TOMORROW starts here.
Virtual Device Context (VDC) Design and Implementation Considerations with Nexus 7000

BRKDCT-2121

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Course Objective

- What you will learn…..
- VDC Configuration Guidelines
- Common VDC Use Cases
- How to use VDCs with Advanced Applications
Agenda

- Virtual Device Context (VDC) Overview
  - What are VDCs?
  - VDC Types
  - Resource Allocation
  - Interface Allocation
  - VDC Operation and Management

- Consolidation with VDCs

- Segmentation with VDCs

- Advanced Applications and VDCs

- What’s new in NX-OS 6.2

- Q&A
Virtual Device Context (VDC) Overview
What are Virtual Device Contexts (VDCs)?

- What is a switch?
  - Control plane, Data plane and Management plane
- VDCs enable the virtualization of these planes and hardware resources
- Enables collapsing of multiple logical networks into single physical infrastructure
- Helps scale physical resources of device
- Appropriate for typical silo designs such as:
  - Production, Dev, Test
  - Intranet, DMZ, Extranet
  - Organization A, B C
  - Application A, B, C
  - Customer A, B, C

Different network islands virtualized onto common data center networking infrastructure
Virtual Device Contexts (VDCs)

- **VDC—Virtual Device Context**
  - Flexible separation/distribution of **Software Components**
  - Flexible separation/distribution of **Hardware Resources**
  - Securely delineated **Administrative Contexts**

- **VDCs are not...**
  - The ability to run different OS levels on the same box at the same time
  - based on a **hypervisor** model; there is a single ‘infrastructure’ layer that handles H/W programming...
## Virtualization Hierarchy
Where do VDCs reside in the “Big Picture”

<table>
<thead>
<tr>
<th>Nexus 7000</th>
<th>VDC1</th>
<th>VDC2</th>
<th>VDC3</th>
<th>VDCX</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN VLAN VLAN</td>
<td>VLAN VLAN VLAN</td>
<td>VLAN VLAN VLAN</td>
<td>VLAN VLAN VLAN</td>
<td>VLAN VLAN VLAN</td>
</tr>
<tr>
<td>VRF VRF VRF</td>
<td>VRF VRF VRF</td>
<td>VRF VRF VRF</td>
<td>VRF VRF VRF</td>
<td>VRF VRF VRF</td>
</tr>
</tbody>
</table>
When creating VDCs, certain resources are shared across VDCs while others must be dedicated to a VDC

### Global Resources
Resources that can only be allocated, set, or configured globally for all VDCs from the master VDC are referred to as Global Resources – i.e.: boot image configuration, Ethanalyzer session, CoPP

### Dedicated Resources
Resources that are allocated to a particular VDC are referred to as dedicated resources - examples include Layer 2 and Layer 3 ports, VLANs, IP address space, etc…

### Shared Resources
Some resources are shared between VDCs – for example the OOB Ethernet management port.
NX-OS Software Packaging Licensing Overview

- **Simplified Software Management**
  8 NX-OS enforceable licenses enable full suite of functionalities for any switching deployment

- **Grace Period License**
  120 days of full feature use with ample warning as grace period comes to the end

- **Non-Disruptive Licensing**
  No disruption in service when moving from grace license to purchased licenses

- **Licenses are associated with chassis S/N#**

4 VDCs are in Advanced VDC is incremental +4 to VDC total
VDC Certification

- VDC separation is industry certified
- NSS Labs for PCI Compliant Environments
- FIPS 140-2
- Common Criteria Evaluation and Validation Scheme – Certification #10349
Agenda

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  - What are VDCs?
  - VDC Details
    - Resource Allocation
    - Interface Allocation
    - VDC Operation and Management
- Consolidation with VDCs
- Segmentation with VDCs
- Advanced Applications and VDCs
- What’s new in NX-OS 6.2
- Q&A
How Many VDCs Can I have?

- Supervisor 1 – Four VDCs + 1 Admin VDC*
  - Requires 8GB of RAM
- Supervisor 2 – Four VDCs + 1 Admin VDC (4+1)
- Supervisor 2E – Eight VDCs + 1 Admin VDC (8+1)
  - VDCs beyond 4 require additional license
  - N7K-VDC1K9 (increments VDCs +4)

*Admin VDC on SUP1 Requires NX-OS 6.2
Nexus 7000 Next Gen Supervisors
Two Options For Different Scale Requirements

Supervisor Features
- Latest Generation Intel CPU
- More CPU Cores, More Memory
- Baseline and High-End Versions
- CPU Shares
- USB Flash

