

The Lord of the Industrial Ethernet Ring

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Ethernet has become nearly as common on the factory floor as PLCs. In many cases, along with this need for Ethernet connectivity is the need for fault-tolerant network redundancy. Automation and control engineers have been forced into this IT domain and really don't want to get too involved with the idiosyncrasies and maintenance of Ethernet networks, especially redundant networks...they just want to plug them in and they work.

Along comes the Real-Time Ring™ Ethernet Switch. But, to better understand this new switch, let's take a look back at the evolution of Ethernet connectivity devices.

Hub

I'm sure most of you are familiar with the simple hub. A hub is basically a dumb device that many of us use to connect Ethernet-based devices together, i.e. personal computers, programmable controllers, etc. The hub receives a message on one of the ports and broadcasts it to all the other ports. For each and every message, the hub broadcasts the message to every other port. In this respect, the hub is slow, inefficient and allows for message collisions. Use of the hub is pretty easy though...for all practical purposes you just plug it in and it works. The hub doesn't offer any bells and whistles or any redundancy.

Unmanaged Switch

The hub evolved into something called the unmanaged switch. The unmanaged switch is a little smarter because it is able to intelligently route messages from one port to another. The unmanaged switch has the ability to automatically sense the correct network speed for each device. In addition, this switch has something called a "MAC address table" that allows the switch to learn and remember devices on the network. In other words, if port 2 picked up a message with a particular identifier, then the switch would route all future messages with that particular identifier to port 2. This intelligence prevents message collisions, improves performance and is a drastic improvement over hubs. However, the unmanaged switch doesn't allow any kind of traffic monitoring or redundant configurations.

Managed Switch

Next in the evolution chain is the Managed Switch. The managed switch is much more capable and complex, and comes with a much higher price tag...typically 3-4 times the cost of an unmanaged switch. Since the managed switch offers more functionality, it's fully configurable, typically using a web-based interface. The switch will automatically negotiate with each network device, but users can also manually configure each port for network speed and flow control. Some older devices may not work with the auto-negotiation feature, so manual configuration is a must.

Most managed switches typically also offer many advanced capabilities such as SNMP (Simple Network Management Protocol) for remote monitoring and configuration, port mirroring for diagnostics, VLAN (Virtual Local Area Networks) for grouping networked devices, Priority Queuing for make sure priority messages get through, and much more. With managed switches, a redundant network can also be configured. Using a ring topology, the managed switches are set up in a loop configuration. Each managed switch will automatically determine the best primary and backup paths and block the backup path when and if the primary path fails.



*Example of Ring Topology (left)
In this type of a redundant ring configuration, recovery times may be around 100ms per switch. For example, with six managed switches in a ring topology, the recovery time should be less than 500ms. Unfortunately, since a redundant topology requires the use of multiple managed switches, this configuration is usually cost prohibitive.*

Real-Time Ring™ Switch

The Real-Time Ring™ Switch offers some of the features of a managed switch, but it has been designed and optimized for critical real-time redundant systems, at a cost effective price. Plus, this particular ring switch is pre-configured for plug and play simplicity. Finally, a switch designed to make the automation and control engineer's job easier!

With a recovery time of less than 5ms per hop (switch), this switch is ideal for deterministic systems, PLCs and other control systems. To compare with the example above, for a ring with six real-time ring switches, the recovery time will be less than 30ms. That's quite an improvement!

Real-time ring switches may also belong to more than one ring so information can be shared between work-cells or sub-networks. Since recovery time is dependant on the number of switches, smaller rings will recover faster and will be inherently more reliable.

This Real-Time Ring™ Switch was designed, developed and manufactured by SIXNET in Clifton Park, NY. SIXNET's ring switch and their managed switches can be used in the same network, so you can achieve the optimum mix of performance and cost for your applications. Because of its performance and price point, we've coined SIXNET's Real-Time Ring™ Switch "The Lord of the Industrial Ethernet Ring".

For more information on SIXNET's Real-Time Ring™ Switch, Industrial Managed Switches or Unmanaged Switches, please request SIXNET's Updated Product CD. (<http://www.sixnetio.com>)

About SIXNET

SIXNET is a privately-held Total Quality (ISO9001) manufacturer of industrial automation, data-acquisition, and control products designed for the harsh conditions found on plant floors and other extreme environments. SIXNET's open automation systems product line currently features industrial modems, Ethernet switches, controllers, remote terminal units, modular I/O, and media/protocol converters. For more information, please visit <http://www.sixnetio.com>.