

# Integrating Arbitrated Loop Devices into a Switched Fabric Environment

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# Agenda

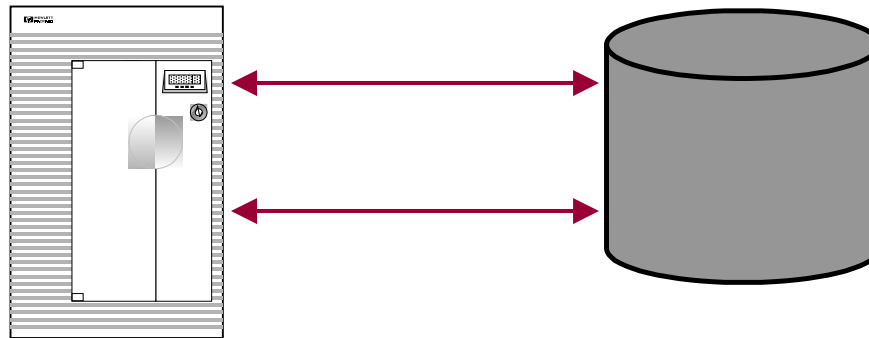
- FC-AL and FC-SW Defined
- Why Choose to Integrate?
- How to Integrate
- Best Practices
- Q&A

# Arbitrated Loop (FC-AL)

- Legacy protocol
- Point-to-Point connections
- Private Loop
- Public Loop

# Point-to-Point (FC-AL)

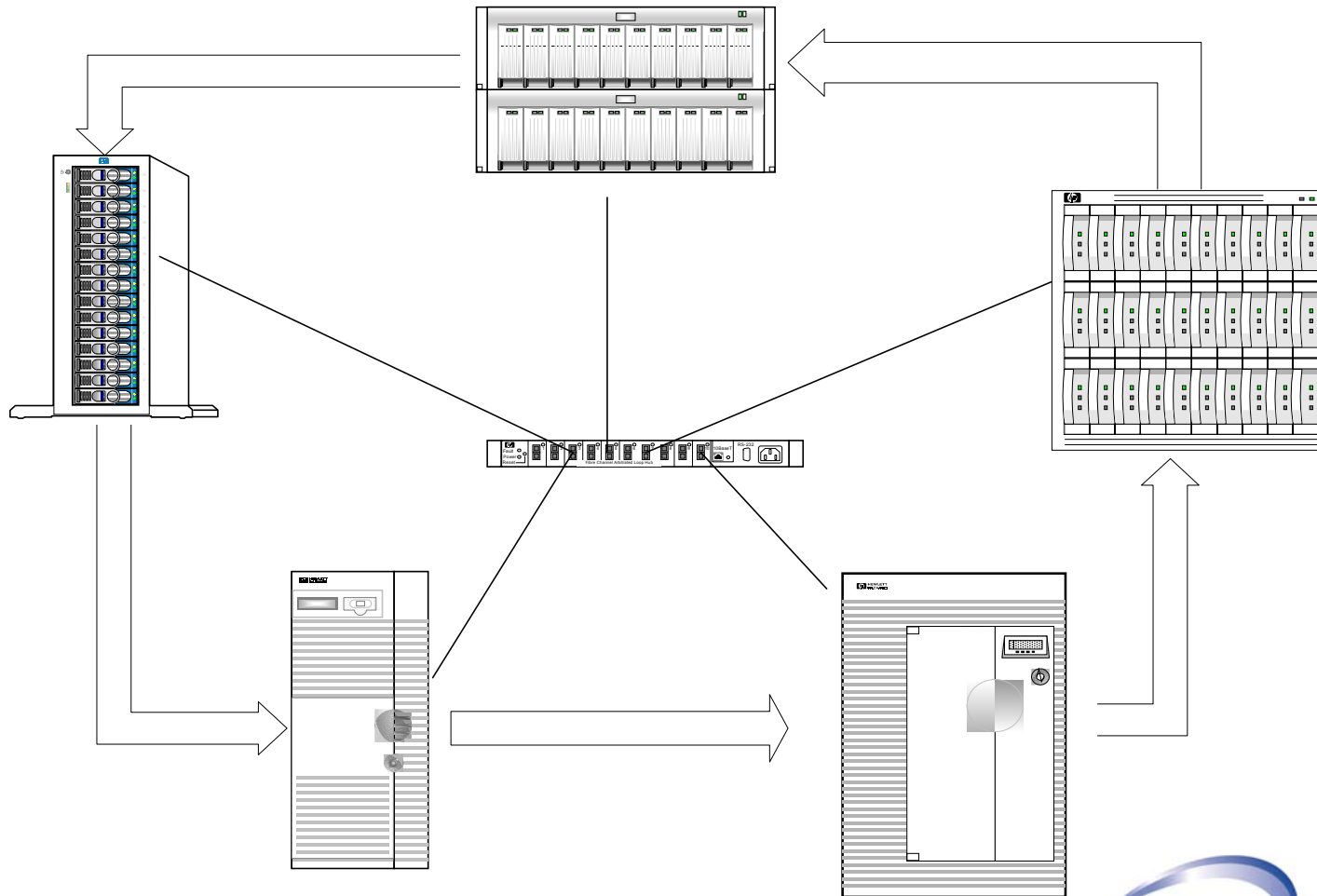
- Used for server to storage (one to one) connections
- First generation implementation of FC



