Network Connectivity Catalog

devicenet . profibus . ethernet

BradControl™

BradConnectivity™

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For nearly 30 years the **Brad**® name, which includes such product lines as Brad Harrison®, mPm®, SST™, applicom® and RJ-Lnxx®, has been recognized for innovation and reliability by offering the products you need to support your automation applications from leading edge technology to complete systems. It is our goal to become your preferred global resource to help optimize factory automation and connection to the office suite.

Brad products provide the tools required to build, validate, diagnose and maintain reliable automation systems. Developed for both harsh and in-cabinet environments, Brad products can be found in applications where dedicated point-to-point wiring systems and industrial networks are used.

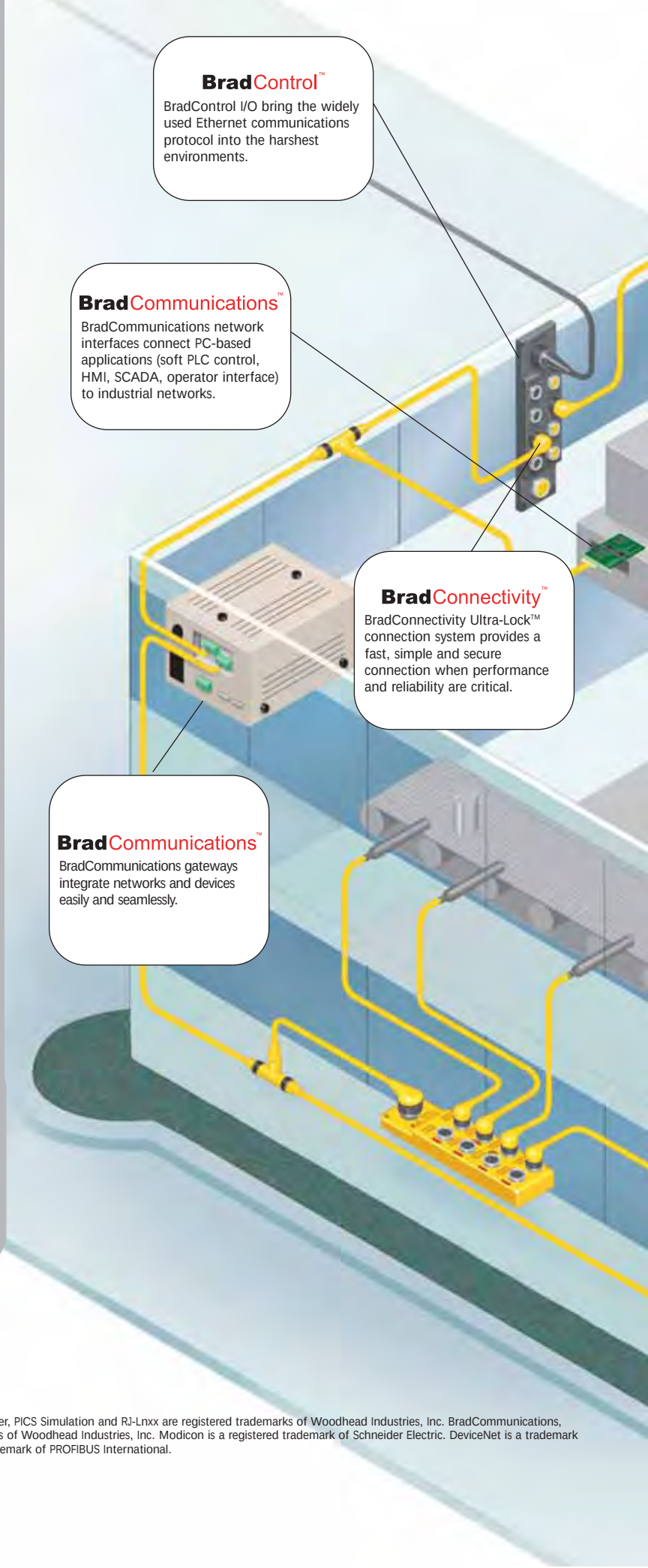
BradConnectivity™ – connectors, cordsets and distribution boxes for sensor, actuator and bus network applications

BradCommunications™ – network interface cards, gateways, simulation software and diagnostic tools

BradControl™ – network I/O for harsh and in-cabinet applications

BradPower™ – modular, flexible wiring systems for machine power distribution and motor control

This Network Connectivity Catalog is designed to offer you product solutions for connecting the most common networks used on the factory floor, including DeviceNet™, PROFIBUS®, and Ethernet. It not only allows you to specify high quality interconnectivity products but provides valuable guidelines on commissioning and designing a system. As part of our on-going commitment our technical support staff can provide guidance on your specific application needs.



