






Storage Virtualization

Kh. Rashedul Arefin

Outlines

- Types of Storage
- Accessing Data
- Storage Area Network (SAN)
- Storage Virtualization

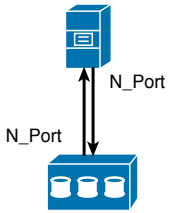
Types of Storage

- Primary Storage
  - Volatile storage that directly accessible by Computer's CPU
  - Small Capacity
  - Very Fast
- Secondary Storage
  - Nonvolatile
  - Not directly accessible by CPU
  - Require I/O channel
  - Slower
- Tertiary Storage
  - Removable mass storage
  - Slower than other two types
  - Lower Cost

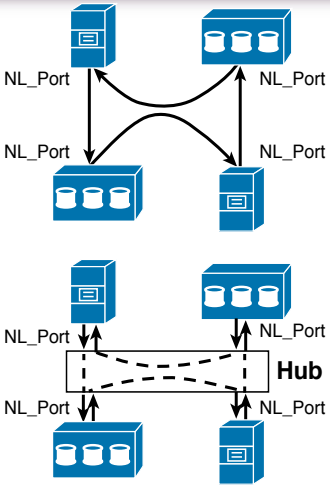
Accessing Data

- Block Based Access
  - SCSI
  - Mainframe Storage Access
  - Advanced Technology Attachment (ATA)
- File Access
  - Network Access Protocol (NAS)
  - Network File System (NFS)
  - Common Internet File System (CIFS)
- Record Access
  - Open DataBase Connectivity (ODBC)
  - Java DataBase Connectivity (JDBC)
  - Structured Query Language (SQL)

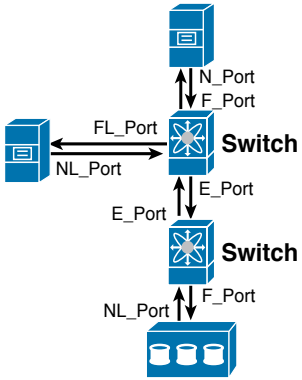
Storage Area Network (SAN)