# Private Loop (FC-AL)

- Up to 126 devices sharing a common loop
- Shared Bandwidth
- Devices must negotiate for transmission rights
- Devices connected using FC hubs
- No connection to a fabric

# Private Loop Example Topology



# Public Loop (FC-AL)

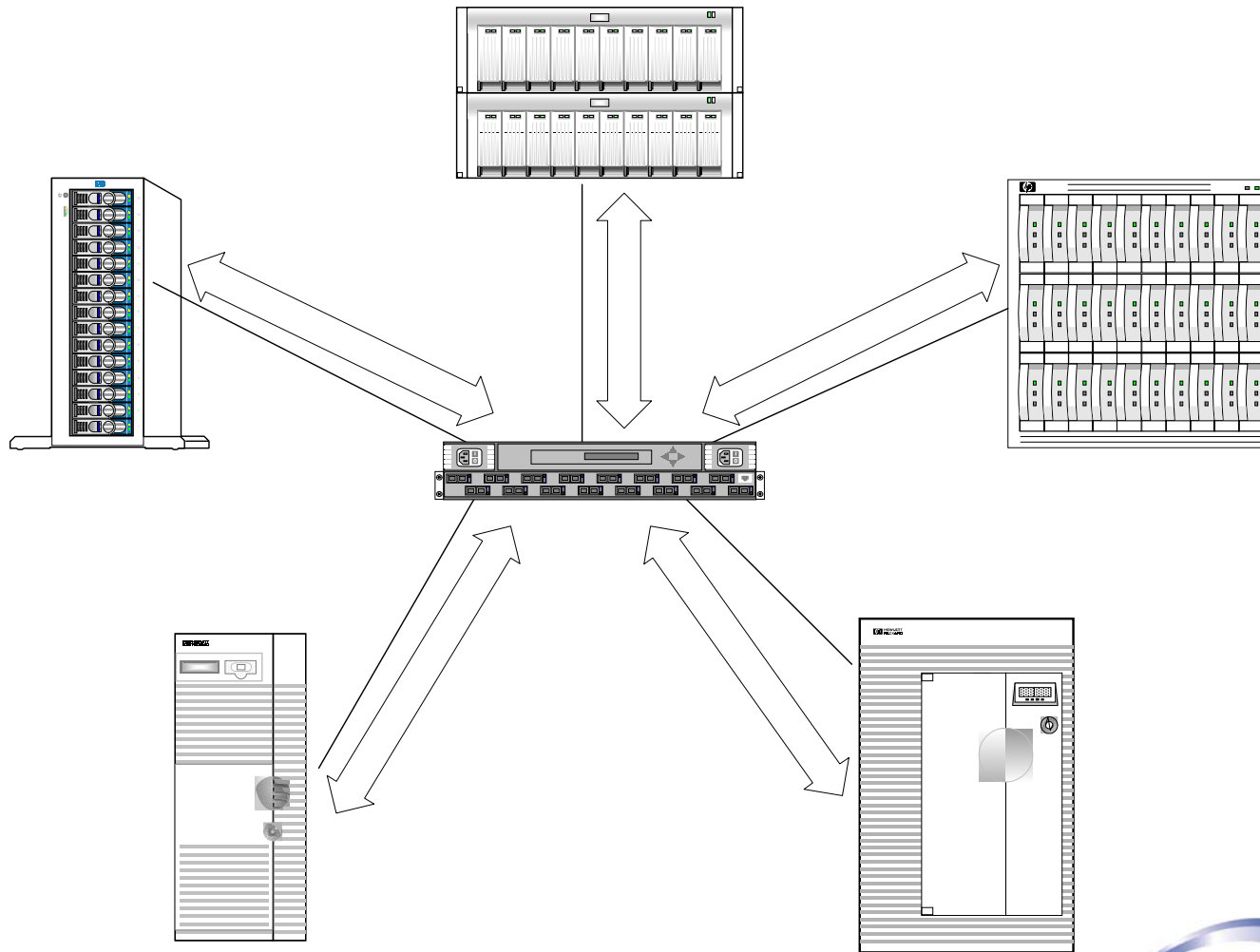
- Private Loop, but can be connected to a Fabric environment through an FL (fabric loop) port
- Not all devices can do this (Private Loop Devices)