Customer Benefits
- Riding the x86 technology curve
- Higher VDC, FEX Scale
- Price points for different segments
- Guarantee CPU for higher priority VDCs
- Better Performance, more widely used

Supervisor 2
- Quad Core CPU
- 12 GB of RAM

Supervisor 2E
- 2x Quad Core CPU
- 32 GB of RAM

*SUP2 and SUP2E Require NX-OS 6.1
CPU Shares

- Enables per-VDC CPU Access and Prioritization
- Provides more control and protection per VDC for users
- Network administrator controls each VDC’s priority
- CPU share is controlled by VDC priority
- CPU is shared equally among VDCs
- User can control allocation – priorities are linear in effect
- The more VDCs configured, the lower the overall percentage per VDC
- Comes into use when CPU utilization increases (contention)
- Available on SUP2/2E only*
- CPU shares take effect immediately (no need to restart/reload)

VDC1 Shares = 2
VDC2 Shares = 4
VDC3 Shares = 1
VDC4 Shares = 8
VDC5 Shares = 10
VDC6 Shares = 5

CPU share = (VDC priority *1000)
Processes that do not want the CPU do not affect CPU time of other processes
The CPU time a process gets is its cpu.share/(sum of cpu.share of all processes that want CPU time)

*SUP2 and SUP2E Require NX-OS 6.1
VDC Details
The Default VDC

- Fully functional VDC with all capabilities
- Some tasks can only be performed in the default VDC
  - VDC creation/deletion/suspend
  - Resource allocation – interfaces, memory
  - NX-OS Upgrade across all VDCs
  - EPLD Upgrade – As directed by TAC or to enable new features
  - Ethalyzer captures – control plane traffic
  - Feature-set installation for Nexus 2000, FabricPath and FCoE
  - Control Plane Policing (CoPP)
  - Port Channel load balancing
  - Hardware IDS checks control
  - ACL Capture feature enable
- Default VDC can be used for production traffic with no issues
  - Some customers may choose to reserve it for administrative functions
VDC Details
Non-Default VDC

- Fully functional VDC with all capabilities
- Changes in non-default VDC only affect that particular VDC
- Independent processes started for each protocol in each VDC
- Discrete configuration file per VDC
- Discrete checkpoints per VDC
- Discrete RBAC, TACACS, SNMP, etc.
VDC Details

Admin VDC

Available on Supervisor 2/2E and SUP1*
Provides pure administrative context

- CoPP configuration
- ISSU and EPLD
- VDC creation, suspension and deletion, interface allocation
- Show tech-support, tac-pac, debugs, GOLD Diagnostics
- System-wide QoS, Port Channel load-balancing

Simplify configuration for data plane VDCs

- No boot statements, CoPP policies, etc in non-Admin VDCs

 Doesn’t require Advanced or VDC License

- Can use 1 Admin VDC + 1 Data VDC (1+1)

Admin VDC on SUP1 requires NX-OS 6.2
VDC Types
“Module-Type” Modes

“Module-Type” Modes

- In release 5.1, “module-type” parameter defines the behavior for each VDC
- Different I/O module types can be specified:
  - m1 – specifies VDC can contain M1 modules
  - m1-xl – specifies VDC can contain M1-XL modules
  - m2-xl – specifies VDC can contain M2-XL modules
  - f1 – specifies VDC can contain F1 modules
  - f2 – specifies VDC can contain F2 modules
  - f2e – specifies VDC can contain F2e modules (NX-OS 6.2)
  - f3 – specifies VDC can contain F3 modules (NX-OS 6.2(6))

- limit-resource module-type m1 m1-xl m2-xl f2e* (default) – Allows mix of M1, M1-XL, M2 and F2e modules in the VDC

*Default in NX-OS 6.2
**VDC Types**

**F2 VDCs – NX-OS 6.1**

- F2 Modules cannot coexist in the same VDC as other non-F2 modules
- Require the creation of a F2 only VDC using limit-resource module-type f2
- In a new configuration where only F2 modules are present, the system will automatically set the default VDC to F2 mode*
- When F2 is added to an existing configuration, ports are placed in VDC0 to be allocated to F2 VDCs by the admin
- In NX-OS 6.1, F2e modules are supported in a F2 VDC

*This check is only done once when no configuration exists.*
VDC Types
F2e VDCs – NX-OS 6.2(2) and higher

- F2e Modules can coexist in the same VDC as other non-F2e modules
  - M1, M1XL, and M2XL in proxy mode
  - F2 in native mode
  - F3 in Lowest Common Denominator (LCD) mode

- F2e only VDC required to use F2e features like SVI counters, MACSEC, etc.

