Introduction to Fibre Channel SANs

FCSAN-101

Student Guide

Revision 0323

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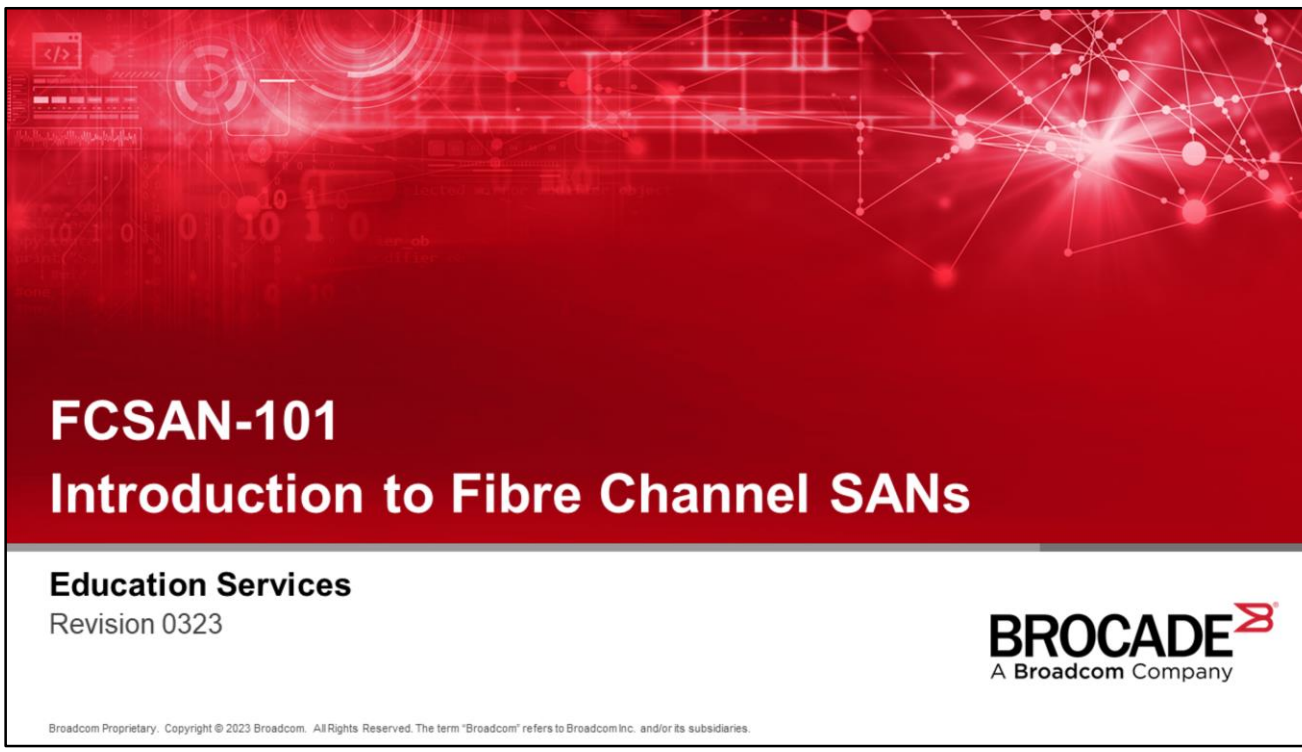
Revision: March 2023


FCSAN-101
Introduction to Fibre Channel SANs
Education Services
Revision 0323
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Section 1: Course Introduction

Legal Disclaimer

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Course Overview

This course provides an introduction to Fibre Channel Storage Area Networks (SAN) and is intended for those new to Fibre Channel SANs.

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Course Objectives

After completing this course, students should be able to:

- Understand what a SAN is
- Explain what a Fibre Channel Fabric is
- Identify the common components of a SAN
- Understand common Fibre Channel concepts such as port types, world wide names and zoning
- Explain the different types of fabric topologies and their benefits
- Identify Brocade Fibre Channel features and tools

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Course Agenda

Required Learning Elements:

- Introduction to Fibre Channel SANs
- Assessment Test

Optional Learning Elements:

- Welcome to Brocade Education
- PDF Student Guide (downloadable)

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Course Prerequisites

This course has no prerequisites.

