UNDERSTANDING REDUNDANCY IN INDUSTRIAL NETWORKS
The PRP Zero Failover Protocol

The Need for Zero Failover

Government regulations have made losing critical data collected on factory floors, during industrial processes and at utilities a costly error. Providing redundancy in Industrial Ethernet networks—including common ring and rapid spanning tree protocols—helps to minimize the chance of lost data. However, in some applications, these protocols do not provide the required failover speed in case of network failure. To address these applications, a new protocol with zero failover time called the Parallel Redundancy Protocol (PRP) has been standardized in IEC 62439-3.

The New Approach to Network Redundancy

This protocol offers a new approach to network redundancy by providing two independent active paths between communicating devices. The sending node uses two independent network interfaces that transmit the same data simultaneously over two completely independent local area networks (LANs.) When both network paths are functioning normally, the destination node will receive two identical packets. It will discard the second arriving packet while continuously checking that both network paths are functioning properly. If one of the networks goes down, then the PRP protocol allows continued packet transmission without any failover time while also recognizing a failure on one of the networks.

Topology of PRP

PRP compatible end devices that have one connection on each of the independent LANs are called dual attached nodes (DANs). Devices that are not PRP compatible can be connected with a device called a redundancy box (redbox) or with advanced Industrial Ethernet switches that can connect multiple devices to a PRP network. Other noncritical devices can be attached to only one LAN. These devices, called single attached nodes (SANs), can communicate with other devices on that same LAN.

The PRP protocol functions at Layer 2, so PRP connected devices use the same MAC and IP address in both LANs. This allows PRP to be used in most Industrial Ethernet applications. Each frame transmitted over PRP is affixed with a redundancy control trailer (RCT), which contains a sequence number that is used to distinguish and discard duplicates.

DAN – Dual Attached Nodes
SAN – Single Attached Nodes
RedBox – Redundancy Box
VDAN - Virtual Dual Attached Node
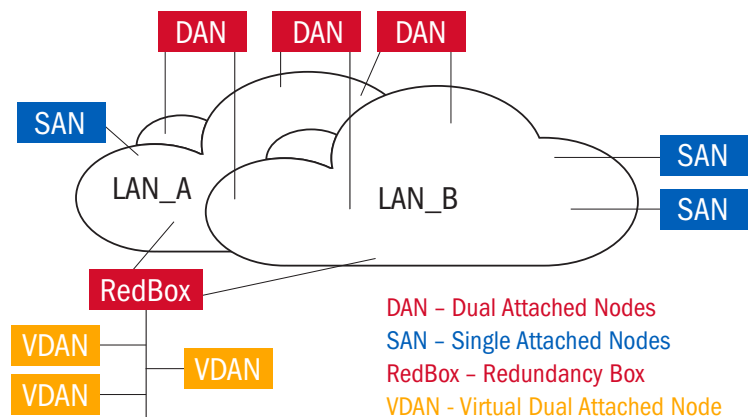
Conclusions

In environments where downtime is absolutely unacceptable, such as power utilities and critical industrial networks using track and trace, data historian and serialization applications, this new protocol helps to minimize data loss through improved network redundancy.

For more information about Parallel Redundancy Protocol or other industrial networking standards, contact your local Anixter representative or call 1.800.ANIXTER.

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