- F2e in proxy or lowest common denominator mode requires `rebind interface` command
  - See Additional Resources slides at end
F3 Modules can coexist in the same VDC with M2 or with F2 and F2e modules
- No support for F3+M1, M1XL or F1

Requires using limit-resource module-type command for desired combination

F3 interoperability works in lowest common denominator mode for feature support

Watch for **rebind interface** command when setting module interoperability
- See Additional Resources slides at end

F3 does not require the use of VDCs
VDC Types
Examples of Limiting Module Type

Want F2-only VDC
limit-resource module-type f2
Want F2e-only VDC
limit-resource module-type f2e
Want F3-only VDC
limit-resource module-type f3
Want M2-XL-only VDC
limit-resource module-type m2-xl
Want M2-XL F2e-only VDC
limit-resource module-type m2xl f2e
Want F3 F2e-only VDC
limit-resource module-type f2e f3

• In a VDC in one of these modes, conflicting modules are placed in “suspended” state on OIR

• Power is applied, module is in “ok” status, but interfaces are not available for configuration

• Only VDC allocation is allowed for such interfaces (e.g., to move F1 interfaces from an M1-only VDC to an F1 or mixed-mode VDC)
VDC Types
Storage VDC

- Enables separation of job functions for LAN and SAN Admin
- Creates a “virtual” MDS within the Nexus 7000
  - Participates as a full Fibre Channel Forwarder (FCF) in the network
  - Zoning, FC alias, fcdomains, IVR, Fabric Binding, etc.
- FCoE Target Support
- FCoE ISLs to other switches – Nexus 7000, 5000, MDS
- Only one storage VDC per chassis
  - Does not require Advanced License (VDCs)
  - Does count towards total VDC

FCoE on F2 and F2e requires Supervisor 2/2E
F1 and F2/F2e cannot intermix in Storage VDC
F3 does not support FCoE at this time
Agenda

- Virtual Device Context (VDC) Overview
  - What are VDCs?
  - VDC types
  - Resource Allocation
    - Interface Allocation
    - VDC Operation and Management
    - Leading practices
- Consolidation with VDCs
- Segmentation with VDCs
- Advanced Applications and VDCs
- What's new in NX-OS 6.2
- Q&A
Resource Allocation

- Ability to allocate resources “as needed”
- Different VDCs may have different requirements
- Production vs. Test/Dev
- Multi-tenancy into shared infrastructure
Some resources can be allocated and limited to a given VDC:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>anycast_bundleid</td>
<td>Set anycast bundle id resource limits</td>
</tr>
<tr>
<td>m4route-mem</td>
<td>Set ipv4 route memory limits</td>
</tr>
<tr>
<td>m6route-mem</td>
<td>Set ipv6 route memory limits</td>
</tr>
<tr>
<td>module-type</td>
<td>Controls which type of modules are allowed in this vdc</td>
</tr>
<tr>
<td>monitor-session</td>
<td>Monitor local/erspan-source session</td>
</tr>
<tr>
<td>monitor-session-erspan-dst</td>
<td>Monitor erspan destination session</td>
</tr>
<tr>
<td>monitor-session-extended</td>
<td>Extended Monitor local/erspan-source session</td>
</tr>
<tr>
<td>monitor-session-inband-src</td>
<td>Monitor inband source</td>
</tr>
<tr>
<td>monitor-session-mx-exception-src</td>
<td>Monitor Mx module exception source</td>
</tr>
<tr>
<td>port-channel</td>
<td>Set port-channel limits</td>
</tr>
<tr>
<td>u4route-mem</td>
<td>Set ipv4 route memory limits</td>
</tr>
<tr>
<td>u6route-mem</td>
<td>Set ipv6 route memory limits</td>
</tr>
<tr>
<td>vlan</td>
<td>Set VLAN limits</td>
</tr>
<tr>
<td>vrf</td>
<td>Set vrf resource limits</td>
</tr>
</tbody>
</table>

*Resources as of NX-OS 6.2(6)*
• Routing table memory limits are in MB. For an idea of MB to routes you can use this command:

```
show routing ipv4|ipv6 memory estimate routes <1000-1000000> next-hops <1-16>
```

N7K-1-Core# show routing ipv4 memory estimate routes 419406 next-hops 1
Shared memory estimates:
   Current max   8 MB; 5197 routes with 16 nhs
   in-use        1 MB; 49 routes with 1 nhs (average)
Configured max 8 MB; 5197 routes with 16 nhs
Estimate memory with fixed overhead: 103 MB; 419406 routes with 1 nhs
Estimate with variable overhead included:
   - With MVPN enabled VRF: 109 MB
   - With OSPF route (PE-CE protocol): 121 MB
   - With EIGRP route (PE-CE protocol): 135 MB