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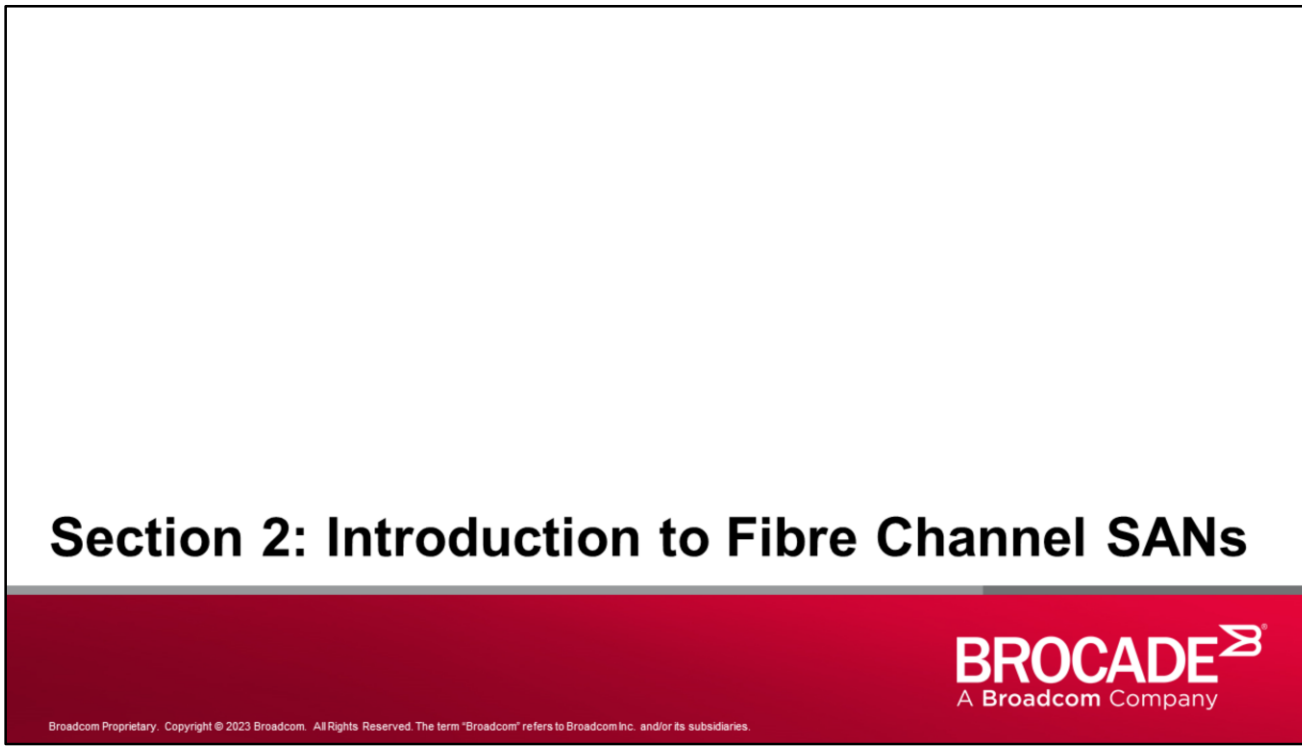
Section 2: Introduction to Fibre Channel SANs
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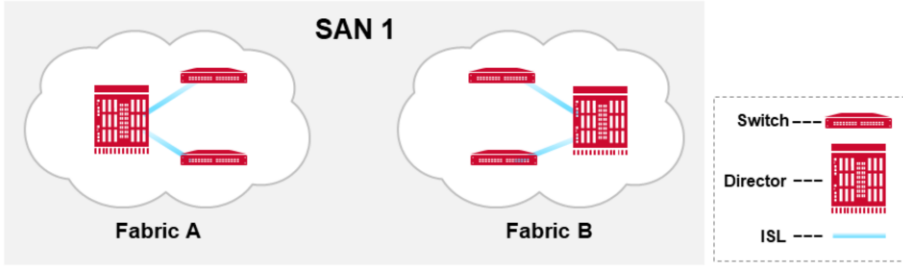
What is a SAN?

