



AFI's Redundant Network Ring Topology

1. Overview

AFI's Series 49 optical repeaters and Series SM family of network switches can be configured into a redundant (self healing) network ring topology which is capable of sustaining full operation in the event of a single fault (fiber connection or active device). One application for this type of ring configuration is in a perimeter security environment (see attached diagram).

Multiple Series 49 optical repeaters are connected in a fiber ring configuration. Each repeater has two RJ45 ports available to connect network cameras to the ring. The Series 49 repeaters are available with PoE (15W) power and PoE+ (30W) power per port. Also, a PoE-HP option can provide 60W out of a single port. The RJ45 ports support triple speed 10/100/1000BaseT Ethernet. The fiber ports operate at 1000BaseX. Singlemode and multimode units are available with either 1 or 2 fibers per optical port.

Redundancy is provided by using two (Layer 2) Ethernet switches with dual 1000BaseX optical ports in the ring. A physical topology that contains a switching (or bridge loop) is necessary for reliability, yet a switched network must not have loops.

A switching (or bridge loop) occurs in networks when there is more than one Layer 2 path between two endpoints (e.g. multiple connections between two network switches or two ports on the same switch connected to each other). The loop creates network overload as broadcasts and multicasts are forwarded by switches out to every port. The switch or switches will repeatedly rebroadcast the broadcast messages flooding the network. Since the Layer 2 header does not support a time to live (TTL) value, if a frame is sent into a looped topology, it can loop forever.

The solution is to allow physical loops, but create a loop-free logical topology using the spanning tree protocol (STP) or rapid spanning tree protocol (RSTP) on the switches. RSTP has a faster recovery time than STP when the network has to reconfigure itself as a result of a connection failure.

The STP or RSTP network protocol ensures a loop-free topology for any bridged Ethernet local area network. The basic function of STP is to prevent bridge loops and the broadcast radiation that results from them by blocking any looping port connections. Spanning tree also allows a network design to include spare (redundant) links to provide automatic backup paths if an active link fails, without the danger of bridge loops, or the need for manual enabling/disabling of these backup links. STP/RSTP disables those links that are not part of the spanning tree, leaving a single active path between any two network nodes.

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