SUPERMICRO DELIVERS SCALABLE ANSYS PERCEIVE EM SOLVER PERFORMANCE FOR WIRELESS PRODUCT & SERVICE DESIGNS

Supermicro Scalable GPU systems, Ansys Perceive EM, NVIDIA Omniverse Digital Twin Real-Time Simulation
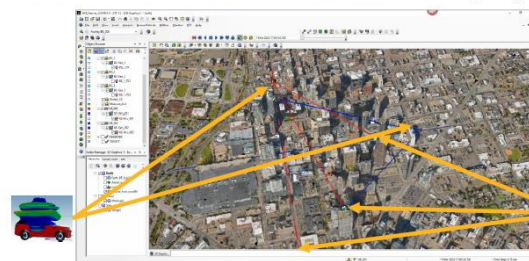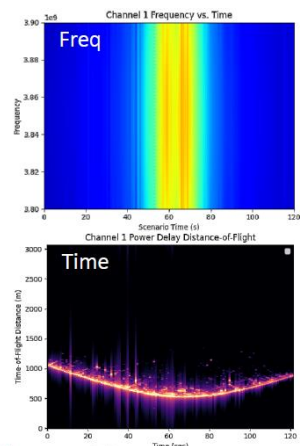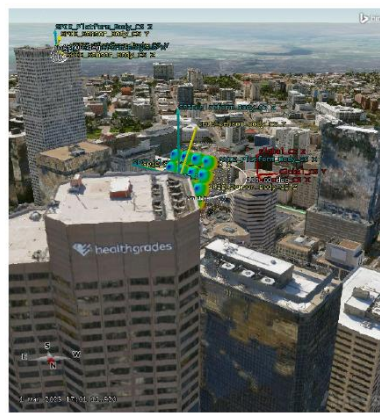
Executive Summary

Wireless communication and sensing are key components of most electronic products and services. Mobile 5G/6G, radar, or radio have brought about valuable services since the early days of the Apple iPhone. Today, these capabilities continually are finding new applications, from autonomous driving, 5G wireless communications, gesture recognition, detailed radar imaging, smart cities, smart agriculture, disaster response, remote healthcare, next generation entertainment, and AR/VR.

Powered by Ansys HFSS, the Ansys Perceive EM solver optimizes radio access network design in real-world conditions with elevated predictive accuracy. Combined with digital twin simulation in NVIDIA Omniverse, Ansys Perceive EM further shortens the time-to-market for these products and services.

Ansys STK RF Channel Modeler provides environment simulation for 5G/6G dynamic wireless channel modeling in dynamic virtual environments.
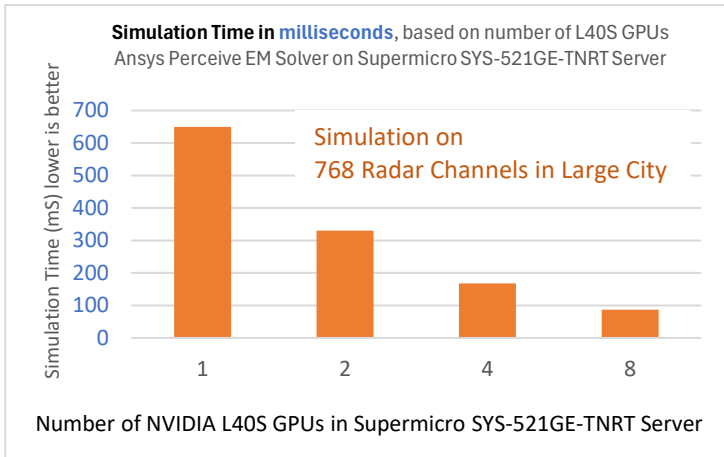
Supermicro partnered with Ansys to design a solution reference architecture using Supermicro's scalable GPU system supporting 8 NVIDIA L40S GPUs, which is optimized and validated for Perceive EM applications. This will minimize GPU server acquisition time while ensuring more predictable and effective performance.

Together, Supermicro collaborated with NVIDIA to bring real-time photorealistic rendering and accurate EM/RF simulation into digital twins.

