

# Pillar Axiom



## Implementation Tips for Link Aggregation

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PILLAR AXIOM

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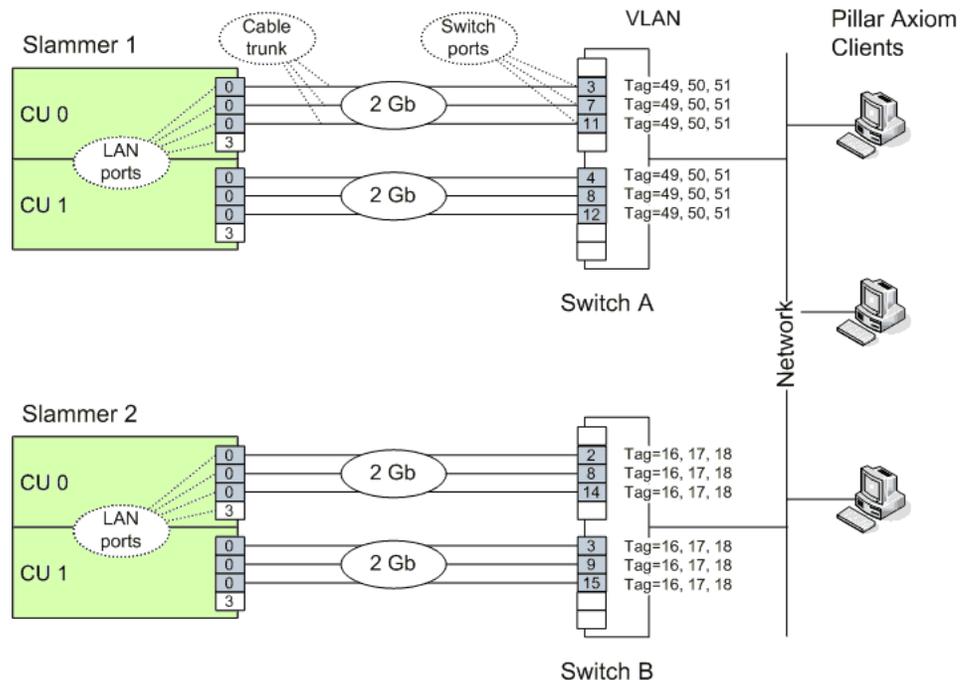
# Implementation Tips for Link Aggregation

Link aggregation groups several network links into a single logical link. Link aggregation provides load balancing and fault tolerance for multiple Ethernet links. Using extensions of Ethernet auto-negotiation, the link partners exchange MAC control frames to provide for load balancing and link fault detection.

The following tips help you to implement successfully link aggregation for Oracle's Pillar Axiom 600 storage system:

- The aggregated LAN ports (at least two) on a given Slammer control unit (CU) become one logical port. Supported port aggregation sets on a Slammer CU are as follows:
  - [0, 1]
  - [2, 3]
  - [0, 1, 2]
  - [0, 1, 2, 3]
  - [0, 1] and [2, 3]
- Enabling link aggregation enables it across all CUs on all Slammer storage controllers. In essence, all LAN ports in the aggregate assume the same port number as the lowest number in that aggregate (see the illustration below).
- Remaining port(s) in the CU can be used as non-aggregate ports.
- Depending on the switch and how it handles Link Aggregation Control Protocol (LACP), link aggregation can provide automatic port failover. If one of the ports on the Ethernet switch or Slammer fails or if one of the cables or connectors fails, the Ethernet switch routes all traffic to the remaining aggregated ports.
- When link aggregation is enabled, all virtual interfaces (VIFs) that have been defined on LAN ports other than the port with the lowest number are disabled. However, if link aggregation is disabled, these VIFs are re-enabled. For example, if [0,1,2] is the aggregate, all the VIFs and File Servers have to be on port 0. All the VIFs and File Servers on port 1 and port 2 are disabled.

- For CU failover to work, the two CUs within a Slammer must be configured in the same way. If they're not configured in the same way, the client's data path will be interrupted.
- All aggregated LAN ports on a Slammer must connect to the same switch; otherwise, a data path to a failed CU will not fail over to the partner CU.
- If you enable link aggregation, be aware of the following:
  - You need to specify at the switch which ports you want to aggregate. For example, in the diagram below, switch A has aggregated ports 3, 4, 7, 8, 11, and 12.



- The switch may impose additional restrictions: For example all ports might need to be on the same blade. Consult your switch documentation or release notes for restrictions.
- Aggregating multiple Slammer ports provides more bandwidth for each aggregated port and an increase in load balancing and failover capabilities.
- If one cable in a given CU trunk malfunctions, the other cable(s) will continue to support the data path.
- If all cables in a given CU trunk malfunction, the data path hangs until the connection is re-established. Furthermore, the affected CU does not fail over. In this scenario, the affected CU logs an event about the missing or dropped connection, possible timeouts, or the fact that a client is not

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responding. Also, the LED displays a Link Down status. The CU takes no further action.

To make use of link aggregation on a Pillar Axiom system, be sure that:

- All ports that will be used for a given logical aggregated link are on the same Slammer CU.
- Many Ethernet switches require that all links in an aggregated link be on the same blade or Ethernet controller chip. Consult the switch vendor's documentation for restrictions.
- The Slammer connects to a 100/1000 BaseT switch that:
  - Has Auto-speed enabled.
  - Conforms to the IEEE 803.2ad link aggregation standard.
  - Uses LACP for managing the links.
  - Is configured to actively advertise link aggregation capability.

**Tip:** To provide for continued operation in the event of a Slammer CU failover, if link aggregation is enabled on one Slammer CU, it should also be configured on the partner Slammer CU.