• u4route-mem and u6route-mem limits are only applied after a switchover or reload – they are not hot updates.
Resource Allocation
Memory for Routing

• Fixed system-wide maximums for u4route-mem and u6route-mem
  • 250MB pre-NX-OS 5.2 and 350MB from NX-OS 5.2 forward
• These values are divided amongst *all* VDCs in a system
• If using Admin VDC, set these values to a minimum to free memory for data plane VDCs
• May need to adjust these in high scale routing topologies

Sample Allocation

Total of 350MB
Resource Allocation
Default Resource Allocations

N7K1-VDC1# show vdc N7K1-VDC2 resource

<table>
<thead>
<tr>
<th>Resource</th>
<th>Min</th>
<th>Max</th>
<th>Used</th>
<th>Unused</th>
<th>Avail</th>
</tr>
</thead>
<tbody>
<tr>
<td>vlan</td>
<td>16</td>
<td>4094</td>
<td>35</td>
<td>0</td>
<td>4059</td>
</tr>
<tr>
<td>monitor-session</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>monitor-session-erspan-dst</td>
<td>0</td>
<td>23</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>vrf</td>
<td>2</td>
<td>4096</td>
<td>2</td>
<td>0</td>
<td>4086</td>
</tr>
<tr>
<td>port-channel</td>
<td>0</td>
<td>768</td>
<td>0</td>
<td>0</td>
<td>752</td>
</tr>
<tr>
<td>u4route-mem</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>u6route-mem</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>m4route-mem</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>m6route-mem</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
Resource Allocation

CPU Shares

- Configured under each VDC
- Shares are defined on a scale of 1-10 with default of 5
  - 10 is highest priority, 1 lowest

```bash
vdc Agg1 id 2
  limit-resource module-type ml f1 mlx1 m2x1
  allow feature-set ethernet
  allow feature-set fabricpath
  allow feature-set fex
  cpu-share 5
  allocate interface Ethernet4/1-8
  boot-order 1
</snp>

N7K-1# show vdc Agg1 det

vdc id: 2
vdc name: Agg1
vdc state: active
vdc mac address: 00:26:98:0f:d9:c2
vdc ha policy: RESTART
vdc dual-sup ha policy: SWITCHOVER
vdc boot Order: 1
CPU Share: 5

CPU Share Percentage: 20%
```

Default CPU Share

CPU Share Percentage shows minimum % during contention
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  - What are VDCs?
  - VDC Types
  - Resource Allocation
  - **Interface Allocation**
  - VDC Operation and Management

- Consolidation with VDCs
- Segmentation with VDCs
- Advanced Applications and VDCs
- What’s new in NX-OS 6.2
- Q&A
Interface Allocation
Interface Allocation N77-F348XP-25

Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N77-F348XP-25 Requires allocation in port groups of eight to align ASIC resources.
Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N7K-F312FQ-25 Requires allocation in port groups of two to align ASIC resources.
Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N77-F324FQ-25 Requires allocation in port groups of two to align ASIC resources.
Ports are allocated in VDC config mode

```
N7K1-VDC1# config t
Enter configuration commands, one per line. End with CNTL/Z.
N7K1-VDC1(config)# vdc N7K1-VDC2
N7K1-VDC1(config-vdc)# allocate interface e8/1-4

Moving ports will cause all config associated to them in source vdc to be removed. Are you sure you want to move the ports (y/n)? [yes] yes

N7K1-VDC1(config-vdc)# show vdc membership
vdc_id: 4 vdc_name: N7K1-VDC2 interfaces:
   Ethernet8/1          Ethernet8/2          Ethernet8/3          Ethernet8/4
N7K1-VDC1(config-vdc)# allocate interface ethernet 4/1
Entire port-group is not present in the command. Missing ports will be included automatically

Moving ports will cause all config associated to them in source vdc to be removed. Are you sure you want to move the ports (y/n)? [yes]
```

- Note that FEX ports only exist in the VDC where their parent interfaces reside.
Exception to the rule allowing an interface to exist in only one VDC

- Splits traffic based on Ethertype
- Ethernet VDC “owns” interface
- Storage VDC sees the interface as well
- Shut in Ethernet VDC shuts down both Ethernet and Storage VDC interface
- Shut in Storage VDC only shuts down FCoE interface