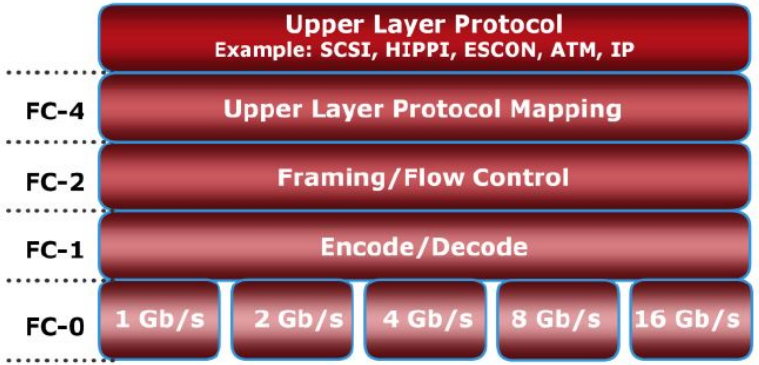
Point-to-Point



Arbitrated Loop



Switched Fabric

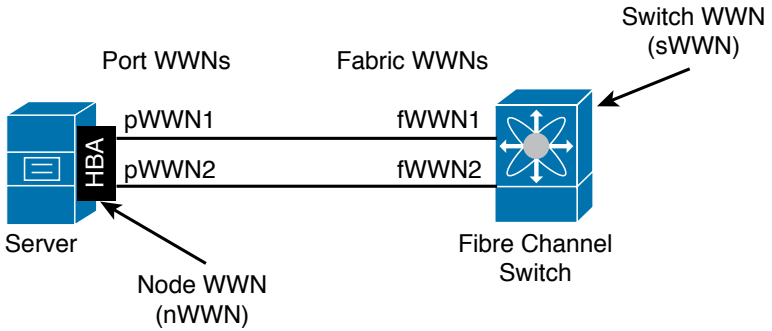


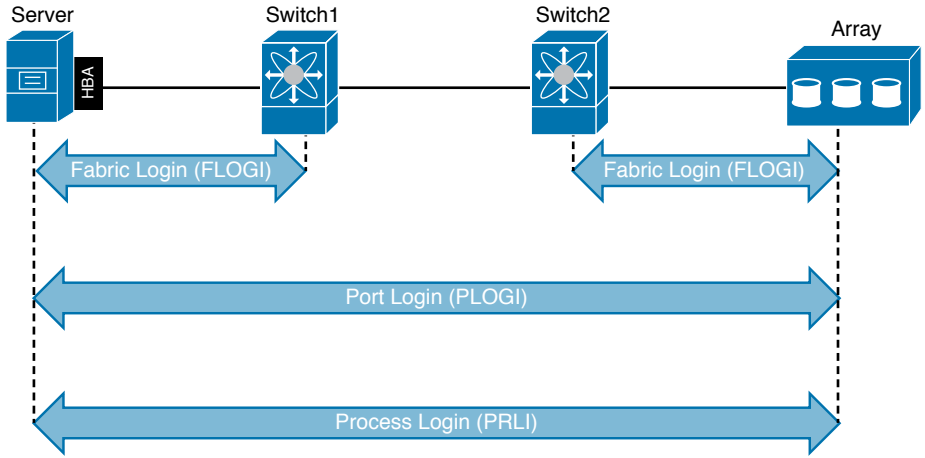
N_Port: Node Port
NL_Port: Node Loop Port

F_Port: Fabric Port
FL_Port: Fabric Loop (Public) Port

E_Port: Expansion Port
(Create ISL)

Storage Area Network (SAN)



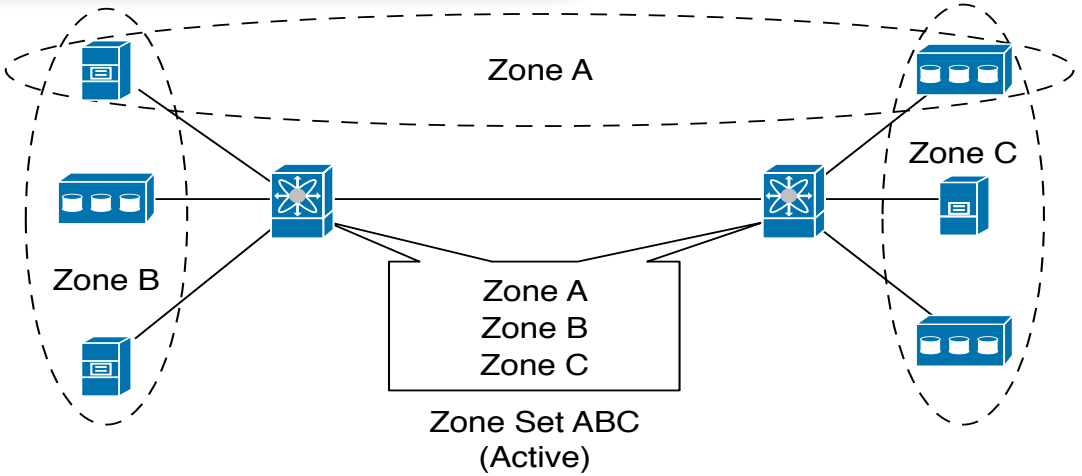


WWN: World Wide Names
pWWN: Represent N_Port
nWWN: Represent a node (HBA)
sWWN: Uniquely represent a Fabric Switch
fWWN: Uniquely represent F_Port
FCID: Administratively assigned address → Domain ID + Area ID + Port ID

Storage Area Network (SAN)

Soft Zoning:

- ✓ Zone numbers are visible to each other through Name Servers
- ✓ Unauthorized frames are capable of traversing the fabric

