offered us Telco optimized 2U SYS-220HE System and Super Server SYS-E403-9D-14CN-IPD2 system. They are designed using the market standard components, making the certification process simple. The hardware architecture is future proof as it’s thermally prepared to support future generations of CPUs. The SYS-220HE System servers offer exceptional versatility and expandability. We can use up to 10 expansion cards, including a wide range of accelerators, two CPUs with up to 270W TDP, and up to 32 DIMMS in a short depth (574mm) chassis. That allows us to use the same server model as a CU or DU, which keeps the total cost of investment low. Serviceability is simplified with a toolless design. The ability to work directly with engineers designing the offered products is also an advantage.” - **Robert Cieloch, COO, IS-Wireless**



Figure 6 - Supermicro IP65 Mounted Server and 2x SYS-220HE-FTNR

## About IS-Wireless

IS-Wireless develops and delivers 4G and 5G mobile networks, supporting more users with better performance at lower costs by applying cutting-edge technologies. The company is a provider of software and hardware necessary for building 4G and 5G networks in the scope of both RAN and Core. IS-Wireless participates in the Open RAN revolution and expects significant changes in how networks are built and deployed in the coming years. The company has been

recognized as one of a few European RAN vendors by leading telco operators, including Deutsche Telekom, Orange, Telecom Italia (TIM), Telefónica, and Vodafone, in their November 2021 report “BUILDING AN OPEN RAN ECOSYSTEM FOR EUROPE.” <https://www.is-wireless.com/>