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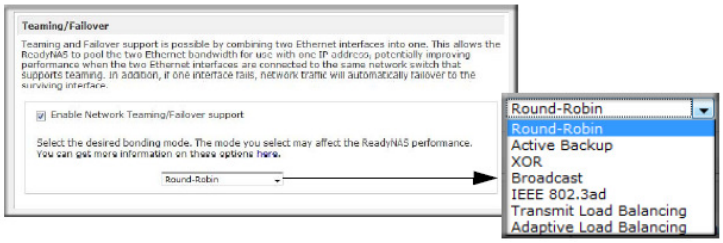
Ethernet Teaming on the ReadyNAS

Network teaming provides a way to aggregate the two network interfaces into a single logical teamed, or bonded, interface. The teamed interface allows for fail-over support and can provide for enhanced aggregate performance over a single interface.



In this article we'll cover the different options as well as the different requirements for each on the network side of the connection.

Round-Robin:

This option requires the switch or router in front of the ReadyNAS to be configured for static link aggregation – it will not work if there is dynamic link aggregation configured in the router/switch.

Packets are transmitted in a sequential order between both interfaces. One packet would leave one interface, while the next one would leave through the second one.

Pros: This mode provides increased throughput and offers redundancy, load balancing and fault tolerance.

Cons: Traffic that is predominantly TCP may see an impact in performance due to packets arriving out of sequence and the receiving end requiring the NAS to retransmit. This would end up reporting large amounts of TCP retransmit errors on both sending and receiving side.

Active Backup:

This option does not require any additional configuration on the switch side.

In this mode only one interface is active. The secondary interface will only become active if the ReadyNAS detects a failure in the primary interface. The MAC address that the ReadyNAS will use will be the same on both ports, but it is externally visible on only one port at a time to avoid confusing the switch.

Pros: This mode provides redundancy and fault tolerance.

Cons: It offers no throughput increase at all.

NOTE: The ReadyNAS will report to have 2000 Mbps or 200 Mbps in the GUI due to the redundancy being active, but at any given time it will only offer either 1000 Mbps or 100Mbps depending on what it is connected to, as the other interface will be disabled.

XOR:

This option does not require any additional switch-side configuration.

This mode employs a computational hashing policy based on source and destination MAC addresses to decide which interface should be used in the transference.

Pros: This mode provides increased throughput redundancy and fault tolerance.

Cons: On certain situations, depending on the MAC addresses of the hosts, one interface may end up overloaded if through the hashing calculation the results point traffic to most destinations through the same interface.

Broadcast:

This option does not require any additional switch-side configuration.

This mode is really a special purpose mode, and is suitable only for very specific needs. For example, if the two switches are not connected (no ISL), and the networks beyond them are totally independent. In this case, if it is necessary for some specific one-way traffic to reach both independent networks, then the broadcast mode may be suitable.

IEEE 802.3ad:

This option requires the switch or router in front of the ReadyNAS to be configured for dynamic link aggregation – it will not work if the router/switch is configured for static link aggregation.

This mode uses the IEEE 802.3ad specification to allow the teaming to be negotiated through the use of the Link Aggregation Control Protocol (LACP).

Pros: Uses an industry standard supported by most hardware, provides greater bandwidth, redundancy and fault tolerance.

Cons: Requires the switch/router at the other side of the connection to support IEEE 802.3ad (LACP) link aggregation. Each interface must have the same negotiated speed.

Transmit Load-Balancing:

This option does not require any additional switch-side configuration.

The outgoing traffic is distributed according to the current load (computed relative to the speed) on each interface. Incoming traffic is received by the current interface. If the receiving interface fails, another interface takes over the MAC address of the failed receiving interface.

Pros: Similarly to XOR it uses a computational algorithm to split load between the ReadyNAS interfaces, offering increased throughput, redundancy and failover. Unlike XOR, the calculation TLB uses is smart enough to overcome unlucky MAC address calculations that would saturate a single particular interface.

Cons: Takes more processing power than XOR or Round Robin.

Adaptive Load-Balancing:

This option does not require any additional switch-side configuration.

This mode is everything that balance-tlb is, and more. It has all of the features (and restrictions) of transmit load-balancing, and will also add a layer of decision based on IPv4 addressing.

Pros: All those listed in Transmit Load-Balancing, plus an additional layer based on ARP replies which also makes it so one particular interface is not particularly saturated due to inbound connections.

Cons: Takes more processing power than XOR, Round Robin or Transmit Load-Balancing.