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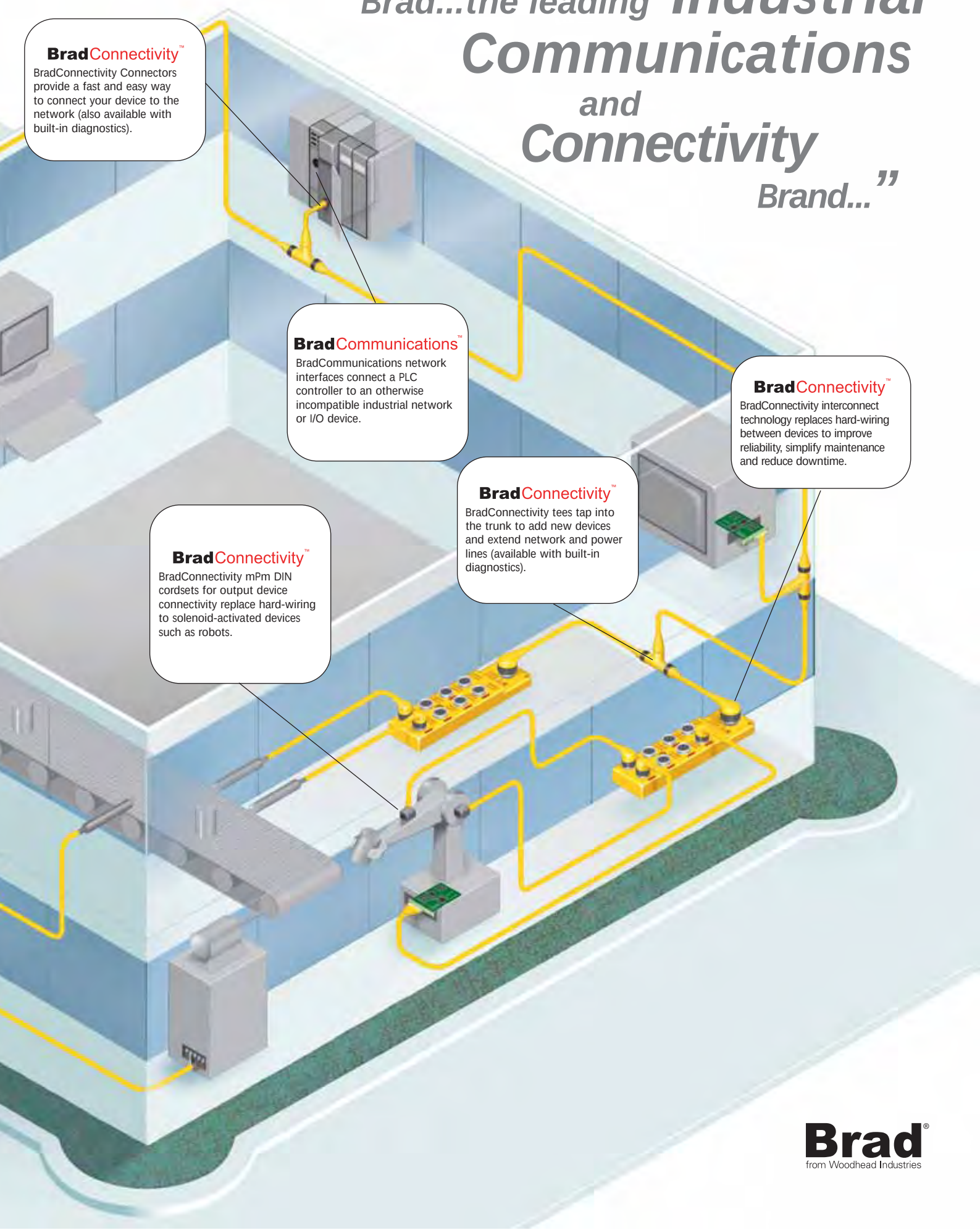
"Brad...the leading Industrial Communications and Connectivity Brand..."



BradConnectivity™
BradConnectivity Connectors provide a fast and easy way to connect your device to the network (also available with built-in diagnostics).

BradCommunications™
BradCommunications network interfaces connect a PLC controller to an otherwise incompatible industrial network or I/O device.