FCoE Initialization Protocol (FIP) Ethertype 0x8914 and FCoE 0x8906 only are directed to the storage VDC. All other Ethertypes are directed toward the Ethernet VDC
Interface Allocation
Requirements for Shared Interfaces

- Interfaces must be on N7K-F132XP-15 or N7K-F248XP-23 or N7K-F248XP-25E modules
- Shared between Ethernet VDC and Storage VDC
- Ethernet VDC is where interface is allocated
  - Must be configured as a 802.1q trunk in the Ethernet VDC
  - All ports on the ASIC must be configured for sharing (2 on F1, 4 on F2/F2e)
- Storage VDC is allocated shared interfaces
- Cannot have shared interface with M/F2e module interoperability VDC

*FCoE on F2/F2e requires SUP2 or SUP2E
Interfaces already allocated to N7K1-VDC1

N7K1-VDC1# config

N7K1-VDC1(config)# vdc fcoe

N7K1-VDC1(config-vdc)# allocate fcoe-vlan-range 2000-2100 from vdc N7K1-VDC1

N7K1-VDC1(config-vdc)# allocate shared interface e3/25-26

Ports that share the port group of the interfaces you have specified will be affected as well. Continue (y/n)? [yes] yes

N7K1-VDC1(config-vdc)# end

N7K1-VDC1# switchto vdc fcoe

FCoE# show int brief

Eth3/25 1 eth trunk down Administratively down auto(D) --
Eth3/26 1 eth trunk down Administratively down auto(D) --
Communicating Between VDCs

- Must use front panel port to communicate between VDCs
  - No soft cross-connect or backplane inter-VDC communications

- Storage shared ports can communicate with each other *within* their respective VDC

- Front panel ports align security models, ensure QoS, ACL, Netflow, etc. resources

- No restrictions on L2/L3 or linecard models

- When using vPC or vPC+ between VDCs, ensure domain IDs are unique

- Copper Twinax cables (CX-1) provide a low cost 10G interconnect option
Layer 2 learning with multiple active VDCs also has a positive impact on resource utilization - MAC addresses learnt in a VDC are only propagated to other linecards when that linecard has a port in that VDC…

MAC “A” is propagated to linecard 2 and 3 but only linecard 2 installs MAC due to local port being in VDC 10.
When only the default VDC is active, the FIB and ACL TCAM on each linecard is primed with forwarding prefixes and policies associated with that default VDC as shown below...
Virtual Device Contexts
VDC Resource Utilization (Layer 3) – with M1/M2

FIB and ACL TCAM resources are more effectively utilized…
Virtual Device Contexts

VDC Resource Utilization (Layer 3) – with F2

VDC 10  VDC 20  VDC 30  VDC 40

SoC 1
FIB TCAM 32k
ACL TCAM 32K

SoC 2
FIB TCAM 32k
ACL TCAM 32K

SoC 3
FIB TCAM 32k
ACL TCAM 32K

SoC 4
FIB TCAM 32k
ACL TCAM 32K
CoPP works per forwarding engine, as such it is VDC "agnostic"

If ports for the same forwarding engine are shared between VDCs and CoPP thresholds are violated, CoPP will start dropping matching traffic for all ports of this forwarding engine,

This behavior might break the separation of VDCs

If ports of one forwarding engine belong to different VDCs you can limit this effect:

The ACL e.g. for ARP and ICMP are use "match protocol" but didn't specify networks.

If VDCs using different IP ranges, it is possible to define different CoPP policies based on IP ACLs per protocol
FEX and VDCs

- FEX feature-set needs to be installed in default or admin VDC once
- Feature-set fex can then be abled as needed per VDC
- FEX IDs must be unique across a chassis
- FEX Host Interfaces (HIFs) belong to the VDC where their parent Network Interface (NIFs) reside
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VDC Types
VDC Creation - Ethernet

```
N7K1-VDC1# conf t
N7K1-VDC1(config)# vdc N7K1-VDC4
Note: Creating VDC, one moment please ...
N7K1-VDC1(config-vdc)# show vdc
vdc_id vdc_name state mac type  lc
------ -------- ------ ------ -------- ---
1  N7K1-VDC1 active 00:26:51:c7:34:41 Ethernet m1 f1 m1xl
2  N7K1-VDC2 active 00:26:51:c7:34:42 Ethernet m1 f1 m1xl
3  N7K1-VDC3 active 00:26:51:c7:34:43 Ethernet m1 f1 m1xl
4  N7K1-VDC4 active 00:26:51:c7:34:44 Ethernet m1 f1 m1xl
```

```
N7K1-VDC1(config-vdc)# show vdc N7K1-VDC4 detail
vdc id: 4
vdc name: N7K1-VDC4
vdc state: active
vdc mac address: 00:26:51:c7:34:44
vdc ha policy: RESTART
vdc dual-sup ha policy: SWITCHOVER
vdc boot Order: 1
vdc create time: Mon May 16 00:12:38 2011
vdc reload count: 0
vdc restart count: 0
vdc type: Ethernet
vdc supported linecards: m1 f1 m1xl
```
VDC Types
VDC Creation – Ethernet – F2 Module

N7K1-VDCL# conf t
N7K1-VDCL(config)# vdc N7K1-VDCL limit-resource module-type f2
Note: Creating VDC, one moment please ...

