FCoE Deployment in a Virtualized Data Center

Satheesh Nanniyur
(satheesh.nanniyur@qlogic.com)
Sr. Staff Product Marketing Manager
QLogic Corporation

All opinions expressed in this presentation are that of the author. They do not indicate any product plans or endorsements from his employer!
Agenda

- Trends in Virtualized Data Centers
- FCoE CNA Compatibility with FC
- IO Virtualization with FCoE CNAs
- FCoE Phased Deployment
- Software FCoE v/s FCoE CNA Deployment
- VM Mobility and QoS with FCoE CNA
- Brief Case Study of FCoE Deployment
Drivers for Virtualization

IDC survey suggests virtualization driven by 4 key factors
- Server consolidation
- Business continuity
- Test and development
- Resource pooling and sharing leading to dynamic provisioning

Industry experiencing rapid growth of virtualization

Source: IDC Virtualization Tracker Survey, 2008
Virtualized Data Center Trends

- Multi-Core CPUs allow bigger and multiple workloads, increase server consolidation

- Virtual Machine IO Performance near Physical Machine requiring more bandwidth per server (IO Virtualization, Hardware assists, Offloads)

- Reduced Hardware Components reduces Power and Cooling cost (Nearly 60% of data center cost comes from Power and Cooling)

- Simplified Management and Dynamic Provisioning
FCoE Overview

- It is just Fibre Channel encapsulated in Ethernet
- FC frames are not modified enroute

FCoE Goal: Enable Server I/O Consolidation and Network Convergence

San José, CA USA
February 2010
FCoE CNA Software Compatibility

- Reliability from field proven driver stack
- 100% application transparency
- Investment protection and smooth transition
Operating System view of FCoE CNA

Storage

Ethernet
FCoE CNA Management Compatibility

- Deploy common SAN practices such as FC zoning, LUN masking, etc.
  - Transparent Layer 2 FCoE to FC address mapping
- Build failover solutions using multi-pathing software
  - Same driver interface as FC
- Troubleshoot LAN/SAN issues
  - Unique MAC address or “Ethertype” for FCoE data traffic

- Reuse proven SAN & LAN management practices
- Reuse familiar SAN & LAN management tools
- Reuse in-house SAN & LAN admin expertise
IO Virtualization with FCoE CNA

- Virtual Intermediary (VI)
- VF-drvr
- PF
- VF

I/O Virtualization
SW based
San José, CA USA
February 2010
FCoE Phased Deployment

- TODAY: Dual adapters and networks for LAN and SAN
- PHASE 1: CNA reduces power, enables efficient use of real estate in blades
- PHASE 2: Converged Network consolidates network resources while coexisting with current networks
- PHASE 3: Simplified data center with Server and Network Consolidation reduces IT cost

- NO NEED for infrastructure overhaul; deploy in phases
- NO NEED for rip and replace; use existing LAN & SAN
- NO NEED for two convergence technologies; one fits ALL
Software FCoE v/s FCoE CNA Deployment

Converged Network Adapter:
- Provides superior IO Performance
- Increases server consolidation; frees up CPU from protocol processing
- Provides field-tested solution across Operating Systems and Platforms
Why not Software FCoE?

Performance disclaimer from “FCoE Initiator Functional Specification*”:

“This is a software FCoE solution, there are code paths which are CPU intensive (e.g. FC-CRC calculation). Depending on the CPU power, when I/O traffic through the FCoE ports is heavy, CPU utilization could go very high.”

* - Source:
Enhanced Transmission Selection (ETS) protocol allows bandwidth percentage allocation across FCoE SAN and Networking traffic.

Further, FC level QoS can be configured for the bandwidth allocated at FC level.
FCoE supports N-port ID Virtualization similar to FC
FC zoning configuration migrated with NPIV
All other Virtual Port properties migrated to new host along with NPIV
Case Study – Before CNA deployment

<table>
<thead>
<tr>
<th>26 Servers</th>
<th>Ethernet</th>
<th>FC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapters</td>
<td>26</td>
<td>26</td>
<td>52</td>
</tr>
<tr>
<td>Switches</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Cables</td>
<td>56</td>
<td>56</td>
<td>112</td>
</tr>
<tr>
<td>Uplinks</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

Access Layer with Cisco Catalyst and MDS switches

SAN

LAN
Case Study – After CNA deployment

<table>
<thead>
<tr>
<th>26 Servers</th>
<th>CNA</th>
<th>Total</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapters</td>
<td>26</td>
<td>26</td>
<td>50%</td>
</tr>
<tr>
<td>Switches</td>
<td>2</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>Cables</td>
<td>60</td>
<td>60</td>
<td>46%</td>
</tr>
<tr>
<td>Up links</td>
<td>8</td>
<td>8</td>
<td>0%</td>
</tr>
</tbody>
</table>

Access Layer with Cisco Nexus 5020 + Expansion Modules
Cost Savings from FCoE CNA deployment

Cost per server

<table>
<thead>
<tr>
<th>Component</th>
<th>FC and Ethernet</th>
<th>FCoE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>$300</td>
<td>$200</td>
</tr>
<tr>
<td>FC HBA (2-port)</td>
<td>$1200</td>
<td>-</td>
</tr>
<tr>
<td>1GbE NIC (2-port)</td>
<td>$800</td>
<td>-</td>
</tr>
<tr>
<td>10GbE FCoE CNA (2-port)</td>
<td>-</td>
<td>$1800</td>
</tr>
<tr>
<td>FC switch</td>
<td>$2400</td>
<td>-</td>
</tr>
<tr>
<td>1GbE switch</td>
<td>$2800</td>
<td>-</td>
</tr>
<tr>
<td>FCoE switch</td>
<td>-</td>
<td>$4000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$7500</strong></td>
<td><strong>$6000</strong></td>
</tr>
</tbody>
</table>

20%
What to look for when you buy FCoE CNA?

- Full FCoE protocol offload
- Full 10GbEE NIC functionality with stateless offloads
- Certified across Operating Systems and Platforms
- Single ASIC solution with low power dissipation
- Leveraged from years of FC expertise and field proven drivers and management apps
- End-to-end ecosystem support