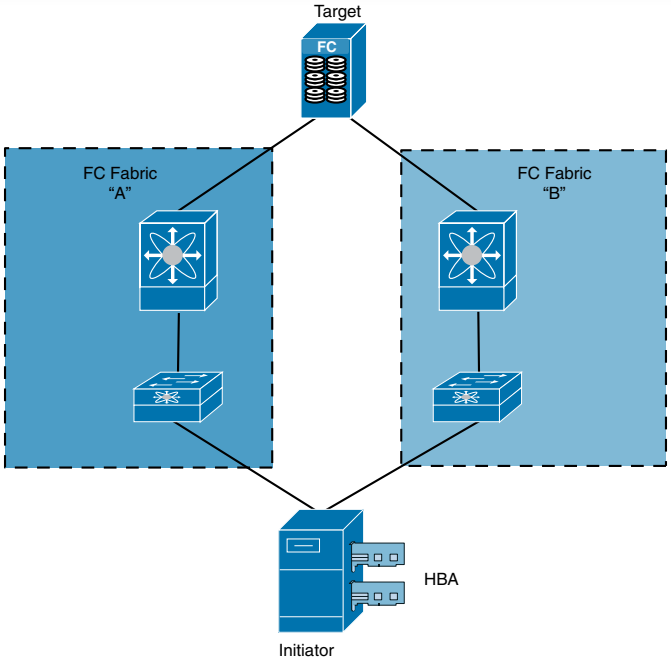


Hard Zoning:

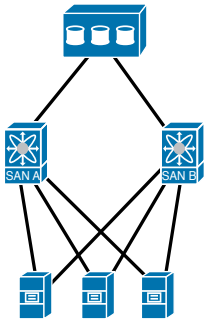
- ✓ Only authorized frames are permitted among the members in a zone

Zone A: Single initiator → Single Target
Zone B: Multiple initiator → Single Target
Zone C: Single initiator → Multiple Target

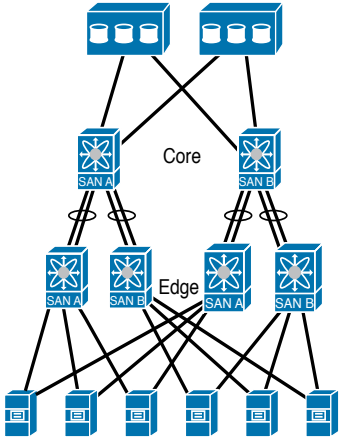
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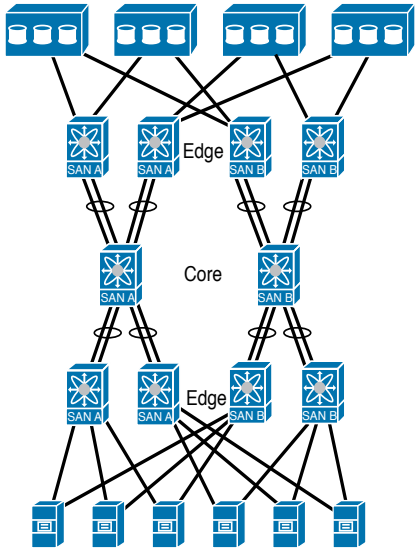
Single-Layer