N7K1-VDCL(config-vdc)# show vdc

<table>
<thead>
<tr>
<th>vdc_id</th>
<th>vdc_name</th>
<th>state</th>
<th>mac</th>
<th>type</th>
<th>lc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N7K1-VDCL1</td>
<td>active</td>
<td>00:26:51:c7:34:41</td>
<td>Ethernet</td>
<td>m1 f1 mLx1</td>
</tr>
<tr>
<td>2</td>
<td>N7K1-VDCL2</td>
<td>active</td>
<td>00:26:51:c7:34:42</td>
<td>Ethernet</td>
<td>m1 f1 mLx1</td>
</tr>
<tr>
<td>3</td>
<td>N7K1-VDCL3</td>
<td>active</td>
<td>00:26:51:c7:34:43</td>
<td>Ethernet</td>
<td>m1 f1 mLx1</td>
</tr>
<tr>
<td>4</td>
<td>N7K1-VDCL4</td>
<td>active</td>
<td>00:26:51:c7:34:44</td>
<td>Ethernet</td>
<td>f2</td>
</tr>
</tbody>
</table>

N7K1-VDCL(config-vdc)# show vdc N7K1-VDCL4 detail

vdc id: 4
vdc name: N7K1-VDCL4
vdc state: active
vdc mac address: 00:26:51:c7:34:44
vdc ha policy: RESTART
vdc dual-sup ha policy: SWITCHOVER
vdc boot Order: 1
vdc create time: Mon May 7 00:12:38 2012
vdc reload count: 0
vdc restart count: 0
vdc type: Ethernet

vdc supported linecards: f2
**VDC Types**

**VDC Creation - Storage**

N7K1-VDC1(config)# vdc FCoE type storage
Note: Creating VDC, one moment please ...

N7K1-VDC1(config-vdc)# show vdc

<table>
<thead>
<tr>
<th>vdc_id</th>
<th>vdc_name</th>
<th>state</th>
<th>mac</th>
<th>type</th>
<th>lc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N7K1-VDC1</td>
<td>active</td>
<td>00:26:51:c7:34:41</td>
<td>Ethernet</td>
<td>m1 f1 m1xl</td>
</tr>
<tr>
<td>2</td>
<td>N7K1-VDC2</td>
<td>active</td>
<td>00:26:51:c7:34:42</td>
<td>Ethernet</td>
<td>m1 f1 m1xl</td>
</tr>
<tr>
<td>3</td>
<td>N7K1-VDC3</td>
<td>active</td>
<td>00:26:51:c7:34:43</td>
<td>Ethernet</td>
<td>m1 f1 m1xl</td>
</tr>
<tr>
<td>4</td>
<td>FCoE</td>
<td>active</td>
<td>00:26:51:c7:34:44</td>
<td>Storage f2</td>
<td></td>
</tr>
</tbody>
</table>

N7K1-VDC1(config-vdc)# show vdc FCoE detail

vdc id: 4
vdc name: FCoE
vdc state: active
vdc mac address: 00:26:51:c7:34:44
vdc ha policy: RESTART
vdc dual-sup ha policy: SWITCHOVER
vdc boot Order: 1
vdc create time: Mon May 7 00:28:33 2011
vdc reload count: 0
vdc restart count: 0
vdc type: Storage
vdc supported linecards: f2
VDC Types
Admin VDC

- Admin VDC Creation – Two Options

- During boot of a supervisor with no configuration

  ---- System Admin Account Setup ----

  Do you want to enforce secure password standard (yes/no) [y]:
  <snip>

  Boot up system with default vdc (yes/no) [y]:y

  • Admin VDC is not the default – user must choose to do Admin VDC

- Manual creation
  - Two options for manual creation:
    - Customer already using default VDC as an admin VDC without LAN interfaces and configurations to preserve other than Mgmt0
    - Customer already using default VDC a data plane VDC with LAN interfaces and configurations to preserve
VDC Types
VDC Creation – Admin – Manual Option 1

