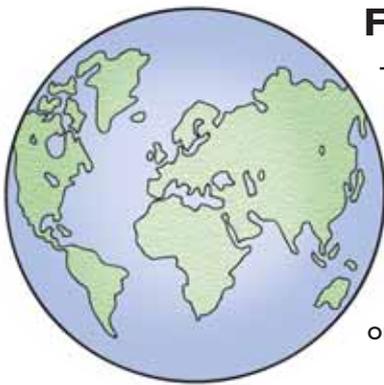


Local communication



Fieldbuses

Today, each part of a modern automation system must have the capacity to communicate and have uniform communication paths. Data communication requirements are increasing all the time, both horizontally on a field level and vertically through more hierarchical levels. A fully integrated data communication solution for industry usually involves all these elements. This applies to everything: sensor signals, which in turn are connected to instruments, valves, motors etc. These underlying system components communicate with main control systems or industrial computers where an application is executed.

This is the basis for the concept of fieldbuses, but what is a fieldbus really? In simple terms you can say fieldbuses are a little like the Internet, but for industry. Fundamentally they allow machines and other equipment to be linked to each other in a network. This allows devices to communicate with each other and with other systems. When the idea emerged at the end of the eighties the driving force behind it was the desire to shorten installation times and cable routing, in other words it should be less expensive. Gradually this aspect has diminished in significance and today it is more a question of the exchange of information. You can say that the fieldbus of tomorrow will be more and more like the Internet and perhaps even based on the same technology.

The international standardisation of fieldbus systems is vital as to how they are accepted and established. IEC 61158 is a standard that describes fieldbuses, the standard has the title: "Digital Data communication for measurement and control. Fieldbus for use in industrial control systems" and is divided into 6 parts.

| IEC 61158 document | Contents | OSI layers |
|--------------------|--|---------------------|
| 61158-1 | Introduction | |
| 61158-2 | Specification and definition of services | Layer 1 Physical |
| 61158-3 | Service definition | Layer 2 Data link |
| 61158-4 | Protocol specification | Layer 2 Data link |
| 61158-5 | Service definition | Layer 7 Application |
| 61158-6 | Protocol specification | Layer 7 Application |

Different Fieldbuses

A number of different media are used within industrial communications such as: copper cable, fibre optics, infrared transfer or radio technology. Fieldbus technology has been developed with the intention of replacing the earlier systems with standardised solutions. Due to different needs, different fields of application and some major manufacturer's own solutions there are currently several bus systems available on the market with different characteristics and which are more or less open. A comprehensive comparison of the most common fieldbuses is presented below.

| Fieldbus | Developed by | Standard | Topology | Media | Max. range | Communication method |
|-------------------------|--------------------------------------|-------------------------|--------------------------|--------------------------|--|--|
| PROFIBUS DP/PA | Siemens | EN 50170/ IEC 1158-2 | Bus, star, ring | Twisted pair or fibre | 100 m (328 ft) at 12 Mbit/s | Master/slave Peer to peer |
| INTERBUS-S | Phoenix Contact, Interbus club | DIN19258 EN 50254 | Ring | Twisted pair or fibre | 400 m (1312 ft)/ segment 128 km (79.53 mi) total | Master/slave |
| DeviceNet | Allen-Bradley ODVA | ISO 11898 ISO 11519 | Bus | Twisted pair | 500 m (1640 ft) (speed dependent) | Master/slave Multimaster Peer to peer |
| LONWORKS® | Echelon Corp. | | Bus, ring, loop, star | Twisted pair or fibre | 2000 m (1.25 mi) @ 78 kbit/s | Master/slave Peer to peer |
| CAN open | CAN In. Automation | CiA | Bus | Twisted pair | 25 – 1000 m (82 – 3283 ft) (Speed dependent) | Master/slave Peer to peer Multicast Multimaster |
| Ethernet | DEC, Intel, Xerox | IEEE 802.3 | Bus, star | Twisted pair or fibre | 10/100 Base T 100 metres (328 ft) | Peer to peer |
| Modbus Plus | Modicon | | Bus | Twisted pair | 450 metres (1476 ft) per segment | Peer to peer |
| Modbus RTU/ASCII | Modicon | EN 1434-3 ICE870-5 | Bus | Twisted pair | 1000 metres (0.62 mi) | Master/slave |
| Data Highway Plus (DH+) | Allen-Bradley | | Bus | Twisted pair | 3000 m (1.86 mi) | Multimaster Peer to peer |