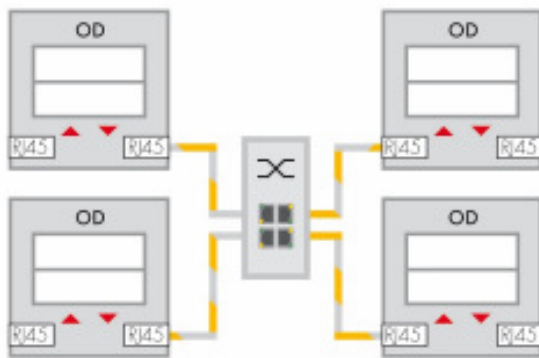


How do Industrial Ethernet Switches function and which role do they play at SafetyNET p ?

A switch is a network component which connects several Ethernet partners and network segments in a local network (LAN). Switches also have the task of analysing network traffic and making logical decisions, for this reason they are also known as intelligent hubs.

Basic switches function on layer 2 (link layer) of the OSI model. The switch processes the 48 Bit long MAC addresses (z. B. 08:00:20:ae:fd:7e) and attaches a SAT (Source-Address-Table), in which the physical port, which receives this information, is saved along with the MAC address. Unlike the Hub, the network packets are now only transferred to the port in the SAT with the relevant destination address. If however, the destination address is unknown (learning curve), the switch will direct the packet concerned into all active ports. From the network's perspective, the number of packets in the segments is drastically reduced, this is due to the fact that communication between the machines predominantly takes place within the segments. Switches therefore reduce the network load - the main advantage of switches compared to hubs. The most important switch duties are the "store and forward principle" and the "cut through principle". The store and forward principle is the usual duty, whereby complete Ethernet telegrams are received and then forwarded. With the cut through principle, only the MAC destination address is evaluated and the telegram is then forwarded immediately, this reduces the processing time. Standard switches are unsuitable for hard real time communication with micro-second cycle times due to their unpredictable delay times. For this reason SafetyNET p recommends standard switches only for application in the soft real time range.



In so called RTFN networks they are used to realise star and tree topologies. Above all, standard switches should be avoided in line topologies, due to the fact that the delay times accumulate as a result of consecutive switches. For this reason, an optimised switch function was integrated for the SafetyNET p partner for hard real time communication. In the so called RTFL (Real Time Frame Line) the telegrams are processed in throughput (Cut Through). This means that whilst the telegram is being received at one port it is already released at another port. The partner reads or writes the data in throughput in the frame. The reduced, fast switch function is possible due to the fact that every partner in a line topology knows his predecessor and successor. The delay times in RTFL are so low that cycle times of up to 62.5 micro seconds are possible.

