



# NEC Deploys Massive MIMO Radio Unit Powered by AMD Versal™ AI Core Adaptive SoCs

AMD adaptive computing technology enables advanced signal processing capabilities for massive MIMO antennas and beamforming

## PARTNER

Orchestrating a brighter world

# NEC

## INDUSTRY

Communications; 5G

## CHALLENGES

NEC wanted to build a new radio unit (RU) to support full digital beamforming with an open, front-haul interface. The solution needed to offer significant compute density and advanced high-speed connectivity to meet the throughput and low-latency requirements of 5G.

## SOLUTION

The AMD Versal™ AI Core adaptive SoC handles advanced signal processing and beamforming in the RU and has enabled NEC to achieve higher levels of hardware and software integration

## RESULTS

AMD technology has enabled further integration of both hardware and software, and the flexibility that will allow NEC to bring new products to market quickly.

## AMD TECHNOLOGY AT A GLANCE

Versal™ adaptive SoC

In the world of 5G, consumers often don't think twice about streaming music, videos, or large files to their smartphones. That's because the technology is so reliable and fast that they don't need to give it a second thought.

Part of this speed is thanks to Multiple Input, Multiple Output (MIMO) technology. It's been around for many years in the telecoms world, combining multiple antennas across mobile devices and networks with specialized algorithms to improve connectivity and enhancing user experiences.

With the addition of 5G new radio (NR) networks, massive MIMO (mMIMO) has been taking this technology to a new level by adding multiple antennas at 5G base stations to deliver even greater performance and better experiences for customers.

NEC is a leader in the communications space, serving many of the world's leading global communication service providers. Its radio units offer high performance and quality, and NEC has been a leading technology innovator in mMIMO.

AMD has been a technology partner with NEC for many years, dating back to its 3G and LTE wireless devices, so it was no surprise when the company decided to consider AMD for its next-generation massive MIMO radio unit (RU) design.

## CHALLENGE

NEC was looking to build a new RU to

support full digital beamforming with a standards-based open, front-haul interface. The solution needed to offer significant compute density and advanced high-speed connectivity to meet the enhanced throughput and low-latency requirements of 5G.

In a typical mMIMO radio configuration of 64 antennas, the beamforming device in the radio needs to perform more than 1.5 Tera Multiplications and Accumulations (TMACs) per second for downlinks, and additional computing for beamforming in the uplink direction, all while meeting challenging thermal and system footprint constraints of a field-deployed telco radio solution.

NEC chose the high-performance and scalable AMD Versal™ AI Core adaptive SoC for its design.

## SOLUTION

NEC's new massive MIMO RU supports full digital beamforming and has been developed with NEC's unique high-density design. It provides an open front-haul interface, which complies with the O-RAN Option 7-2x category B spec. The RU combines massive MIMO technology with digital beamforming technology to enable higher bandwidth and more efficient communications.

Also, the O-RAN interface provides a wide range of interoperability with equipment from a variety of vendors to enable open and flexible 5G RAN deployments.

The Versal™ AI Core adaptive SoC from AMD, powering this solution, handles advanced signal processing and beamforming in the RU and has enabled NEC to achieve higher levels of hardware and software integration and expand its market size, according to Tomoyuki Teramoto, director of the wireless access development department in the network service business unit at NEC.

The Versal™ AI Core series delivers breakthrough AI inference and wireless acceleration with integrated AI engines that deliver over 100X greater compute performance than today's server-class CPUs. The heterogeneous, multicore device features three scalar engines for applications processing and platform management, adaptable engines which allow users to create powerful accelerators for any application, and intelligent engines that provide high compute density for running complex AI algorithms.

Teramoto said that part of the decision to choose the Versal device was based on an evaluation of "whether the Versal™ platform would contribute to the competitiveness of our equipment, in terms of performance, cost, power consumption, and ease-of-development."

## RESULT

"In terms of performance and scalability, the Versal™ AI Core series platform offers advanced signal-processing capabilities for massive MIMO antennas and beamforming," Teramoto said. "This technology has also enabled expansion of our market size, advancement of semiconductor technology, further integration of both hardware and software, and the flexibility that will allow us to offer new products to the market quickly."

Teramoto added that during product development, "effective support was provided by AMD to each design base around the world at the appropriate timing."

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### About NEC

NEC Corporation has established itself as a leader in the integration of IT and network technologies while promoting the brand statement of "Orchestrating a brighter world." NEC enables businesses and communities to adapt to rapid changes taking place in both society and the market as it provides for the social values of safety, security, fairness, and efficiency to promote a more sustainable world where everyone has the chance to reach their full potential. For more information, visit NEC at <https://www.nec.com>.

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