- A storage area network or SAN is one or more purpose built networks used for storage connectivity
  - Most SANs are built using Fibre Channel switches and directors
  - A fabric is a single dedicated storage network within the SAN
  - A SAN consist of one or more fabrics



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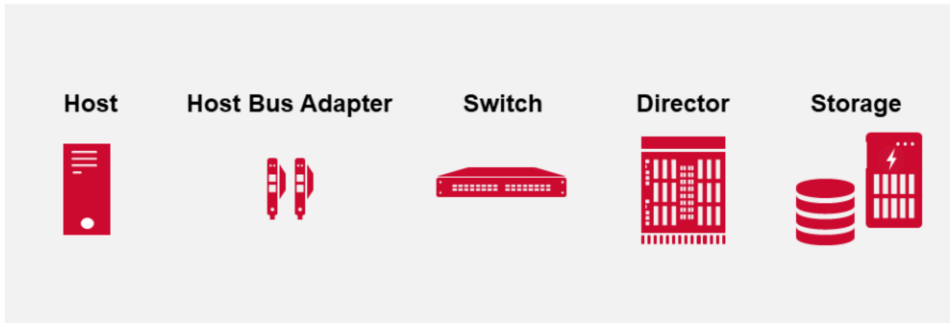
Standard Components of a Fibre Channel SAN



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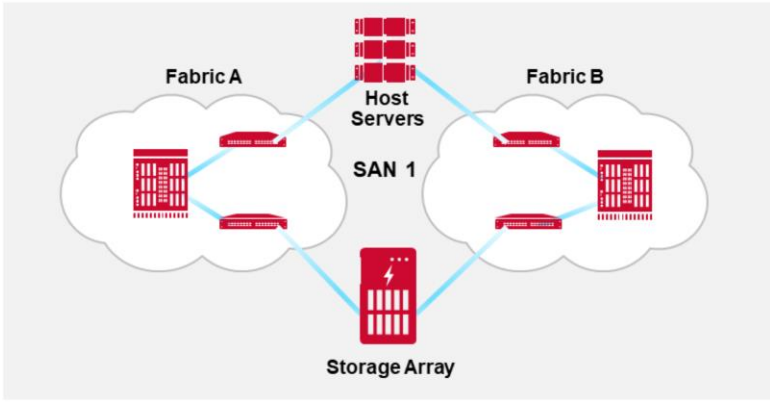
Connectivity

- The primary purpose of a SAN is to connect and share valuable resources
  - Host servers and storage systems are attached to fabrics



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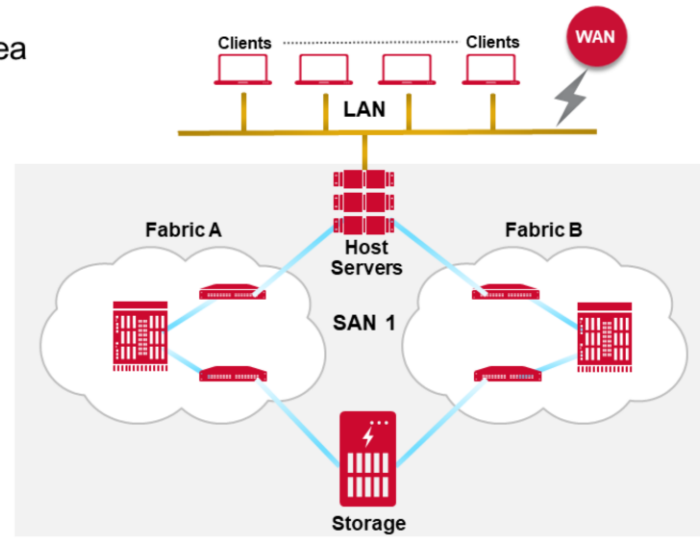
Connectivity (cont.)