# Switched Fabric (FC-SW)

- One or more FC switches in a single network
- Up to a theoretical maximum of 16 million devices
- Dedicated concurrent bandwidth to each device



# FC-SW Example Topology



# Why Choose to Integrate?

- Extend the lifetime of existing assets
- Leverage investment in legacy storage devices
- Pool storage resources
- Ease of data migration to new platforms
- Improve data availability, management and reliability

# Host Investment Protection

- Allow older FC-AL attached servers to access new FC-SW attached storage
- Upgrade existing servers (those that are supported) with new FC-SW HBAs

# Storage Investment Protection

- Continue to use storage devices that have already been paid for
- Make new storage resources available to older FC-AL attached hosts
- Re-use older, slower storage for less critical purposes (**cascading**)

# Storage Resource Pooling

- Ensure that the hosts that need storage are able to access it
- Easily redeploy storage resources across the organization based on changing business and IT needs

# Data Migration

- Easier migration from FC-AL to FC-SW attached storage
- Old way – back up to tape, swap out storage, restore from tape
- Better way – mount both resources at the same time, copy data across server backplane

# Data Availability, Management and Reliability

- Instead of redundant loops, now we can have redundant fabrics with multiple data paths
- Implement software solutions for improved performance and redundancy, such as HP's AutoPath, Veritas Software's DMP and/or EMC's PowerPath
- Fabric Switches are SNMP enabled for improved management

# How to Integrate FC-SW and FC-AL

- Connecting Private Loops to Fabrics
- Proprietary vendor implementations (e.g. Brocade's QuickLoop)
- Hardware and software requirements



# QuickLoop

- Software based solution to allow Private Loop Fabric Attach
- Supported on Brocade Silkworm switches
- Allows Private Loop hosts and storage to attach to a switched fabric
- Public (Fabric) hosts can easily access Private Loop attached storage devices

# QuickLoop

- Individual switch ports are configured for QuickLoop – can attach any type of FC-AL device, e.g. servers storage or hubs
- All QuickLoop devices are registered automatically in the fabric
- No host reconfiguration is required on the FC-AL attached server

