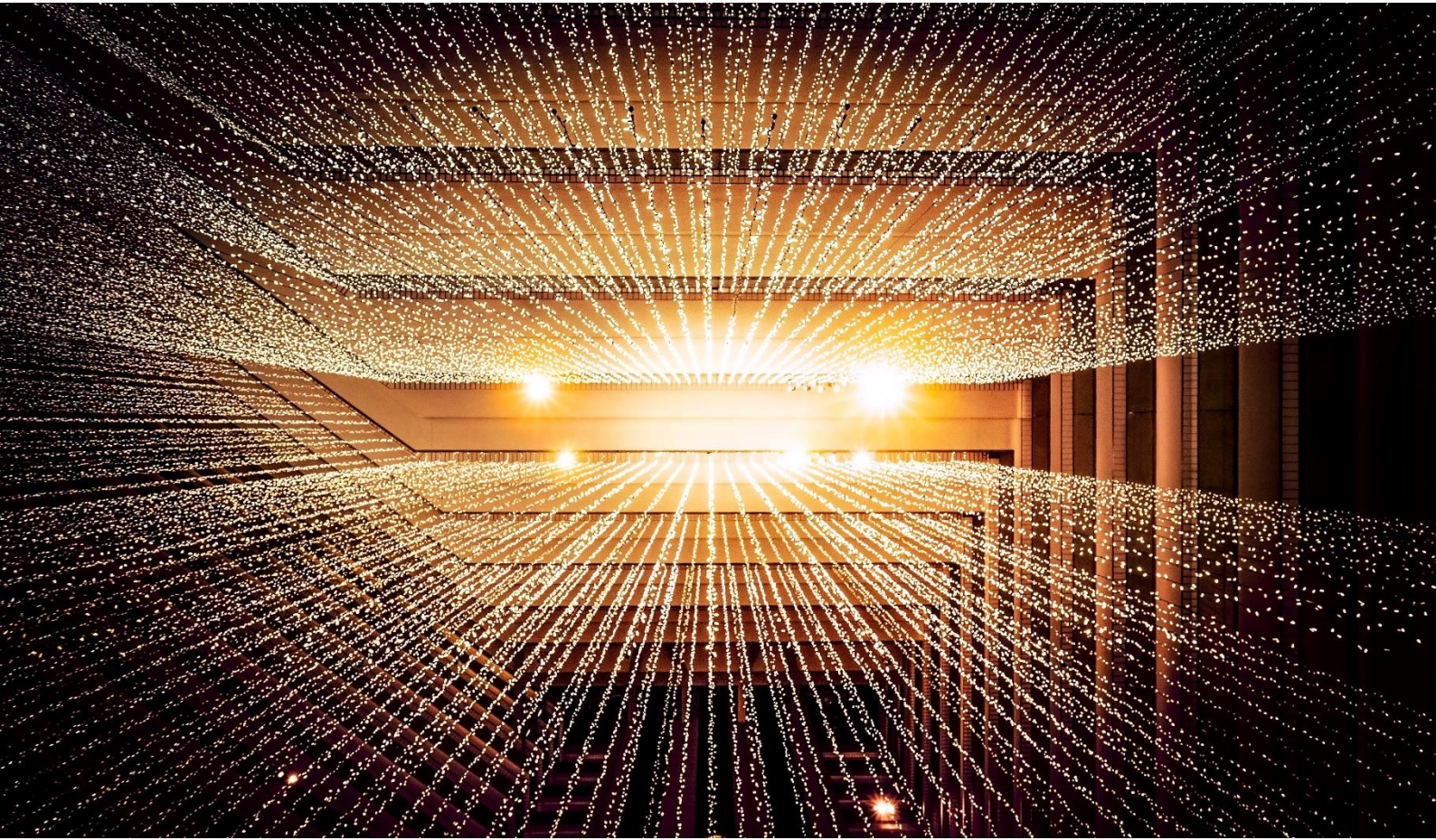




How edge computing will impact hardware

With connectivity increasing rapidly, alongside the need for low latency “real-time” data processing, it is no surprise that many companies are transitioning to the edge. However, with this transition, there is a strong requirement for edge computing hardware to be built for specific conditions for its different use cases with different hardware requirements for each.

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What is edge computing hardware?

Edge computing hardware refers to the physical components and the surrounding services that are needed to run an application at the edge. These components include servers, processors, switches & routers and the end device. To learn about other parts of the edge value chain, use our [Edge Ecosystem Tool](#).

Processors

Processors are composed of CPU, GPU, and memory storage. The CPU determines the performance of an edge computing system; a higher number of CPU cores means that the system can handle more workloads and complete tasks at a higher speed. GPUs are used to accelerate hardware and allow for performance computing to occur at the edge. GPUs can also allow for edge computers to store, process, and analyse large volumes of data. More recently, processors are being optimized and purpose built for edge and IoT, with built in AI accelerators and 5G support.

Servers

Servers are the hardware that run the compute at an edge location, within which a processor resides. Servers can be common-off-the-shelf, or specialised (depending on the processor). Servers may be more or less suited for different use cases based on their specifications and location. These include CDN edge servers, network edge servers on on-premise edge servers. Find out more about edge servers in our article: [What is an edge server?](#)

Routers & switches

An edge router is a device that is deployed to act as a gateway between networks in addition to connecting local networks to the internet or a WAN. An edge switch (also known as an access node) is a component located at the meeting point of two separate networks and connect end-user local area networks to internet service provider networks.