BradConnectivity™
BradConnectivity interconnect technology replaces hard-wiring between devices to improve reliability, simplify maintenance and reduce downtime.

BradConnectivity™
BradConnectivity tees tap into the trunk to add new devices and extend network and power lines (available with built-in diagnostics).

BradConnectivity™
BradConnectivity mPm DIN cordsets for output device connectivity replace hard-wiring to solenoid-activated devices such as robots.

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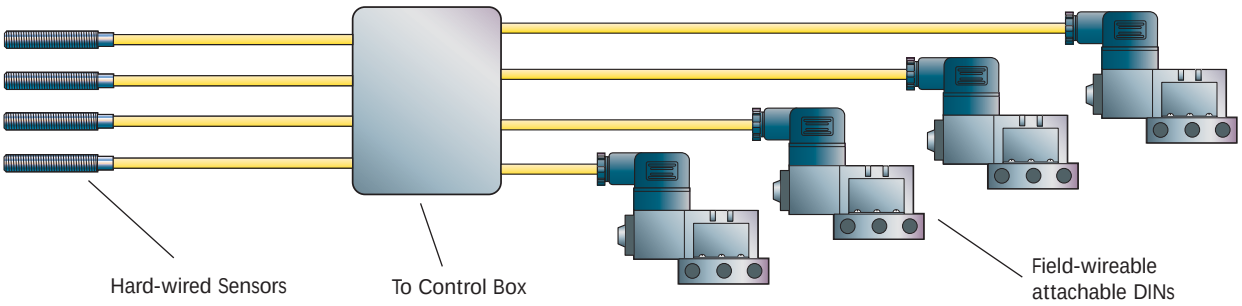
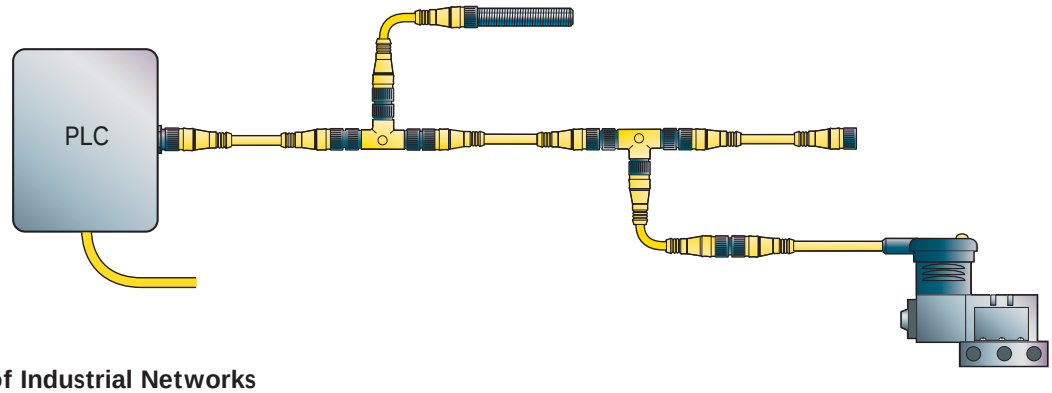
Industrial connectivity has changed from time-consuming installation and re-installation of failed input and output devices found in point-point wiring:

Hard-Wiring



to a single bus cabling system which allows a single bus cable to be run throughout the control system with meaningful status monitoring and diagnostic information.

Networks



Benefits of Industrial Networks

There are a variety of benefits that can be gained by the installation of industrial networks, including:

- Reduced installation costs – Point-Point hard-wiring labor costs are significantly higher than those of a plug-play network cabling system
- Fast system commissioning – due to the built-in diagnostics and the plug-play connectivity, a network system is commissioned and debugged quickly
- Extensibility – Adding and configuring additional network devices is simple and fast
- Vendor Choice – open network protocols, especially Ethernet, offer greater price/performance points for the user as proprietary networks tend not to offer this benefit
- Enterprise-wide information flow can be made from the office to the factory floor

