White Paper

IP-based Communications Build up Smart Factories

Built upon Industry 4.0, the essence of smart factory lies in a well-connected communication network which allows for automated manufacturing, remote production monitoring, and smooth operations. The communication network as a key role for smart factories helps integrate data from sensors and manufacturing equipment, making it possible to apply big data analysis to optimize production, logistic, and inventory management.

"Factory owners must build a smart factory step by step" said Hadwin Liu, Chief Architect of NEXCOM Network and Communication Solutions Business Unit. "Establishing efficient and secure industrial communication architecture is critical."

Flexible Industrial Communications Meet Demands

The circuit switching method, commonly used in traditional industrial communication architecture, has several drawbacks. The connection holds a physical link and has dedicated bandwidth which cannot be shared and leads to poor transmission efficiency. The maintenance is complicated and time-consuming. Industrial Ethernet, on the other hand, adopts packet switching method which uses virtual circuit, supports full duplex operation, allows bandwidth to be shared among nodes, and supports traffic prioritization. The installation and maintenance is also simpler.

Take remote monitoring for instance. The monitored data takes many forms including sensor readings, manufacturing variables, optical inspection images, and live videos. The industrial Ethernet with greater flexibility in sharing bandwidth and connecting field devices can help managers get real-time status required to detect abnormality.

Still, on the factory floor there are plenty serial-based devices and devices using different protocols too critical to be replaced overnight. Liu suggests that factory owners can take a small step by deploying industry Ethernet switches in pursuit of better transmission efficiency. Also, gaps between intranet and control layer can be bridged, allowing management mechanism to be created.

Enhanced Network Security with VPN and Industry Firewall

"Cyber attacks are inevitable as long as companies rely on internet connection. Virtual private network (VPN) and industry firewalls must be deployed for network security," Liu reminds. "Industry firewalls are used to protect asset. VPNs are encrypted tunnels that keep messages from eavesdropping or tampering, which secure remote access."

Despite of high availability of commercial VPNs and firewalls, their protection level and durability are different from industrial ones. Industry firewalls feature stateful inspection firewall technology to allow only authorized packets to pass. Also, industry firewalls support industrial protocols for deep packet inspection. With extended temperature support design, industry firewalls are highly reliable under harsh operating environments. With multiple years cultivating in industrial communication, NEXCOM offers industry VPNs and Firewalls paving ways for factories' IP migration.

IP-based Communications Remain Hot within Next Decades

Although having dire needs for data-based decision making and optimized management, many factory owners are hesitant to replace legacy control systems. Still, factory owners can start building IP-based communications with industry switches or gateways while turning to a larger scale migration with internet-connecting systems during equipment replacement.

As for factories such as wind farms located on remote sites, industrial Ethernet is a good choice for operation monitoring, allowing operators to access real time operation status from afar. Newly built plants are also segments that have faster and smoother IP deployment due to existing IP-friendly infrastructure. The IP-based communication still has decades to go before industrial Ethernet is fully embraced in factories.

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The Intelligent Systems

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