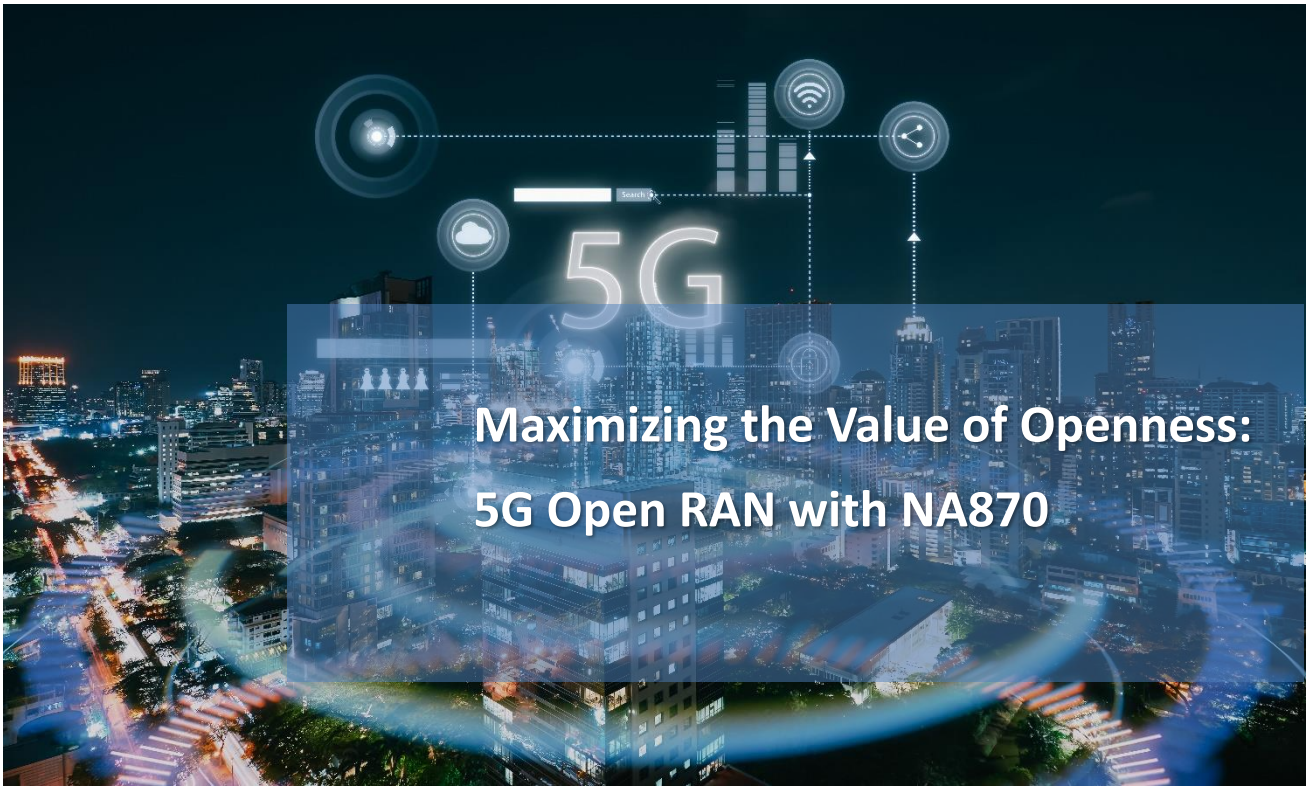


Maximizing the Value of Openness: 5G Open RAN with NA870

The 5th generation (5G) of mobile technology is already here to enable a truly connected world where everything will instantaneously connect with each other. 5G is expected to be 10 to 100 times faster than its 4G predecessor, utilizing millimeter waves (mmWaves) and small cell base stations deployed in multiple locations to offer up to 10 Gbps (gigabits per second) data speeds, ultra-low latency, as well as greater bandwidth and network coverage. While 5G allows mobile users to enjoy much faster download speeds and lag-free Internet streaming, it also significantly enhances real-time communications among billions of devices to facilitate edge AI, autonomous driving, augmented reality (AR), and many other emerging technologies requiring fast, low-latency data access and quick network responsiveness.

Opening the RAN for 5G

A mobile network is divided into two domains: the Radio Access Network (RAN) and the core network (Core). The RAN is made up of base stations and antennas that cover a specific region. The antennas send and receive RF signals to and from mobile phones and other user devices, while the base station's remote radio unit (RRU) and baseband unit (BBU) digitize and connect the signals to the core network. The core network responsible for authenticating user access then connects users to the Internet.

A traditional RAN is built using proprietary components supplied by a single vendor, making it extremely difficult for service providers to integrate different vendor components for an optimal solution. As 5G continues to be rolled out globally, this closed RAN architecture is now evolving towards an open network where operators can choose components from a broader range of suppliers to address demands for faster speeds, tremendous network traffic growth, security risks, and other challenges specific to 5G, while still being able to keep equipment and operating costs low to make 5G more economically viable to the public.