Core-Edge



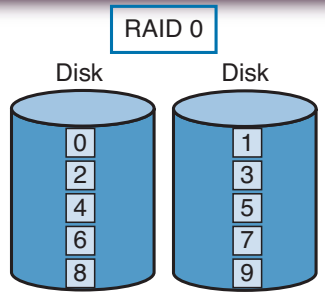
Edge-Core-Edge

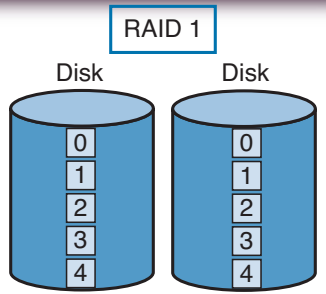


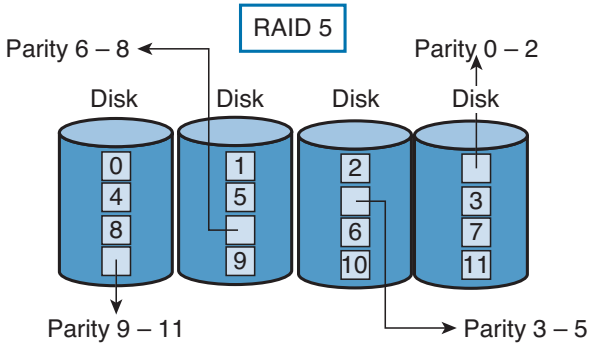
Storage Virtualization

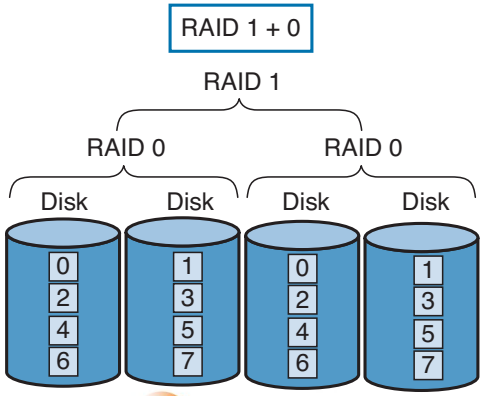
- RAID
- Virtualizing Storage Devices
- Virtualizing LUN
- Virtualizing File Systems
- File / Record Virtualization
- Tape Storage Virtualization
- Virtualizing SAN
  - FCIP for SAN Extension and Traffic Engineering
  - IVR for Transit VSAN
  - NPV for Blade Server Hosting Data Center
- N-Port ID Virtualization
- FCoE and SAN Extension for LAN and SAN Management Separation
- iSCSI