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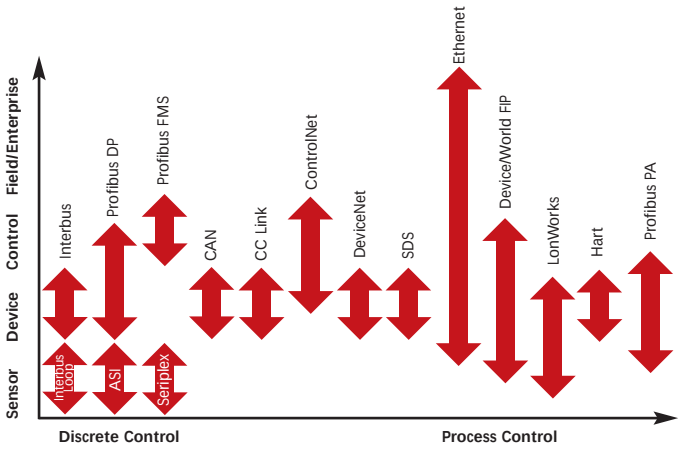
Industrial Network Options



Field Bus – Large scale process automation network (typically non-deterministic)

Control Bus – Peer level network for distribution controllers and smart devices, may support block I/O.

Device Bus – Device level network for discrete I/O, block I/O, smart devices and small distributed controllers.

Sensor Bus – Sensor & actuator I/O bus.

Numerous networks fill different functions, but only Ethernet has the ability to cover the whole range

Brad automation solutions provides complete connectivity solutions for the most popular industrial networks including the CAN-based DeviceNet device level network, Profibus DP which can be used for both device and control networks and Ethernet which will go from the bit level up through the enterprise level.

DeviceNet™ is designed to be a low-cost, real-time, device level bus architecture that connects sensors and actuators. Wiring and installation of automation devices is greatly simplified while the diagnostic information about the various I/O of the system is greatly enhanced. DeviceNet defines a standard device object-oriented software model that permits multi-vendor interoperability. It offers the users a variety of control architectures, giving the control designer the ability to choose either: highly distributed control, semi-distributed control or highly centralized control. This is the most prevalent fieldbus in use in industrial applications in North America.

Profibus is a very versatile open industrial network protocol with an installed user base which includes discrete manufacturing sites, process plants and commercial buildings. Of the three levels of the Profibus protocol standard, the products listed herein support Profibus DP which is used for time critical transfer of information between distributed I/O and control/master devices. Speed is one of the greatest benefits offered by this network, with the ability to transfer up to 512 bits of input data and 512 bits of output data over 32 nodes in 1msec. This is the most prevalent fieldbus in use in industrial applications in Europe.

Ethernet is the up and coming network protocol which will link the office to the industrial factory floor. With the advent of Ethernet enabled controllers, exchanges of status and configuration information between multiple cells has become common place. Soon to come will be I/O status and informational exchanges down to the device layer, effectively making Ethernet a common network platform from enterprise layer down to the device layer. The advantages of Ethernet on the factory floor offer the users well-experienced MIS departments who can support and install Ethernet networks. Important information can be easily disseminated up through the enterprise network enabling seamless factory floor to boardroom communications. Production data can be served up through the Internet and can have production data or diagnostics uploaded using web browser technology. Certainly with these advantages along with its proven robustness and speed, Ethernet will be the factory to office network of the future.

This Network Connectivity catalog will give you an overview of the high quality, broad line of products you can specify for the above most common networks.

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Depending on what devices, machines or manufacturing operations in a factory need to be connected, different network types are appropriate. The broad categories of network types are listed below:

Field Bus – Large-scale process automation network (typically non-deterministic) which can be used to connect many automation cells together or one buildings' automation network to another

Control Bus – Peer level network for distributed controllers and "smart" devices such as when multiple machines in the same factory need to be linked together (e.g.: filling, packaging and distribution lines in a food processing facility).

Device Bus – These networks read the status conditions from discrete or block I/O or "smart" devices and link them together via a common network. These buses are typically found on packaging, machine tools and semiconductor processing machinery where a relatively high density of both discrete inputs such as sensors are mixed with "smart" output valve controllers. Such inputs and outputs with imbedded logic are used on the network when frequent diagnostic information such as the last time the sensor has been cleaned needs to be known.