# Fabric Assist

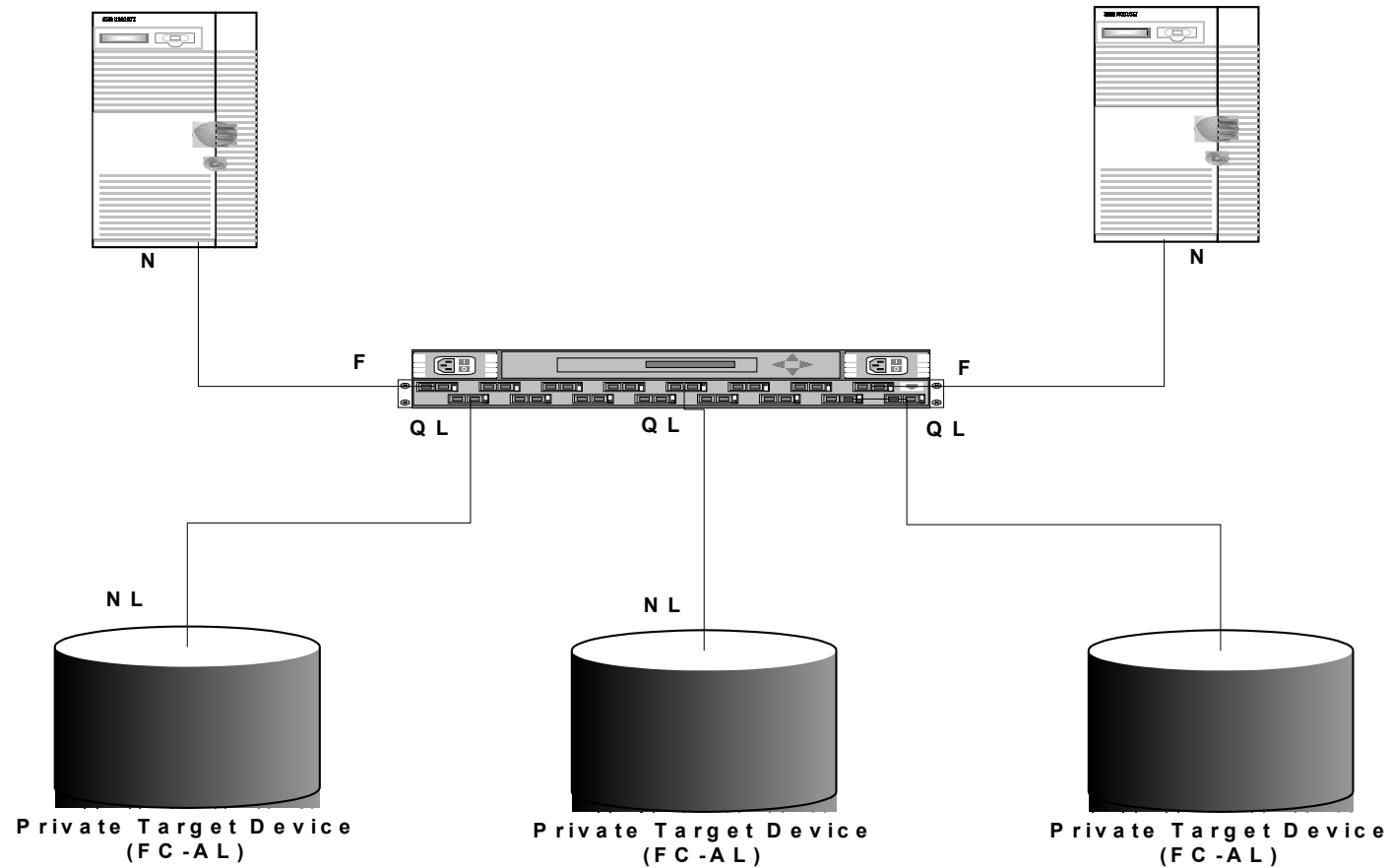
- Used to zone FC-SW hosts to FC-AL resources
- As all FC-AL resources are registered in the Fabric, you can use the same best practices as in FC-SW zoning

# Other Requirements

- Ensure that you have a supported Fibre Channel HBA (host-bus adapter)
- Upgrade to latest revision of FC software driver
- Device addresses will change when migrating from private loop to switched fabric – be prepared, use `vgexport` and `vgimport` to migrate existing volume groups