Storage Virtualization

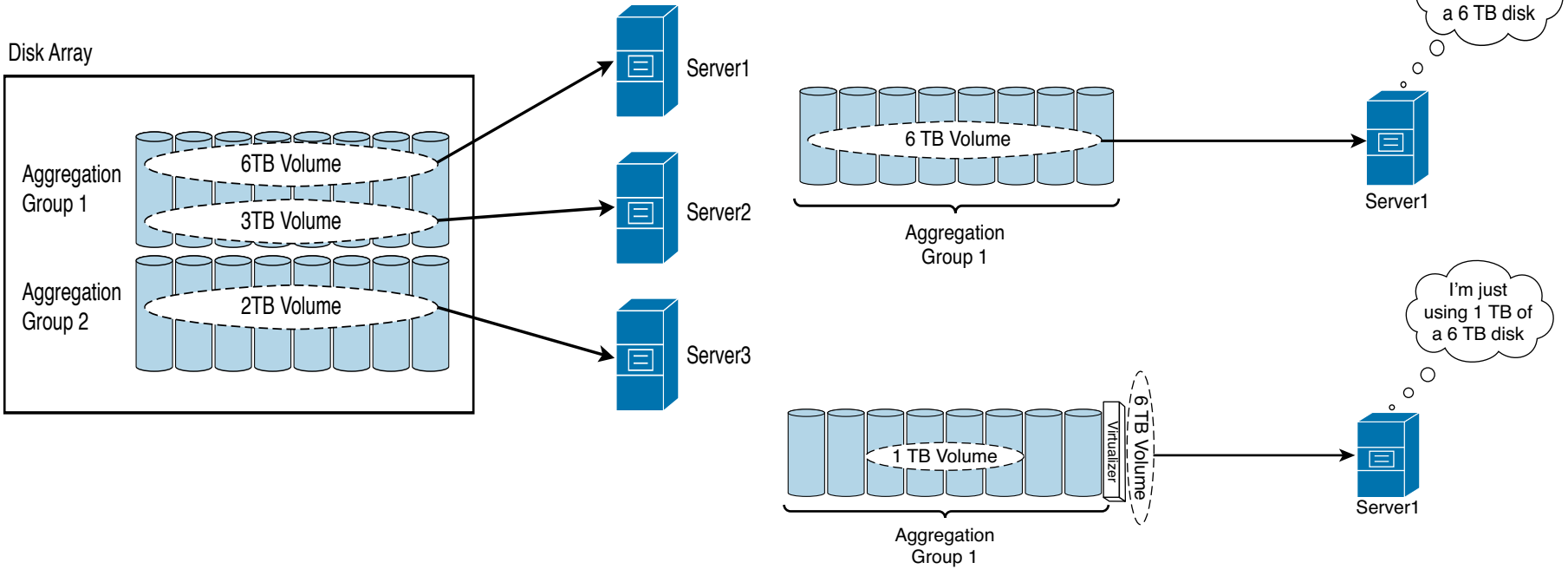




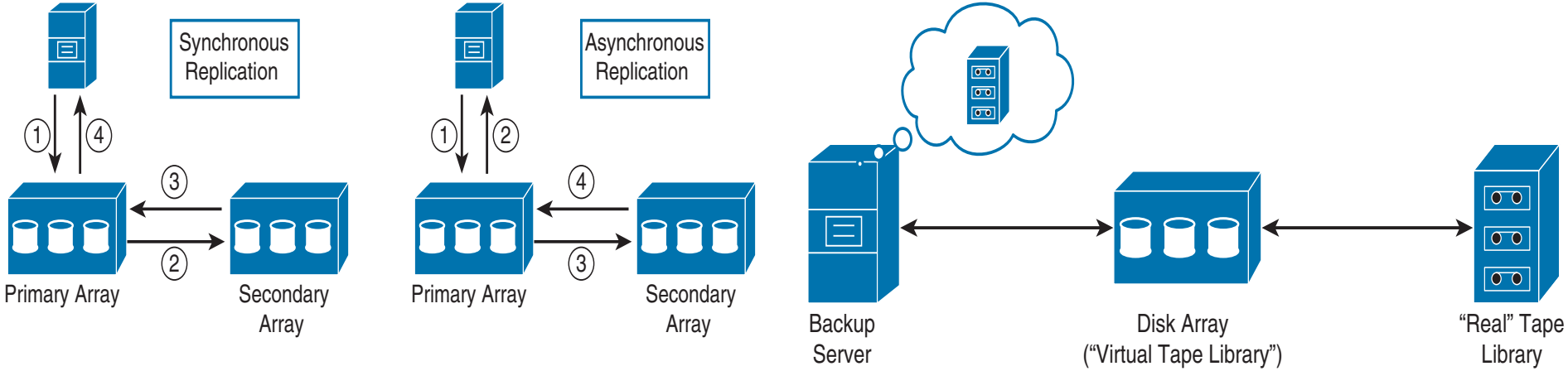




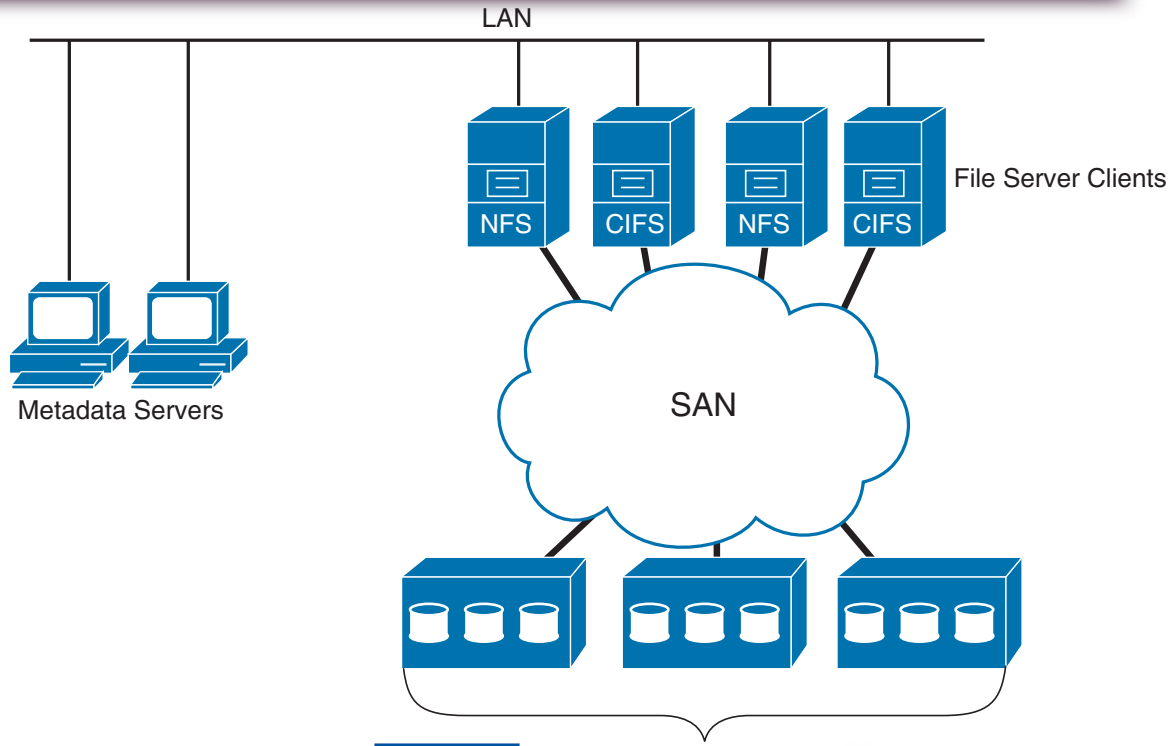