The Open RAN is built over a set of industry-wide open standard interfaces between all components, including non-proprietary hardware and virtualized software elements, in order to maximize interoperation among different vendors' equipment. Instead of getting locked into a single vendor's devices, service providers can purchase commercial-off-the-shelf (COTS) products such as white box servers from any hardware supplier and then utilize cloud virtualization technologies and software programming to operate 5G base stations. This vendor-neutral environment gives operators faster and more flexible deployment options as they customize their telecom services to varying bandwidth requirements, low latency needs, as well as new use cases like cloud analytics and edge computing, in the meantime reducing dependence on a single supplier's proprietary solutions which may limit 5G innovation.

Benefits of Open RAN

- Open standard interfaces increase interoperability between different equipment and help create a diverse supplier ecosystem by engaging a broader participation of vendors in 5G development.
- Using multi-vendor COTS hardware prevents proprietary vendor lock-in risk and provides solution agility and new capabilities leading to further innovation, giving operators more deployment options and partnership resources to quickly address 5G issues and deliver the best possible customer experience.
- Increased virtualization of network functions extends cloud capabilities to the edge of the network, minimizing physical deployment limitations and costs to accelerate 5G penetration.

Open RAN architecture

The Open RAN architecture splits up a 5G base station into three functional units:

- Radio Unit (RU): Deployed on site near or integrated into the antenna, the Remote Radio Unit converts radio signals sent to and from the antenna into digital data for transmission. It controls the digital front end (DFE), the lower layer 1 (L1, physical layer) baseband processing, as well as fronthaul transport.
- Distributed Unit (DU): The Distributed Unit connects to multiple RUs and the Centralized Unit (CU) although physically closer to the RU. The DU handles real-time layer 1 (L1, physical layer) and lower layer 2 (L2, Data Link Layer) functions including MAC (Media Access Control) and RLC (Radio Link Control).
- Centralized Unit (CU): The Centralized Unit contains compute resources to function as a data center for the RU and DU. It controls DU operation, connects to the cellular network, and communicates with other base stations. The CU is responsible for performing non-real time, higher L2 and L3 (network layer) protocol stack workloads, such as the functions of RRC (Radio Resource Control) and PDCP (Packet Data Convergence Protocol). One CU can manage one or more DUs over the midhaul interface.

CU and DU are the computational parts of the base station and can be hosted on COTS-based (commercial off-the-shelf) servers using specialized software and virtualized functions to control networks.

Axiomtek's NA870 Network Server Enables 5G Open RAN Operations

Axiomtek's NA870 is a 3rd generation Intel® Xeon® Scalable CPU-based network server, with remarkable edge cloud and compute capabilities to help accelerate Open RAN deployments and enable greater security protection across the entire edge of the 5G network. This 2U rackmount network server can be deployed as a COTS server in a base station, where it can speed up edge compute workloads to enable real-time data processing for AI applications and optimize throughput to meet higher bandwidth and lower latency demands. The server also performs firewalling, authentication, and many other security-enhanced tasks in remote locations to protect the network from potential cyberattacks.

Powerful edge cloud computing

The NA870 can be configured as a single or dual LGA4189-socket server featuring the 3rd generation Intel® Xeon® Scalable processors (code name: Ice Lake-SP) to deliver up to 40 cores of processing power, along with higher base frequency to significantly improve throughput for handling virtualized network workloads. The server takes advantage of the CPU's higher memory bandwidth to include twenty DDR4-3200 R-DIMM memory slots with a memory capacity of up to 1,280 GB, while also providing two hot-swappable 2.5-inch SATA HDD trays as well as two M.2 Key M 2242/2280 with PCIe and SATA signal support for storage expansion.

Extensive connectivity

In terms of network interfacing, the server has two built-in Gigabit Ethernet ports, plus eight expandable NIC modules with a total of 64 LAN ports to support 1GbE/10GbE/Fiber/Copper/Bypass functions, allowing the server to manage multiple connected computers and serve network-intensive applications.

Advanced security capabilities

The NA870 provides a versatile on-premises network security platform to safeguard data exchange and storage across different networks. It features Intelligent Platform Management Interface 2.0 (IPMI 2.0) to enable remote management and monitoring of network servers and supports Trusted Platform Module 2.0 (TPM 2.0) to provide data encryption for hardware-based data protection. The NA870 also features Intel® Crypto Acceleration, a security technology incorporated into the 3rd generation Intel® Xeon® Scalable CPU, to enable greater performance for intensive crypto processing workloads and better protection across server, storage, and network infrastructure, allowing operators to prevent cybersecurity issues that may arise as a result of the highly distributed and remote nature of 5G networks.

