

The Growing Need of Industrial PCs with 10 GbE Networking Capabilities

In today's rapidly evolving industrial landscape, the demand for high-performance computing systems at the network edge is on the rise. Industrial edge PCs with 10Gbit Ethernet ports have emerged as powerful tools for processing the data intensive applications of the edge. These specialized devices pack high-performance processing, storage and networking in a compact ruggedized enclosure that withstands harsh environments. High performance industrial PCs enable low-latency data processing, real-time analytics, and seamless connectivity.

In this article, we explore the characteristics of industrial edge PCs, the importance of 10G networking in the edge and its impact on various industries.

Background

Industrial edge PCs are designed to operate reliably in harsh industrial environments. Unlike traditional computing systems, edge PCs should withstand extreme temperatures, dust, shock and vibrations. They need to be compact to enable simple deployment in the field. These requirements are not difficult to meet using low-power hardware but are significantly more challenging for a high-performance system as required by today's resource-intensive applications such as edge AI, robotics, industrial automation, cyber security and more.

Effectiveness of high-performance edge PC is often limited by low-bandwidth networking. 10G networking is a key enabling feature. Let's explore some of the use cases.

A typical edge environment involves many devices with 1 GbE port. 10G port in the edge PC allows real time reliable communication with many devices through an Ethernet switch.

Most edge applications involve online processing in the cloud or in an enterprise data center. 10G link to the data center allows higher data rates and improved response time. Often multiple industrial edge PCs must work in sync onsite and quickly transfer a high amount of data between them. 10G LAN is ideal for that.

A common use case for an industrial edge PC is a gateway in remote locations where wired WAN connection is not possible. In these scenarios a 5G network is often utilized, which can provide bandwidth well above 1 Gbps. To take full advantage of the high bandwidth of 5G the gateway PC requires 10G ports for communication with its connected devices.

Some industrial edge PCs operate offline where connected sensors stream large amounts of data into the edge PC storage. An example is a vehicle PC connected to cameras and additional sensors doing street mapping. Terabytes of data must be downloaded daily for further processing. 10G interface in the edge PC allows completing download in a timely manner.

Applications

In manufacturing, these devices enable real-time monitoring, machine control, and data collection, supporting production system synchronization, predictive maintenance, and automation initiatives. In smart cities and infrastructure management, they facilitate real-time data processing and analytics for optimized resource allocation and efficient urban planning.

Transportation and logistics benefit from industrial computers with strong networking capabilities by enabling real-time tracking, efficient routing, and intelligent fleet management. These devices ensure reliable communication between vehicles, warehouses, and distribution centers, enhancing operational efficiency and reducing costs.

Energy and utilities industries leverage industrial computers and edge PCs for monitoring and controlling complex energy systems. With 10G networking, these devices enable high-speed data acquisition, facilitating grid optimization, predictive analytics, and intelligent energy distribution.

Modern healthcare involves large amounts of data with restrictions on compression. Industrial computers with 10G networking enhance patient monitoring, streamline medical imaging processes, and facilitate real-time communication between medical devices. These devices contribute to improved diagnostics, patient care, and data security.

SolidRun Bedrock packs dual 10G and 8 Core AMD Embedded Ryzen CPU in a compact fanless enclosure

SolidRun, a leading developer in edge computing, is now shipping Bedrock V3000. This compact high-performance fanless industrial PC is based on AMD Ryzen™ Embedded V3000 Processor. Ryzen V3000 is a 7nm 8 Core CPU with integrated dual 10 GbE ports.

SolidRun Bedrock V3000 is a ruggedized fanless edge PC that can be easily deployed in harsh conditions thanks to its compact size and wide temperature range support. Bedrock V3000 provides the highest performance for a fanless PC this size with high power efficiency and integrates dual 10 GbE ports, four 2.5 GbE ports, DDR5 RAM, up to three NVME gen 4 storage devices, 5G modem and WiFi 6E. All ports are conveniently arranged on a single panel for easy integration and service, for example mounting Bedrock on a DIN rail.

This unique set of properties makes Bedrock V3000 an ideal platform for demanding edge applications which must not compromise on processing power and networking performance, yet require reliable operation in challenging environmental conditions.



Summary

High-performance industrial edge PCs with 10 GbE networking are a building block that enables many industries to reach a new level of efficiency. These new edge PCs improve all aspects of edge computing – data acquisition, processing and analytics at the edge, high speed communication and low latency cloud computing. Robustness, small form factor and easy integration allow seamless deployment of these new edge PCs in existing infrastructure.

This new generation of edge PCs is adopted in all industry segments with surging data requirements, from manufacturing and transportation to energy and healthcare, helping to achieve higher efficiency, reliability, and productivity.

Learn more about Bedrock V3000:

<https://www.solid-run.com/fanless-computers/bedrock-v3000-basic/>