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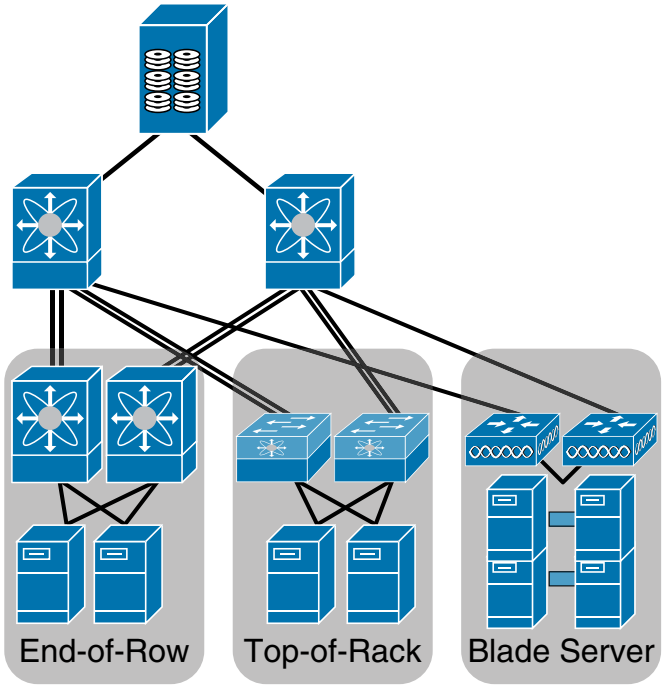
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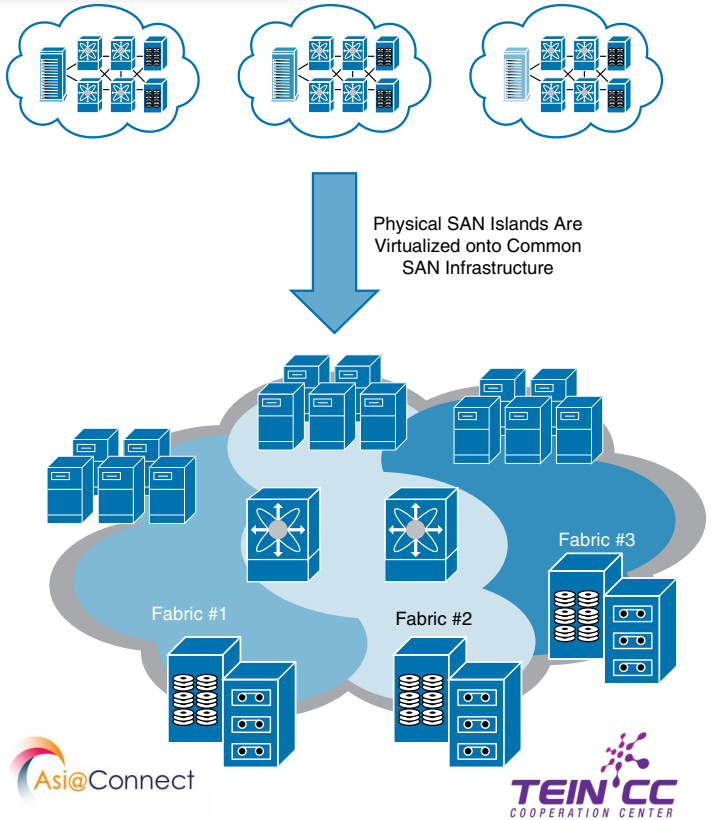


