Overview of Fieldbus Technologies

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Fieldbuses traditionally addressed two main areas. The first was the need for the distribution of Inputs/Outputs (IO) cards to save on wiring costs. The second was the need to communicate between the "Islands of Automation" on the plant floor. The technology and the user needs have progressed since then and currently there are at least three additional factors, which should enhance fieldbus functionality:

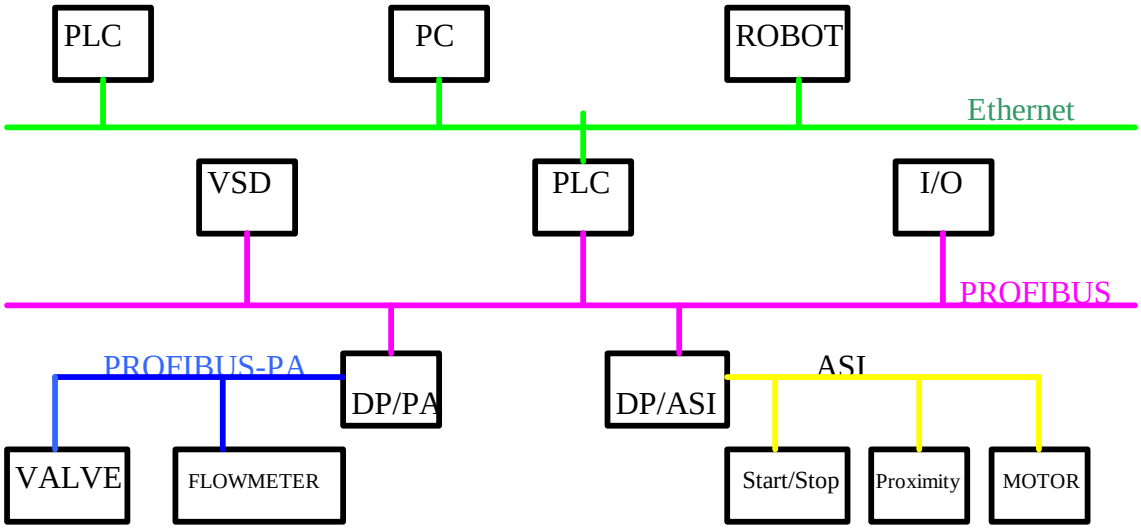
1) As the distribution devices continue to individual IO levels, and addition of start buttons, stop buttons, pilot lights, proximity sensors, and measuring instruments directly onto the fieldbus continue to grow, the maintenance, diagnostics, configuration, and calibration of these devices need to be addressed by the filedbus.

2) Up until recently, Ethernet was mainly used in Office Automation. As the non-deterministic issue of Ethernet is addressed by switching technologies and the higher speeds, the gap between the Office Automation and Industrial Automation begins to diminish, and fieldbuses are expected to move to what was the IT domain not so long ago.

3) Generally hard-wired systems, and dedicated fielbuses have been used in safety related applications in the past. There is move to use fieldbus for most of these applications. This entails introduction of new hardware and software layers to increase functionality of the filebus to operate in safety related areas.

Therefore the collective influence of these three factors is forcing the fieldbus suppliers to move down, and up, and sideways simultaneously. IEC61158 & IEC61784 specify 10 different types of fieldbuses[1]. All these fieldbuses are competitors and are addressing all or most of these functionalities continuously.

[1] Foundation Fieldbus(Type1), ControlNet(Type2), PROFIBUS(Type3);P-Net(type4), Foundation Fieldbus, HS Ethernet(Type5), SwiftNet(Type6),WorldFIP(Type7),Interbus-S(Type8), FMS for Foundation Fieldbus(Type9), PROFInet(Type10).



We will consider PROFIBUS-DP as an example to explain the development phases, which the technology has gone through. The basic technology is a Master/Slave communication which caters for the distribution of IO cards (passive slaves) and communication between "Islands of Automation"(active slaves). If we look at the three areas mentioned above:

1) PROFIBUS provides the interface to individual discrete IO using interface to ASI(Actuator Sensor Interface) bus for manufacturing applications, and PROFIBUS-PA offers a similar functionality for process applications.

2) PROFInet is the Ethernet-based automation standard of PROFIBUS International. It is a component-based model, and offers Soft Real Time transfer of data using TCP/IP.

3) PROFIsafe is an additional software layer to ensure the reliability of the message delivery. If we consider analogy with postal service, PROFIBUS is the normal mail, while the PROFIsafe is the Special Delivery Service. A similar development is also made at the lower layer with ASI bus, with the introduction of ASI-safe.

As the technological developments continue, you may wonder "Is there a future for fieldbuses?". One scenario is that the Ethernet will squeeze the fieldbuses out of existence, and all devices would have their own IP address communicating over Ethernet . The other scenario is that fieldbus suppliers will embrace Ethernet in one form or other and the fieldbus wars continue, all be it at a higher level.

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