Simple (and) safe

MS Ultraschall Technologie GmbH networks machines with WALL IE from Helmholz

As a globally active mechanical engineering company, MS Ultraschall Technologie GmbH is confronted everyday with the requirement of safely integrating machine networks into higher level production networks. With the Industrial NAT/gateway and WALL IE firewall from Helmholz, the ultrasound experts based in Spaichingen in Baden-Wuerttemberg have found a solution to this task that is as reliable as it is practicable.

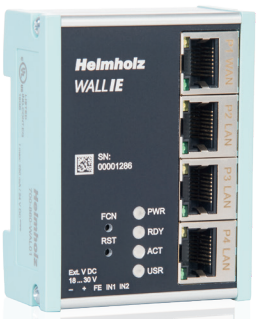
Fast, secure, and precise: ultrasound effortlessly melts thermoplastics through high frequency vibrations and thus ensures a very strong connection of the two join partners in a short time. There is thus good reason why many automotive suppliers, but also other plastic processors worldwide trust in this process. A technology leader in this segment is MS Ultraschall Technologie GmbH: around 350 special and series machines leave production in Spaichingen in Swabia each year.

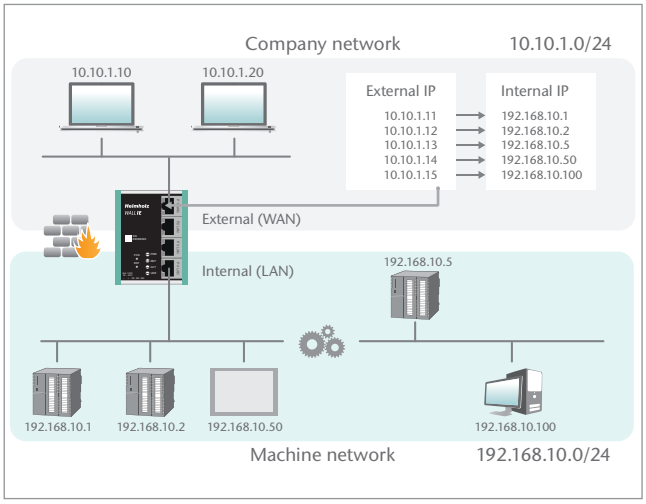
The advance of Ethernet networking, or more specifically the change from Profibus to Profinet, of course doesn't stop at MS Ultraschall Technologie GmbH, as Mr. Maucher from the Electrical Design department explains: "In recent years, an ever increasing number of customers have called upon us to integrate our machines or their machine networks into a higher level production network."

Focus on cybersecurity

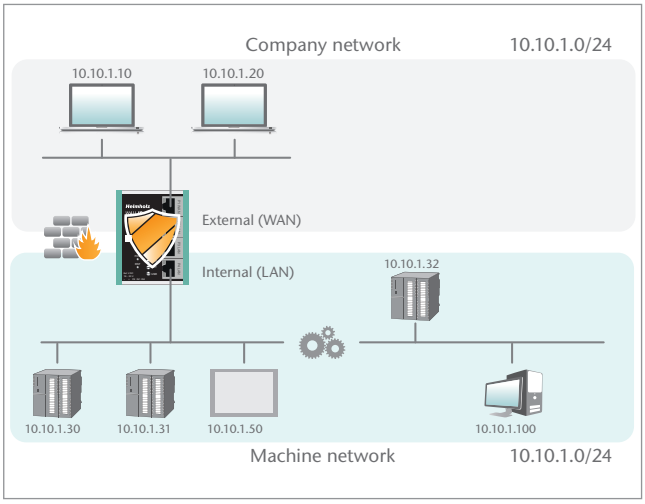
This initially seems technically practicable: The machine network, meaning the network of an automation cell with one or more machines, is thereby to be considered as a LAN (Local Area Network), the production or company network as a WAN (Wide Area Network). However, the situation becomes significantly more complex when considering the indispensable cyber-security.

In order to effectively protect control systems and automation networks from external attacks, the machine





Basic NAT (also known as “1:1 NAT” or “Static NAT”) is the translation of individual IP addresses and of complete address ranges.



In the bridge operating mode, WALL IE behaves like a switch with packet filter between the automation cell and the production network.

network must be securely integrated into the higher level production network or be separated from it.

Until several years ago, the realization of such an interface was only possible by being complex firewall solutions. However, these are by nature oversized for this special use, thus also highly expensive and complicated in terms of handling. Therefore, it was clear to. Mr. Maucher and his colleagues from MS Ultraschall Technologie GmbH: “We need a practicable solution.” It was found in 2015 at the “SPS IPC Drives” trade fair, where Helmholz presented the NAT Gateway and the Firewall WALL IE for the first time. “What a lucky find!“ as Mr. Maucher remembers.

WALL IE as a high-performance helper

The robust and uncomplicated Ethernet components allow easy integration of machine networks into the higher level production network. In concrete terms, the protects the networks by precisely regulating which participants may communicate and exchange data with which device.

