BROCADE INTER-SWITCH LINK TRUNKING

STORAGE AREA NETWORK

Higher Performance for Demanding Applications

HIGHLIGHTS

- Combines up to eight ISLs into a single logical trunk that provides up to 68 Gbit/sec data transfers (with 8 Gbit/sec solutions)
- Optimizes link usage by evenly distributing traffic across all ISLs at the frame level
- Maintains in-order delivery to ensure data reliability
- Helps ensure reliability and availability even if a link in the trunk fails
- Optimizes fabric-wide performance and load balancing with Dynamic Path Selection (DPS)
- Simplifies management by reducing the number of ISLs required
- Provides a high-performance solution for network- and data-intensive applications

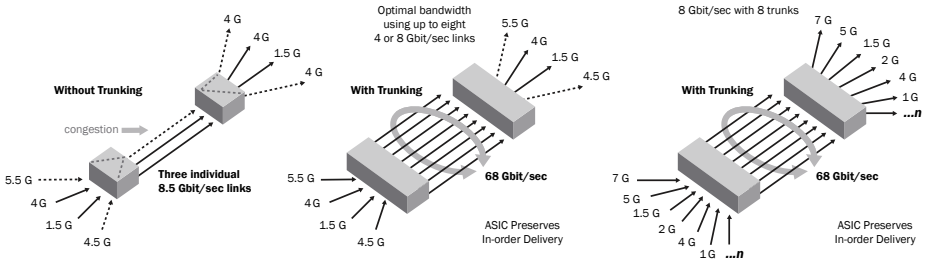
Brocade® ISL Trunking is an optional software product available for all Brocade 2, 4, and 8 Gbit/sec Fibre Channel switches, Brocade Fabric OS®-based directors, and the Brocade DCX™ Backbone. This technology is ideal for optimizing performance and simplifying the management of multi-switch SAN fabrics containing Brocade 1, 2, and 4 Gbit/sec switches and directors and the latest 8 Gbit/sec solutions. When two or more adjacent ISLs in a port group are used to connect two switches with trunking enabled, the switches automatically group the ISLs into a single logical ISL, or "trunk." The throughput of the resulting trunk can be anywhere from 4 Gbit/sec to as much as 68 Gbit/sec.

INCREASED PERFORMANCE WITH ISL TRUNKING

ISL Trunking is designed to significantly reduce traffic congestion in storage networks. As shown in Figure 1, up to eight ISLs can be combined into a single logical ISL with a total bandwidth of 68 Gbit/sec that can support any number of devices.

To balance workload across all of the ISLs in the trunk, each incoming frame is sent across the first available physical ISL in the trunk. As a result, transient workload peaks are much less likely to impact the performance of other parts of the SAN fabric and bandwidth is not wasted by

Figure 1.
ISL Trunking is available for 4 and 8 Gbit/sec links.



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inefficient traffic routing. ISL Trunking can also help simplify fabric design, lower provisioning time, and limit the need for additional ISLs or switches.

DYNAMIC PATH SELECTION FOR OPTIMIZED PERFORMANCE

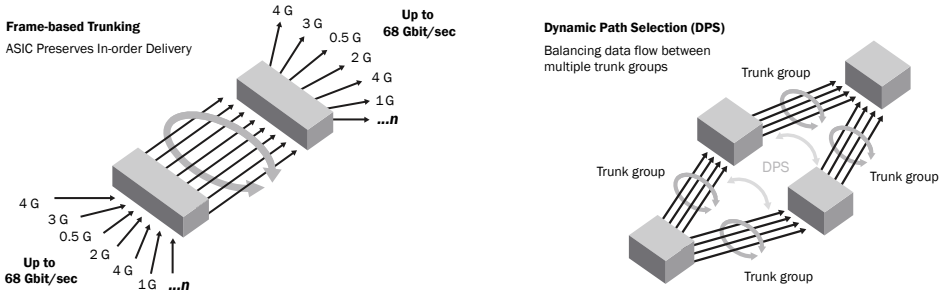
To further optimize network performance, Brocade 4 and 8 Gbit/sec switches and directors support optional Dynamic Path Selection (DPS). Available as a standard feature in Brocade Fabric OS (starting in Fabric OS 4.4), exchange-based DPS optimizes fabric-wide performance by automatically routing data to the most efficient available path in the fabric (see Figure 2).

DPS augments ISL Trunking to provide more effective load balancing in certain configurations, such as routing data between multiple trunk groups—or in Native Connectivity configurations with Brocade M-Enterprise OS (M-EOS) products. This approach provides "transmit" ISL Trunking from Fabric OS to M-EOS products while M-EOS products provide transmit trunking via Open Trunking, thereby enabling bidirectional trunking support. As a result, this combination of technologies provides the greatest design flexibility and the highest degree of load balancing.

TRUNKING OVER DISTANCE

Depending on the number of links and link speeds employed, trunks can operate at various distance/bandwidth combinations. For example, trunking can support distances of 345 kilometers for a 2 Gbit/sec, 5-link trunk providing over 10 Gbit/sec of trunk bandwidth, or 210 kilometers for a 4 Gbit/sec, 4-link trunk providing 17 Gbit/sec of trunk bandwidth.

Figure 2. Dynamic Path Selection augments ISL Trunking to route data efficiently between multiple trunk groups.



SIMPLIFIED MANAGEMENT AND DESIGN

In almost any network, management costs increase with complexity—rising with the number of elements being managed. With ISL Trunking, Brocade Fabric OS views the group of physical ISLs as a single logical ISL, a design that:

- Lowers the number of entities to manage
- Reduces the number of lines on a logical topology map
- Improves traffic and capacity provisioning to keep systems and applications running at full speed
- Simplifies network design, capacity planning, and fabric administration ISL Trunking can be managed through a small number of commands with the Brocade command line interface or through the graphical Brocade Web Tools utility.

HIGHER AVAILABILITY

The failure of a link in a route causes the network to reroute any traffic that was using that particular link—as long as an alternate path is available. Brocade Fabric Shortest Path First (FSPF) is a highly efficient routing algorithm that reroutes around failed links in less than a second.

ISL Trunking improves on this concept by helping to prevent the loss of the route. A link failure merely reduces the available bandwidth of the logical ISL trunk. In other words, a failure does not completely "break the pipe," but simply makes the pipe thinner. As a result, data traffic is much less likely to be affected by link failures and the bandwidth automatically increases when the link is repaired.

AUTOMATIC CONFIGURATION

As with all Brocade optional software products, the license for ISL Trunking can be factory-installed or added later. No software installation is required. ISL Trunking is automatically invoked when ISLs are added between any two Brocade 4 or 8 Gbit/sec solutions. Brocade 4 and 8 Gbit/sec solutions can also form trunks to previous-generation products with the individual links operating at 2 Gbit/sec for full backwards compatibility.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include education, support, and services. For more information, contact a Brocade sales partner or visit www.brocade.com.

Corporate Headquarters
San Jose, CA USA
T: (408) 333-8000
info@brocade.com

European Headquarters
Geneva, Switzerland
T: +41 22 799 56 40
emea-info@brocade.com

Asia Pacific Headquarters
Singapore
T: +65-6538-4700
apac-info@brocade.com

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