- Host servers attach to the local area network (LAN) and the SAN



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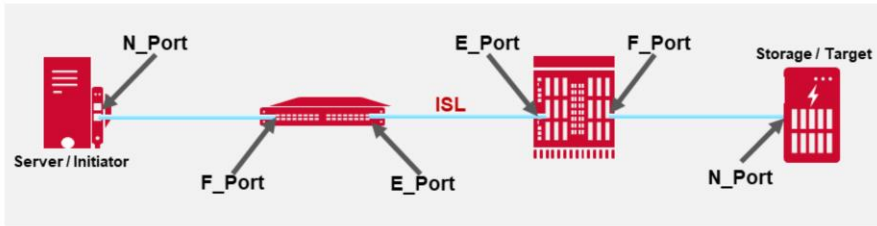
Connectivity (cont.)

- In Fibre Channel a port type identifies what a port is and how it will be used
- The most common Fibre Channel port types are:
  - **N_Port**: Node port -- A port on an HBA or storage controller that connects to a switch or director port
  - **F_Port**: Fabric port -- A switch or director port that is attached to an N_Port
  - **E_Port**: Expansion port -- A port used for inter-switch links (ISLs)



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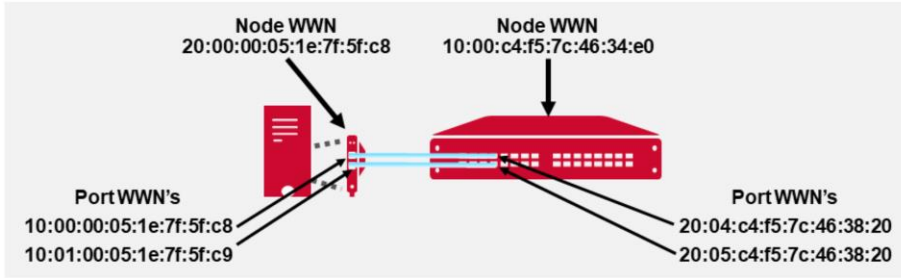
World Wide Name

- A World Wide Name (WWN) is a globally unique address used to identify each Fibre Channel node and node port
  - A node is a switch, HBA or storage controller
    - Note – A storage can have one or more controllers and a server can have one or more HBAs



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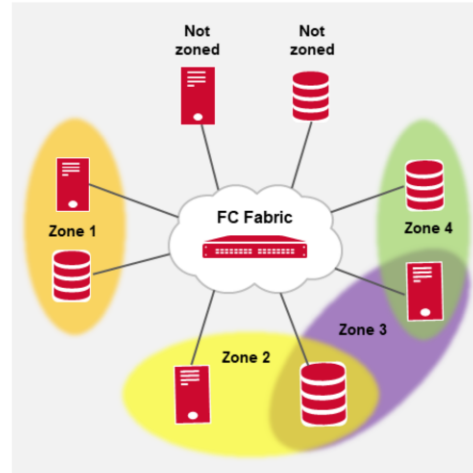
Zoning

- Enables the partitioning of devices attached to a fabric into logical groups called zones
- When zoning is enabled:
  - Devices defined in the same zone are restricted to communicate only with devices in that zone
  - Devices that are not zoned are isolated from other devices in the fabric
  - A devices can be a member of multiple zones



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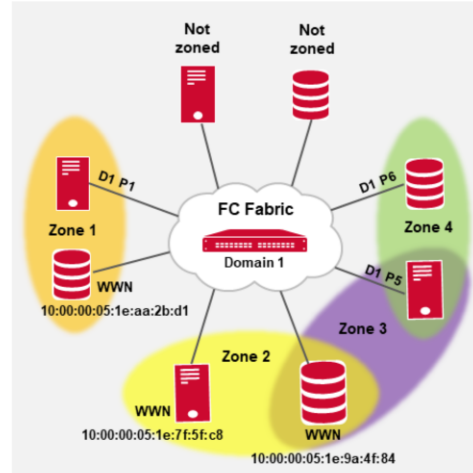
Zone Membership

- There are two ways to define a device as a member of a zone
  - WWN
    - Both Port WWN (WWPN) and Node WWN (WWNN) are supported
  - Domain/Port