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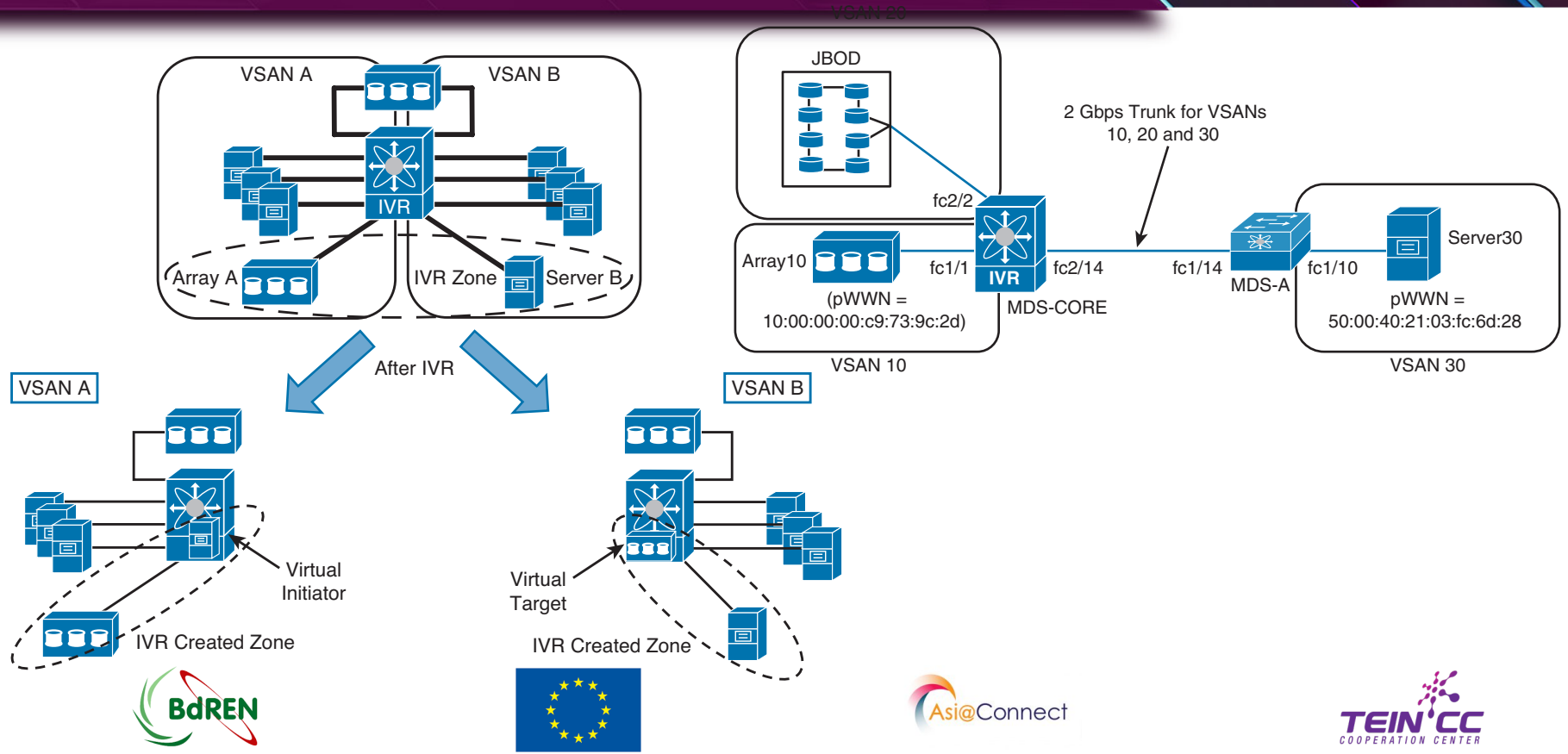


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Q&A