Prior to Conversion
N7K-1# show vdc

<table>
<thead>
<tr>
<th>vdc_id</th>
<th>vdc_name</th>
<th>state</th>
<th>mac</th>
<th>type</th>
<th>lc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N7K-1</td>
<td>active</td>
<td>00:26:98:0f:d9:c1</td>
<td>Ethernet</td>
<td>m1 f1 m1xl m2xl</td>
</tr>
<tr>
<td>2</td>
<td>Agg1</td>
<td>active</td>
<td>00:26:98:0f:d9:c2</td>
<td>Ethernet</td>
<td>m1 f1 m1xl m2xl</td>
</tr>
<tr>
<td>3</td>
<td>OTV1</td>
<td>active</td>
<td>00:26:98:0f:d9:c3</td>
<td>Ethernet</td>
<td>m1 f1 m1xl m2xl</td>
</tr>
<tr>
<td>4</td>
<td>Access1</td>
<td>active</td>
<td>00:26:98:0f:d9:c4</td>
<td>Ethernet</td>
<td>f2</td>
</tr>
</tbody>
</table>

Conversion
N7K-1# config
Enter configuration commands, one per line. End with CNTL/Z.
N7K-1(config)# system admin-vdc
N7K-1(config)#

Post Conversion
N7K-1(config)# show vdc

<table>
<thead>
<tr>
<th>vdc_id</th>
<th>vdc_name</th>
<th>state</th>
<th>mac</th>
<th>type</th>
<th>lc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N7K-1</td>
<td>active</td>
<td>00:26:98:0f:d9:c1</td>
<td>Admin</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Agg1</td>
<td>active</td>
<td>00:26:98:0f:d9:c2</td>
<td>Ethernet</td>
<td>m1 f1 m1xl m2xl</td>
</tr>
<tr>
<td>3</td>
<td>OTV1</td>
<td>active</td>
<td>00:26:98:0f:d9:c3</td>
<td>Ethernet</td>
<td>m1 f1 m1xl m2xl</td>
</tr>
<tr>
<td>4</td>
<td>Access1</td>
<td>active</td>
<td>00:26:98:0f:d9:c4</td>
<td>Ethernet</td>
<td>f2</td>
</tr>
</tbody>
</table>
VDC Types
VDC Creation – Admin – Manual Option 2 - Migration

Prior to conversion
N7K1# show vdc
vdc_id  vdc_name  state   mac       type       lc
-------- -------- ----- --------- -------- -------
1       N7K1     active  00:26:98:0f:d9:c1 Ethernet ml1 mlx1 m2xl
2       Agg1     active  00:26:98:0f:d9:c2 Ethernet ml1 mlx1 m2xl

N7K1# show ip ospf ne
OSPF Process ID 100 VRF default
Total number of neighbors: 1
Neighbor ID  Pri  State            Up Time  Address         Interface
192.168.100.1 1  FULL/ -          00:02:08 192.168.1.1 Eth4/3

Migration
N7K1# config
Enter configuration commands, one per line. End with CNTL/Z.
N7K1(config)# system admin-vdc migrate core1
2012 Apr 23 14:28:53 N7K1 %$ VDC-1 %$ %VDC_MGR-2-VDC_ONLINE: vdc 3 has come online

Post Conversion
N7K1# show vdc
vdc_id  vdc_name  state   mac       type       lc
-------- -------- ----- --------- -------- -------
1       N7K1     active  00:26:98:0f:d9:c1 Admin  None
2       Agg1     active  00:26:98:0f:d9:c2 Ethernet ml1 mlx1 m2xl
3       core1    active  00:26:98:0f:d9:c3 Ethernet ml1 mlx1 m2xl

N7K1-core1# show ip ospf ne
OSPF Process ID 100 VRF default
Total number of neighbors: 1
Neighbor ID  Pri  State            Up Time  Address         Interface
192.168.100.1 1  FULL/ -          00:21:29 192.168.1.1 Eth4/3
Navigating Between VDCs

- From the default VDC, use the `switchto vdc <name>` command

  ```
  N7K1-VDC1# switchto vdc N7K1-VDC2
  N7K1-VDC2#
  ```

- To return to the default VDC use the `switchback` command

  ```
  N7K1-VDC2# switchback
  N7K1-VDC1#
  ```

- Tip – Use the cli alias command

  ```
  cli alias name agg1 switchto vdc N7K1-VDC2
  cli alias name agg2 switchto vdc N7K1-VDC3
  cli alias name fcoe switchto vdc FCOE
  ```
Reload and Suspend VDCs

