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