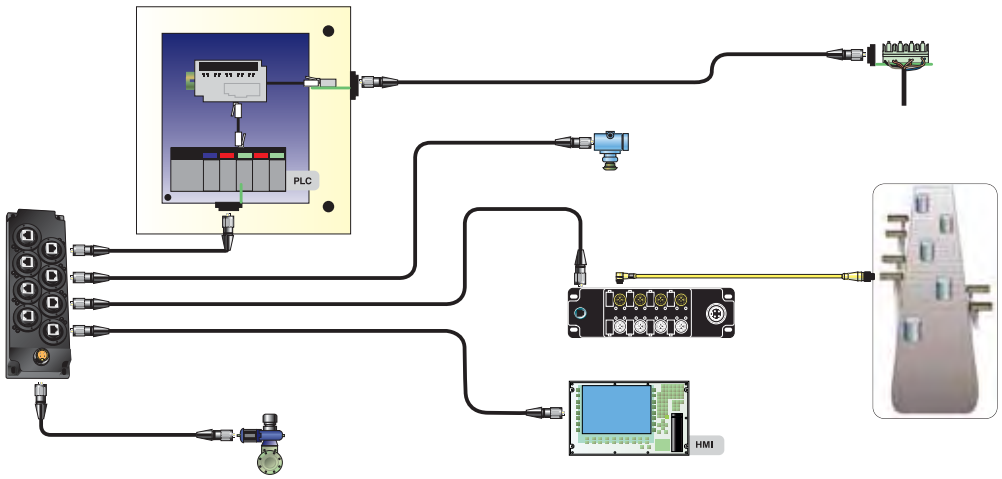
Sensor Bus – Provide basic digital I/O signal and status updates of both sensors and actuators. These buses are limited to the most rudimentary functions such as whether or not the valve or limit switch is ON or OFF and are found on machinery with discrete inputs and outputs. Such networks generally cannot accommodate large amounts of analogue data.

Network Topologies

There are a variety of topologies for the network protocols discussed in this Network Designer's Guide. By better understanding the implications of the layouts of star, bus and ring network topologies, designers can have a greater appreciation for the potential operational benefits of each.

Star Topology

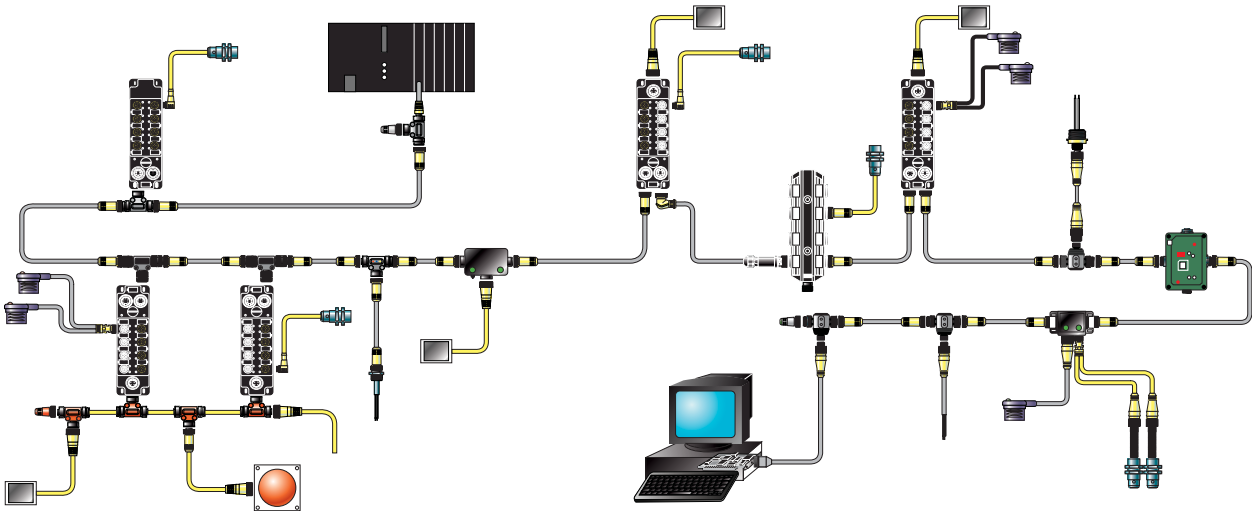
In a star topology network, all messages are sent through a control hub which in turn forwards the messages out to the spokes. In this model each spoke gets the message but discards it if the destination doesn't match. In such a network, a single faulty device such as valve bank controller cannot affect the rest of the network. However a single failure of the routing device, such as an Ethernet switch, can bring the network down.



Industrial Networks

Bus Topology

In a bus topology there is a main communication trunk line with branch drops to the individual components. Reducing cabling costs as well as providing network extensibility are main features of a bus network. Another advantage is that failed devices have the ability to be “hot swapped” for replacements.



Ring Topology

Devices are arranged in a ring topology such that a general circular path is formed connecting one device to another. In this network scheme there is no reliance on a single device.

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