# Sample Topology

## QuickLoop Fabric Attach

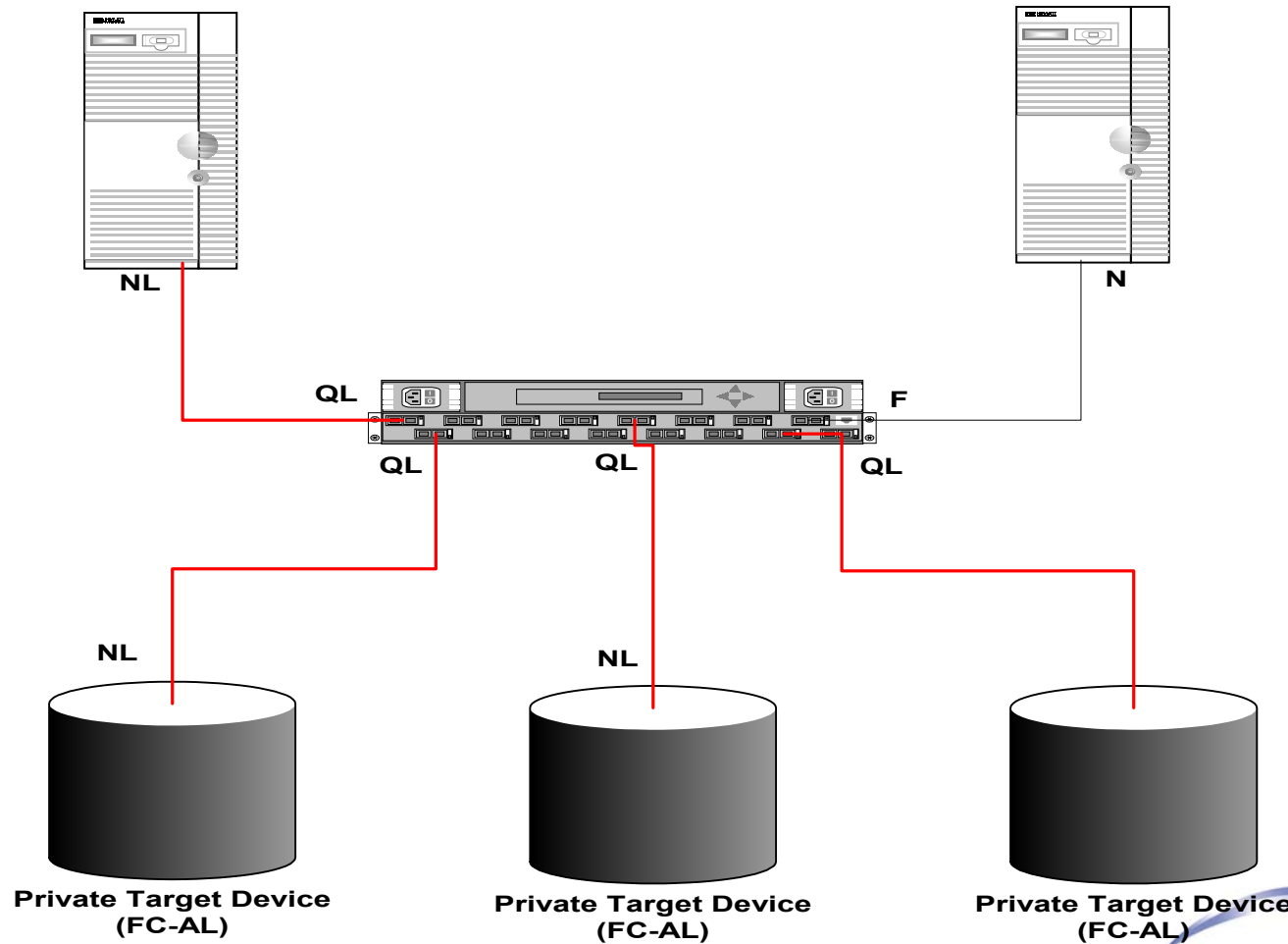


# QuickLoop Fabric Attach

- Hosts are Fabric (FC-SW) attached to F ports (public hosts)
- Storage is FC-AL attached to QuickLoop ports (private devices)
- Public hosts can access any of the private devices on QuickLoop ports, as well as any FC-SW attached storage devices on the fabric