Simulation Time in milliseconds, based on number of L40S GPUs
Ansys Perceive EM Solver on Supermicro SYS-521GE-TNRT Server

Simulation on
768 Radar Channels in Large City

Simulation Time (mS) lower is better

Number of NVIDIA L40S GPUs in Supermicro SYS-521GE-TNRT Server

For Products & Services using RF and EM

The Ansys Perceive EM Solver is a new field solver product that has the power to simulate RF sensors at real-time speeds and real-time channel polling rates. It is specifically tailored for modeling RF propagation in large virtual environments, and through its seamless API integration with NVIDIA Omniverse, users can simultaneously evaluate multiple domains, including radar, wideband communication channels, RF interference, and radio sensing, all within the same simulator. This ability to collect immediate feedback on the performance and functionality of RF systems in accurate bespoke environments will enable engineers to become even more efficient with projects such as optimizing layouts for telecom systems, designing radar sensors, and much more.

Ansys Perceive EM and NVIDIA Omniverse

Ansys Perceive EM is made for customers developing wireless communication solutions, such as modeling signal propagation through structurally dense environments like cities, factories, mountain/river terrain and for simulating radar systems. The Ansys Perceive EM Solver is specifically tailored for RF and EM domains, and through its API integration with NVIDIA Omniverse, users can simultaneously evaluate multiple domains, including radar signal bandwidth, all within the same simulator. Using Perceive EM, customers can create an end-to-end communication environment simulation, which can be incorporated into NVIDIA Omniverse, simulating dynamic scenarios with moving actors.

Ansys Perceive EM, Accelerated by GPUs

Using GPUs like the NVIDIA L40S, Ansys Perceive EM provides real-time high-frequency electromagnetic simulations, such as automotive radar and wireless 5G communications. Perceive EM sends out rays in the simulation, propagates electromagnetic energy through the scene, radiates to receivers, and computes full wireless channel models on the GPUs using CUDA and NVIDIA's RT cores.

Customers can integrate Perceive EM into their workflow via an API or purchase it as part of the Ansys RF Channel Modeler (RFCM) solution for wireless communications or in the Ansys AVxcelerate solution for automotive radar and autonomous driving applications.

As shown in the chart above, adding GPUs significantly shortens simulation time, providing more real-time response. This is critical for dynamic environments where radar and 5G wireless systems must respond to the behavior of other actors at real-time rates with many updates per second.

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Supermicro Systems for Scalable GPU Deployment
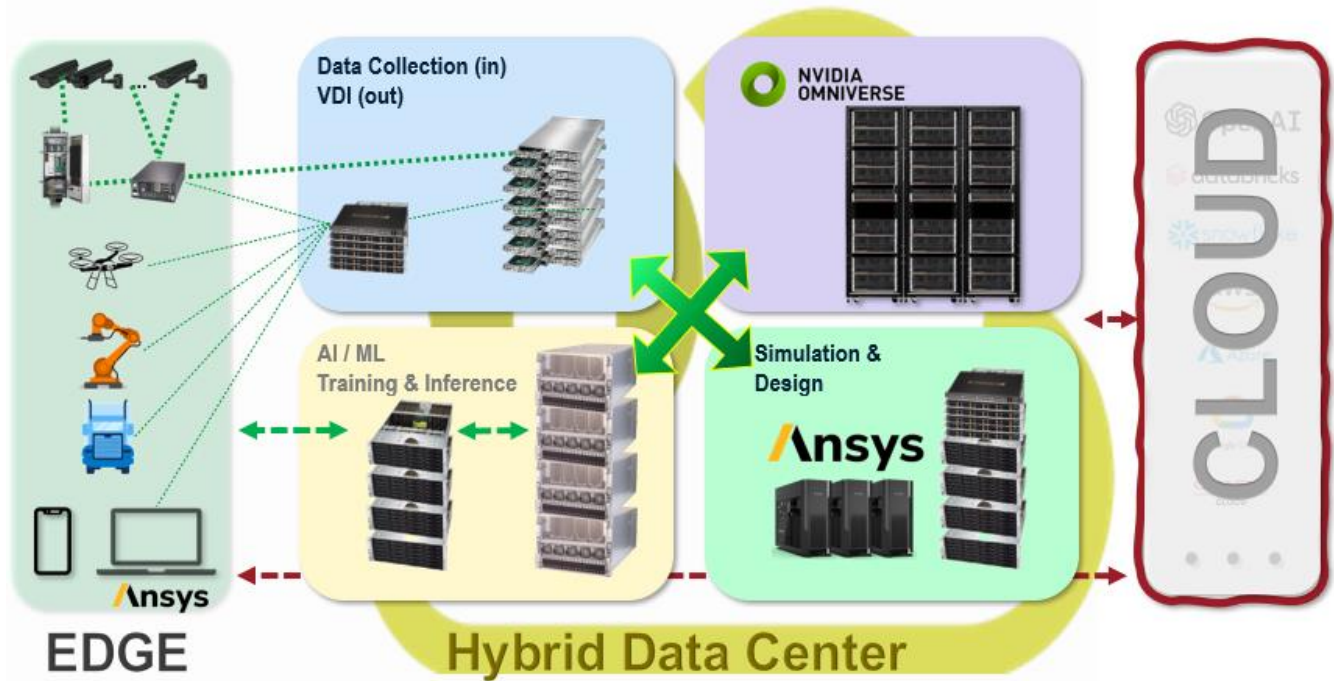
Supermicro offers the following choices to support up to **8 NVIDIA L40S** to run Ansys Perceive EM and NVIDIA Omniverse.