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Edge computing has a multitude of applications that operate in different conditions and locations. They require different hardware requirements depending on their use cases and industries. For example, for autonomous vehicles, it is necessary for real-time decision making for control of the vehicle, thus high performance hardware is a priority given the large amounts of data being processed in real-time, however, due to limited space in the vehicle, hardware size is also a constraint.

Additionally, for industrial uses, edge computing hardware should be rugged and be able to withstand shocks, vibrations, extreme temperatures, and dust due to exposures to harsh environments. To fulfil this, a fanless design could be used with a closed system, in which there are no vents required to be present to cool down the system and prevent dust and dirt from entering the computer and thus preventing damage. To prevent vibration damage, a "cableless design" could be used in which there is a lesser chance of a "loose connection" to cause a defect in the system and fewer moving parts. Data storage would be optimised by using solid-state drives (SSDs) - silicon chips - instead of hard drives (HDDs) - spinning disks - as they allow for faster data transfer and data storage. There is also less chance of data loss in accidental scenarios as fewer moving parts mean the system is less susceptible to damage from vibrations and shocks.

Due to a large amount of data being stored and processed in edge servers, they tend to heat up rapidly and therefore effective cooling systems are required. Air cooling is the most common system, however liquid cooling is also increasingly used in high-performance machines due to its greater heat capturing capacity. There are also initiatives to create sustainable and energy efficient powering solutions for edge computing

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hardware. [Over 40% of data centre energy consumption goes to cooling systems](#), and there is a push for more efficient cooling systems and renewable power sources given the large power consumption of edge computing hardware. Find out more about reducing power consumption in our article: [Edge computing - Changing the balance of energy in networks](#)

Examples of edge hardware

There are many companies developing products and solutions in the edge hardware space, across the value chain, from processors to servers and supporting services such as power and cooling. Below is a small sample of some of the new and existing ecosystem players and their innovations in edge hardware. These companies have been taken from our [60 Edge Companies article](#).

Intel

Intel is an American multinational chipmaker that develops and manufactures primarily processors, but they also offer a range of vision processing units (VPUs), field-programmable gate arrays (FPGAs), networking & connectivity products in addition to a line of SSD products. Intel has a large commitment to edge through its recent acquisitions of edge hardware providers such as Habana Labs and Movidius. Additionally, the company is collaborating with other companies involved in the edge space, such as Red Hat, to create more innovative products such as a [workload-optimised data node configuration for Red Hat Open Shift](#) using Intel Xeon processors and Optane. Recently in a business reshuffle under the new CEO Pat Gelsinger, Intel further iterated its commitment to edge by creating a core business unit for edge computing. In the future, Intel's Managing Director in India believes that edge computing will be "more and more prominent".

Hewlett Packard Enterprise

Hewlett Packard Enterprise (HPE) is an American multinational technology company that offers a wide variety of edge solutions including edge services, edge security and converged edge systems. It has specialised edge products, for example hardware converged edge systems that are ruggedised to cater for a variety of harsh operating environments. Additionally, it provides standalone edge server blades - compact devices that distribute and manage data in a network. HPE is committed to edge, with CEO Antonio Neri stating "the enterprise of the future is edge-centric, cloud-enabled and data-driven", whilst creating an "intelligent edge practice" for the company. Furthermore, HPE seeks to have a "partnership first" attitude to achieve its "edge to cloud vision" through strong collaboration and innovation.

Iceotope

Iceotope is a UK-based edge facility, power, and cooling provider. Its main offering is a chassis-level liquid technology. The company cites that space constraints, rising chip & rack densities, water use regulations and the societal pressure of reducing energy consumption drives its mission of developing high quality cooling technologies. It recently partnered with Lenovo, Schneider Electric and Avnet to take HPC to the edge with Lenovo's ThinkSystem high performance servers to the edge. Iceotope is committed to sustainability and was named as one of the Sunday Times BGF 10 Green Tech to Watch UK Companies. In 2021, it is focusing on how to bring more sustainable data centres by saving water and using more efficient liquid cooling solutions.

NGD Systems

NGD Systems is an American computational storage provider. It created the world's first computational storage device and recently released the entire portfolio of computational storage drives (NVME SSD) to the edge market to production. It is increasing partnerships with other edge companies, for example with Trenton Systems, a rugged cyber-secure system provider, to collaborate and create ruggedised, high-capacity

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computational storage devices (CSDs). The company is seeking more partnerships and continuing to develop new products - especially for organisations with processing needs or public clouds wishing to offer edge services. The CEO, Nader Salessi said, "NGD is solving issues that no other legacy storage architecture can address".

Dell EMC

Dell is a large American multinational technology company that has significant investments in the edge market. The portfolio is segmented into three types of edge computing hardware: Mobile Edge, Enterprise Edge and the IoT Edge for different user sizes and use cases. Dell is committed to edge computing with its UK vice president Rob Tomlin stating, "edge is the future, and those that fail to embrace it now are likely to be left behind". The CEO, Michael Dell, made it clear that the company's investment in this industry is "accelerating and not going to slow down".

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Or visit STL Partners' Edge Hub

www.stlpartners.com/edge-computing