# Sample Topology

## QuickLoop Private Device Attach



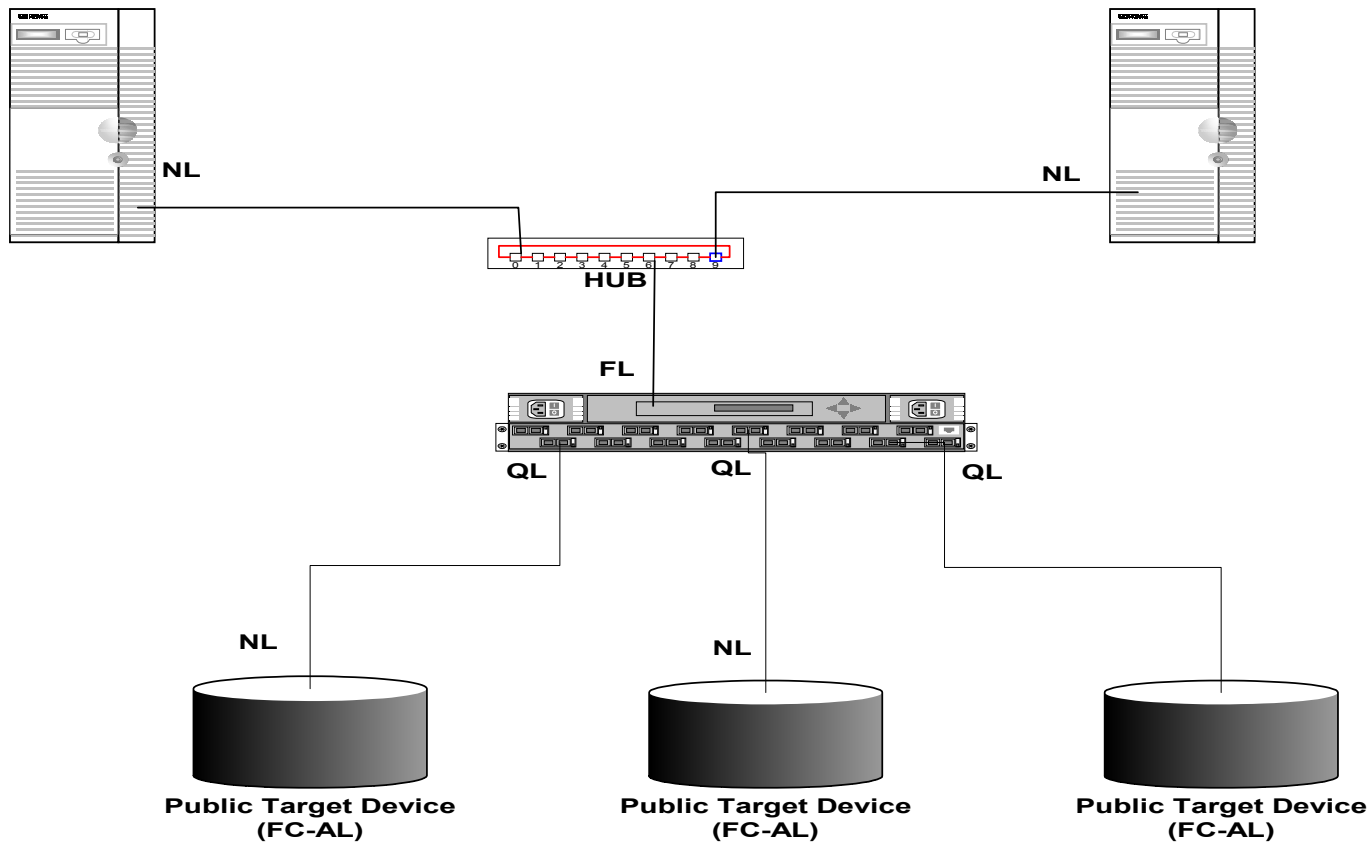
# QuickLoop Private Device Attach

- Public host attached to F port can access all Storage Devices (public and private) on the Fabric
- Private host (FC-AL) attached to a QuickLoop port can access only storage devices on the QuickLoop
- Once the private host is migrated to FC-SW, it will be able to access all storage devices



# Sample Topology

## QuickLoop Public Loop Attach



# QuickLoop Public Device Attach

- Private hosts on an FC-AL hub are connected to the Fabric by and FL port
- Private hosts can now access all storage on the Fabric

# Best Practices

- Over plan don't overbuild
- Always use single initiator zoning (Zone by WWN)
- When possible, remove any FC hubs from the configuration
- Multiple redundant fabrics (dual HBA's in all servers)
- Keep "as built" and current documentation available

# Future Directions

- Storage Virtualization
- iSCSI

# References

- ***The Holy Grail of Storage Management*** – Jon Toigo
- ***Designing Storage Area Networks*** – Tom Clark
- **HP FC Fabric Migration Guide (J2635-90014)** – docs.hp.com
- **Brocade** – www.brocade.com
- **SNIA (Storage Networking Industry Association)** – www.snia.org

# Discussion

# Contact Information

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