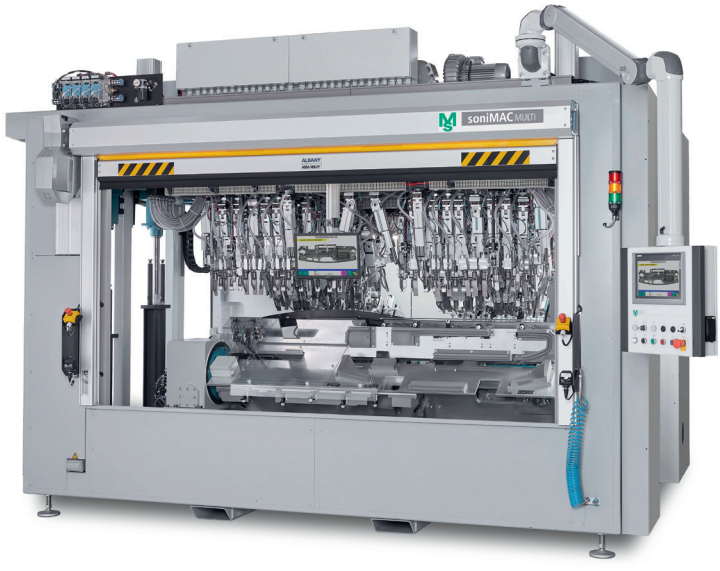
Through individual configuration through the web interface, WALL IE adapts to the respective requirements of the existing machine network. The restriction of access rights to authorized persons is therefore the basis for the protection of the automation network.

In the process, the networks or IP addresses behind WALL IE remain hidden and are not visible from outside. If the company network is now threatened by a virus or malware due to a hacker attack or the negligence of an employee, the automation network behind WALL IE remains unaffected and correspondingly secure.

Packet filter regulates data transfer

The prerequisite for this is by a packet filter functionality: with the packet filter, security is increased to the extent that only desired communication takes place. Unnecessary data transfer is blocked – broadcast or other protocols and ports. As a consequence, access between the factory network and the machine network is optimized. IPv4 addresses, protocol (TCP/UDP), ports, and MAC addresses are currently available as filter criteria on layers 3 and 4.

As another special feature, WALL IE can be used in both the NAT operating mode and as a bridge. In the bridge operating mode, WALL IE acts as a layer 2 switch. As opposed to normal switches, packet filtering is also possible in this operating mode. This means that the restriction of access to individual areas of your network can be achieved without having to use different networks for this purpose.



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WALL IE supports Industrial Ethernet with a transmission rate of up to 100 Mbps. The software foundation is Linux-based and was completely developed by Helmholz itself. The hardware is industry-compatible, robust, and suitable for installation on the DIN rail. The configuration of WALL IE takes place quickly and easily via a responsive web interface. The Helmholz developers let their many years of experience from the TB20 ToolBox flow into the clearly structured user prompting. Online access is subject to strict password protection and runs over an encoded HTTPS connection.

NAT operating mode

When using Network Address Translation (NAT), WALL IE offers the possibility to leave the IP addresses of the machine as they are, but to enable communication with the machine network with own IP addresses from the production network.

In the NAT operating mode, WALL IE forwards the data traffic between various IPv4 networks (Layer 3) and uses packet filters for limiting access to the automation network behind it. In the process, address translation by way of Network Address Translation (NAT) is supported. Collisions that might otherwise be caused by the unambiguous addresses in the overall network are thus being avoided. Static routes are used for communication with other automation cells. For this purpose, the network and the address of the responsible router ("Next Hop") must be configured only.

WALL IE supports two NAT functionalities in the router operating mode: Basic NAT and NAPT. Basic NAT (also known as "1:1 NAT" or "Static NAT") is the translation of individual IP addresses and of complete address ranges. The translation takes place exclusively at the IP level, which means that all ports can be addressed without explicit forwarding. In the case of NAPT (Network Address and Port Translation, also known as "1:N NAT" or "Masquerading") on the other hand, not only the IP addresses, but also the port numbers are rewritten. All IP addresses of the automation cell are translated into a single IP address of the production network. The sender addresses of packages from the automation cell are replaced by this adress.

The DHCP protocol (Dynamic Host Configuration Protocol) allows an automatic assignment of addresses and DNS names per DHCP server on the LAN and DHCP client on the WAN side. In addition, specific rules for each individual port are no longer require, because entire port ranges are bundled by way of wild cards.

SNAT- simple integration

With the "SNAT (Source NAT)" function, WALL IE transparently forwards the incoming data traffic on the WAN side to the LAN network. In the process, all outgoing data packages are provided with the sender IP address of WALL IE. The defined parameters of all LAN participants remain therefore unchanged as a result and the entry of a "gateway" is no longer necessary. This is a considerable advantage for the integration into existing network structures.

All specifications for WALL IE can be defined and configured user-specifically. Helmholz also offers its customers the added value through individualization as a service. The custom configured firewall is delivered ready-to-use, and must tnly be connected-with power.

Positive practice experiences

MS Ultraschall Technologie GmbH already delivers half of the special machines with WALL IE as a standard, or one per week on average. The decision for WALL IE from Helmholz thus has long since paid off according to Mr. Maucher: "It is really a great product," the electrical designer summarizes, "and this not only because of the reliable hardware and simple menu prompting." He is also convinced by the philosophy behind it: "Instead of the port, which we place behind WALL IE, the customer or user only sees one single IP address – and this makes it really easy for him!"

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