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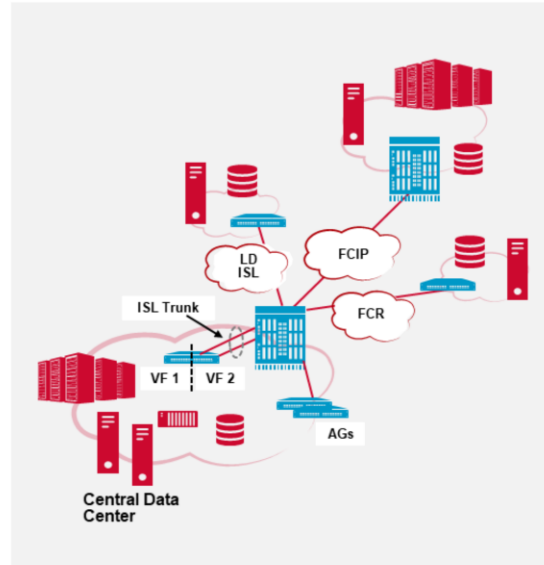
Advanced Switch Features and Tools

- **Access Gateway (AG)**
- **Trunking**
- **Fabric Extension**
  - Long Distance (LD) ISLs
  - Fibre Channel over IP (FCIP)
- **Fibre Channel Routing (FCR)**
- **Virtual Fabrics (VF)**



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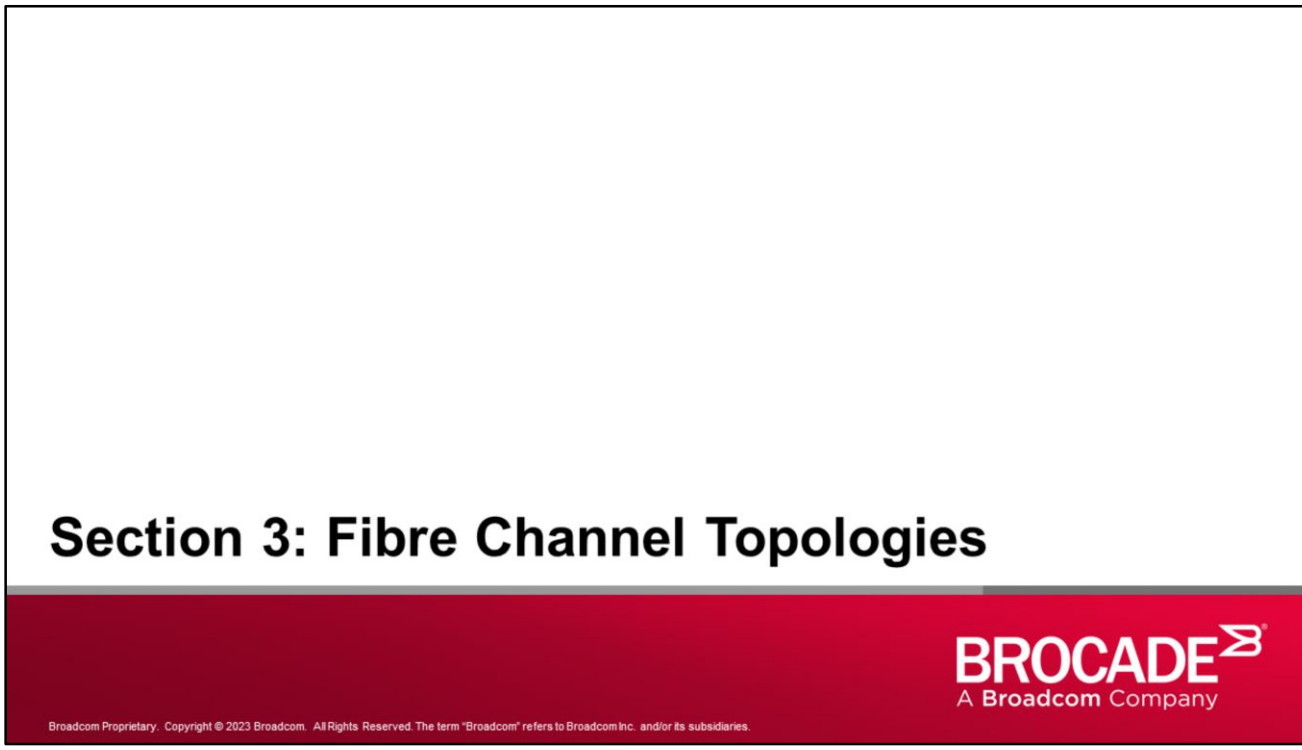
Section 3: Fibre Channel Topologies
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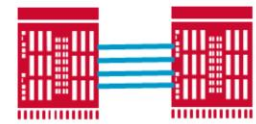
SAN Fabric Topologies