4U AMD 4th Gen EPYC	5U Intel 4th/5th Gen Xeon Scalable (Extended thermal)
AS -4124GS-TNRT	SYS-521GE-TNRT
Up to 6TB of memory	Up to 8 TB of memory
4 x NVMe U.2	8 x NVMe U.2
12 x PCIe Gen 5.0 x16 slots, 1 x PCIe Gen 5.0 x8 slot	13 x PCIe Gen 5.0 x16 slots

Reference Solutions

SYS-521GE-TNRT X13 5U 8GPU SAPPHIRE RAPIDS GEN5 PCIE DUAL ROOT SYS		
Component	**Description**	**Qty**
P4X-SPR8462Y+-SRMGP-MCC	SPR 8462Y+ 2P 32C 2.8G 300W(32/2.6/270,24/3/270)60M	2
MEM-DR564L-CL02-ER56	64GB DDR5 5600 ECC REG---MEM-DR564L-CL02-ER56	16
HDS-MMN-MTFDKBA960TFR-15	Micron 7450 PRO 960GB NVMe PCIe 4.0 M.2 TCG Opal 2.0, 1DWPD	2
HDS-TUN-KCD8XRUG3T84	Kioxia CD8 3.84TB NVMe PCIe 4x4 2.5" 15mm SIE 1DWPD,HF,RoHS	4
GPU-NVL40S	NVIDIA Ada L40S 48GB GDDR6 PCIe Gen 4th---GPU-NVL40S	8
AOC-653106A-HDAT	2-ports 200Gb HDR 200GbE QSFP56 Mellanox CX-6 VPI, Gen4 x16 LP	2
SFT-DCMS-SINGLE	Data Center Management Package (per node license)	1

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Conclusion

Supermicro offers systems that support 8 NVIDIA L40S GPUs, with a choice of Intel or AMD CPUs. Ansys Perceive EM has demonstrated nearly perfect scaling on these systems as more L40S GPUs are added. The combination of Supermicro hardware, Ansys software, and NVIDIA GPUs provides real time wireless communication and radar simulations, enabling scalable, physics-based sensor simulation of dynamic, dense environments critical to current and next generation products. Ansys Perceive EM can be combined with NVIDIA Omniverse to enable faster time to market for these wireless products and services, which are critical to developing accurate and responsive communication networks and radar digital twins that deliver results at the speed of real life.

For more information:

Supermicro 5U 8-GPU Server
Ansys RF Channel Modeler
Ansys Perceive EM

SUPERMICRO

As a global leader in high performance, high efficiency server technology and innovation, we develop and provide end-to-end green computing solutions to the data center, cloud computing, enterprise IT, big data, HPC, and embedded markets. Our Building Block Solutions® approach allows us to provide a broad range of SKUs, and enables us to build and deliver application-optimized solutions based upon your requirements.

ANSYS

For more than 50 years, Ansys software has enabled innovators across industries to push boundaries with the predictive power of simulation. From sustainable transportation and advanced semiconductors, to satellite systems and life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.