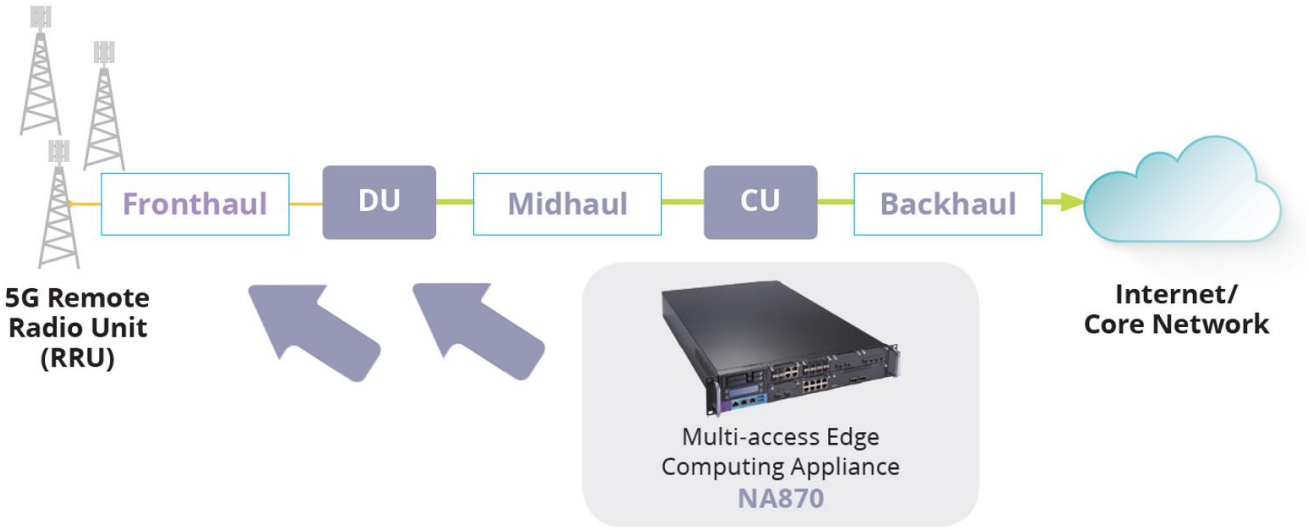
NA870 highlights

- Dual LGA4189 CPU sockets for 3rd gen Intel® Xeon® Scalable processors with 8 to 40 powerful cores (codename: Ice Lake-SP)
- 20 DDR4-3200 R-DIMM for up to 1280GB of memory
- 8 expandable LAN modules supporting 1GbE/10GbE/25GbE/40GbE/Fiber/Copper/Bypass
- Supports 100Gb Ethernet module with Intel® Ethernet controller E810 (AX93357/AX93358)
- PCIe gen 4.0 ready platform
- Supports onboard IPMI (optional)
- Intel® Crypto Acceleration (C627A)

*For detailed specifications, visit www.axiomtek.com and go to: Products > Systems & Platforms > Network Communication Platform > Rackmount Network Appliance > NA870.

How the NA870 Facilitates 5G RAN Operations

Leveraging the powerful 3rd Gen Intel® Xeon® Scalable CPU performance, the NA870 network server is perfectly suited for managing heavy communication workloads between the Centralized Unit (CU) and Distributed Unit (DU) within a 5G Open RAN network. The NA870 can be deployed in a 5G base station where it hosts and executes the CU software to process non-real-time L2/L3 data flows. Meanwhile, the server's computing power plus up to 64 network adapter ports allow it to coordinate multiple Remote Radio Units (RRUs) scattered in different edge locations, at the same time providing compute support for the Distributed Unit (DU) to handle real-time L1/L2 processing, thus significantly reducing network deployment costs. As virtualized radio access network (vRAN) architecture has been increasingly adopted into the 5G RAN to simplify the deployment of edge-based applications, the NA870 also supports the Intel® vRAN Dedicated Accelerator ACC100 to help offload CPU workloads and accelerate the compute-intensive process of RAN layer 1 forward error correction (FEC), enabling the RAN to deliver greater 5G performance and virtualized services.



The Axiomtek's NA870 network server coordinates 5G RAN operations in a base station.

About Axiomtek Co., Ltd.

Axiomtek has experienced extraordinary growth in the past 30 years because of our people, our years of learning which resulted in our tremendous industry experience, and our desire to deliver well-rounded, easy-to-integrate solutions to our customers. These factors have influenced us to invest in a growing team of engineers including software, hardware, firmware and application engineers. For the next few decades, our success will be determined by our ability to lead with unique technologies for AIoT and serve our key markets with innovatively-designed solution packages of hardware and software – coupled with unmatched engineering and value-added services that will help lessen the challenges faced by our systems integrator, OEM and ODM customers and prospects alike. We will continue to enlist more technology partners and increase collaborations with our growing ecosystem who are leaders in their fields. With such alliances, we will create synergy and better deliver solutions, value and the expertise our customers need.

Axiomtek is a Member of the Intel IoT® Solutions Alliance. A global ecosystem of more than 800 industry leaders, the Alliance offers its Members unique access to Intel technology, expertise, and go-to-market support—accelerating deployment of best-in-class solutions.