- **Single switch:** simplest SAN solution
  - Pro:
    - Locality between servers and storage
    - Well suited to higher port count switches
  - Con:
    - Scalability limited by switch port count
    - Not resilient and availability restricted to switch and director field replaceable components

➢ Recommended solution for small deployments
  - Higher-port count switches and directors make single-switch topologies possible

- **Cascade:** switches/directors connected in series
  - Pro:
    - Lowest port count for ISLs
    - Straightforward way to simplify switch management
    - SAN starts small, stays small, and has high levels of locality
  - Con:
    - Availability and scalability
    - Lower performance with more then two switches/directors in a fabric

➢ Recommended solution for two switch or director fabrics



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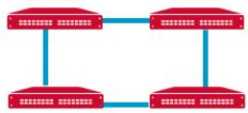
SAN Fabric Topologies (cont.)

- **Ring:** a variation on the Cascade topology
  - Pro:
    - Same as cascade but with better performance and availability
  - Con:
    - Poor scalability

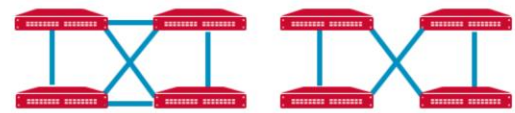
➢ Recommended solution for three to four switch/director fabrics



- **Mesh:** connects each switch/director to every other switch/director
  - Pro:
    - Provides greater fabric resiliency than Cascade or Ring
    - Maximum of one hop to any device
  - Con:
    - Does not scale well
    - Lower user port availability due to increased ISL count

➢ Recommended for solution with no plans for growth and four switches per fabric
  - Higher-port count switches and directors make mesh-based topologies more scalable

Full Mesh **Partial Mesh**



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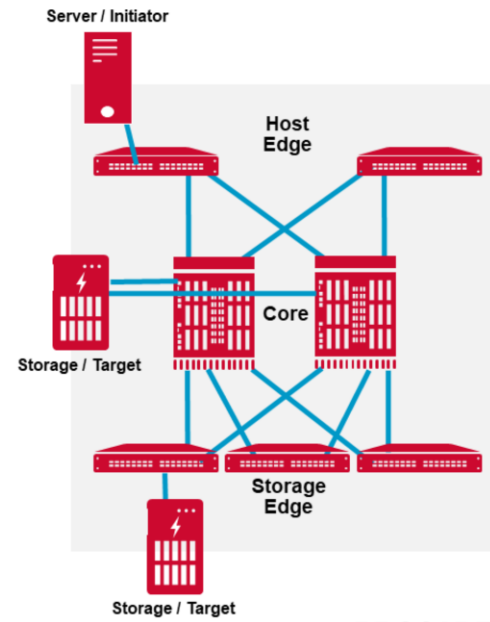
SAN Fabric Topologies (cont.)

- **Core/Edge:** specializes the role of the switches and directors
  - Connect servers and storage to switches at the edge
  - Connect switches at the core to the edge switches
  - Hosts and storage may also be attached directly to the core, depending on design requirements
  - Pro:
    - Excellent scalability, availability, and performance
    - Adding a new Edge switch requires connections only to the Core switches, which makes this a highly scalable topology
    - Having two Core switches makes this is a highly resilient topology
  - Con:
    - High cost

➢ Recommended for solutions with plans for growth and more than four switches per fabric
  - Provides the best mix of scalability, performance, and availability



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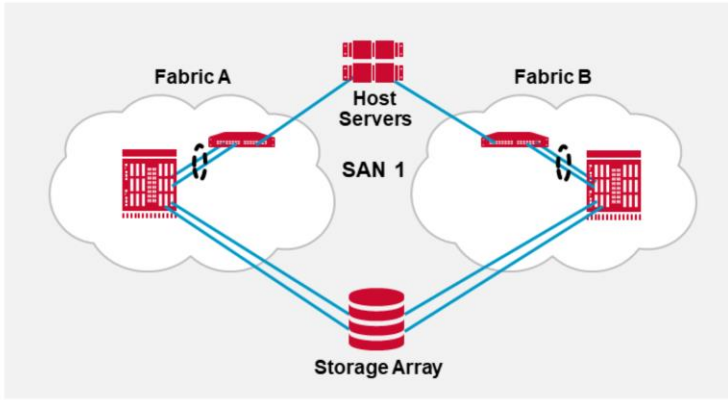
Fabric Redundancy and Resiliency

- A dual fabric design provides the highest level of redundancy



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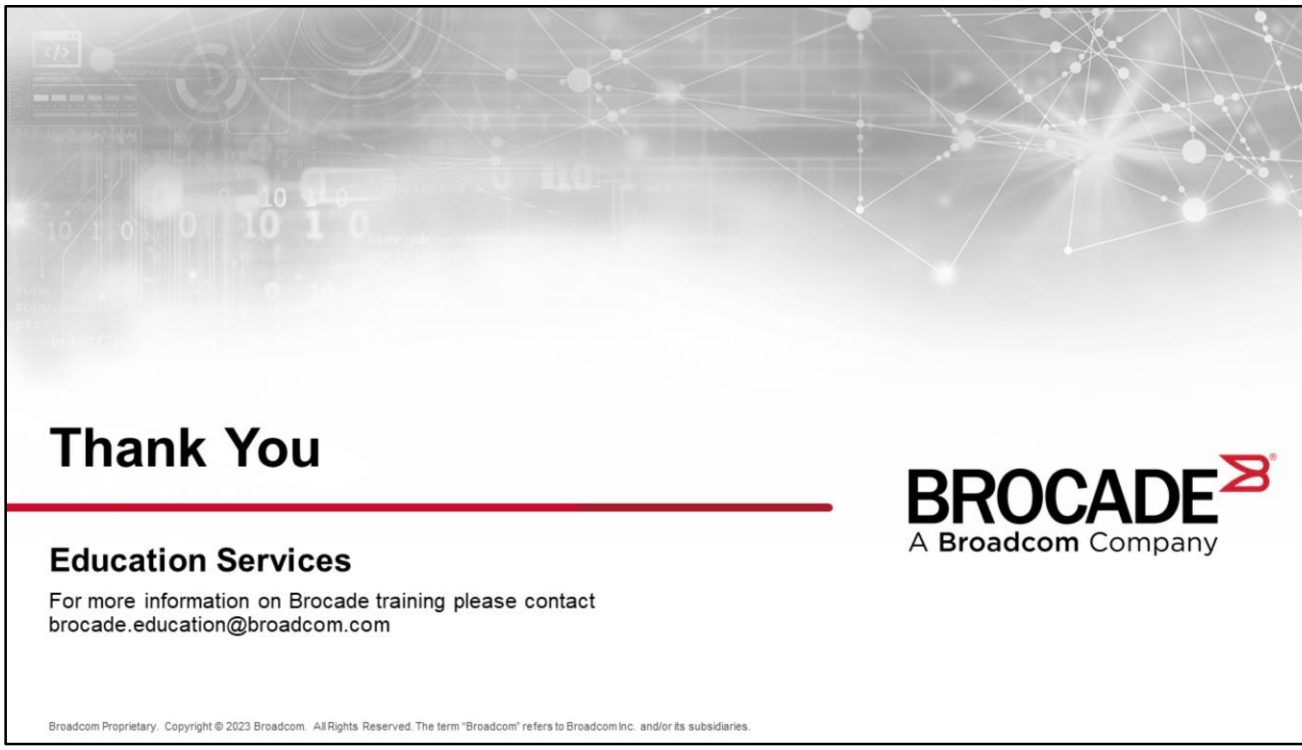
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