- Only non-default VDCs can be suspended, resumed, reloaded or restarted

- Reload is just like reloading a box – clean boot for that VDC

  N7K1-VDC1# reload vdc N7K1-VDC4

- Suspend performs config save and graceful cleanup before suspending

  N7K1-VDC1# (config-vdc)# vdc N7K1-VDC4 suspend
Nexus 7000 Operational Management
Providing Powerful and Flexible User Control

Role Based Access Control

- Framework to create ad hoc roles for any type of user
  - Very flexible and powerful control over users
  - Upon login, every user gets assigned a “role” that defines the privileges of the user that gained access to system
  - The roles are groups of rules that permit or deny a set of operations on NX-OS components
Virtual Device Contexts
VDC Administration

- 4 Named Default Roles
  - network-admin
  - network-operator
  - vdc-admin
  - vdc-operator

- Admin has all rights (read-write)

- Operator has read only rights

- Roles defined for Priv-15 through 0
  - Ease integration into TACACS structure
Managing Virtualization: VDCs and DCNM

VDC aware Fault & Performance Monitoring
VDC aware RBAC
Topology Representation
- VDC per Chassis
- VDC to VDC Connectivity

Wizard-based Configuration
- Interfaces Allocation Across VDC
- Resource Limit Enforcement with Templates
- Resource consumption monitoring
- IPv4 and IPv6 Capable
Consolidation with VDCs
Hierarchical Network Design

- Offers hierarchy—each layer has specific role
- Modular topology—building blocks
- Easy to grow, understand, and troubleshoot
- Creates small fault domains—clear demarcations and isolation
- Promotes load balancing and redundancy
- Promotes deterministic traffic patterns
- Incorporates balance of both Layer 2 and Layer 3 technology, leveraging the strength of both
- Utilizes Layer 3 routing for load balancing, fast convergence, scalability, and control
Consolidation with VDCs

- Enables consolidation while maintaining hierarchy
- Reduction of physical footprint
  - Space (RU)
  - Power & Cooling
  - 4:1 or 8:1 is possible
- Maintains majority of change and failure domain separation
- Provides consistent functionality and features across the network
  - ISSU, QoS, Netflow, etc.
Consolidation with VDCs (cont)

- Considerations
  - VDC to forwarding engine mapping
  - Single chassis is still a single point of failure
  - Highly available – yes, but still a single chassis
  - EPLD Upgrade impact on VDCs – multiple modules recommended
  - MAC table sizing bound to “lowest common denominator”
  - Limited number of SPAN/ERSPAN sessions
    - ACL Capture can help in many instances
    - 6.2 added more SPAN sessions for F1, F2, F2e, F3 and M2 modules
  - Control Plane Policing (CoPP) is system wide
Vertical Consolidation 1

- Consolidation of Core and Aggregation while maintaining network hierarchy

- No reduction in port count or links but fewer physical switches
  - Copper Twinax cables (CX-1) provide a low cost 10G interconnect option
Vertical Consolidation 2

- Consolidation of Core, Aggregation and Access while maintaining network hierarchy
- Plan accordingly for port/ASIC allocation – might need more modules than you think!
Segmentation with VDCs
Internet Edge/DMZ/Core

- Option to meet multiple needs – XL VDC, DMZ and Core
- Maintains security model with logical separation
MPLS and VDCs

Key considerations

- Secure and flexible way of software process partitioning
- All MPLS features are VDC aware
- Each VDC operates as separate MPLS router (LSR):
  - No internal communication between VDCs
  - Multiple logical P / PE routers can be configured
  - Each VDC has independent label space for prefix labels: LDP, VPN, TE
  - Note: per-VRF VPN labels - globally significant for whole chassis, all others are locally significant to VDC
MPLS and VDCs

- Vertical consolidation – collapse layers of P/PE routers
- Horizontal consolidation – collapse PE’s from several PODs
Advanced Applications with VDCs
VDC Functionality with Features

- Using VDCs resolves some hardware restrictions required for features like OTV
- VDCs can provide a migration strategy to new hardware and line cards
- VDCs provide consolidation and separation that makes storage administrators comfortable – virtual MDS
- VDCs allow us to do things that allow us to solve layer 8-10 issues 😊
Overlay Transport Virtualization (OTV)
Overlay Transport Virtualization

OTV is a “MAC in IP” technique to extend Layer 2 domains OVER ANY TRANSPORT

Dynamic Encapsulation
- No Pseudo-Wire State Maintenance
- Optimal Multicast Replication
- Multipoint Connectivity
- Point-to-Cloud Model

Protocol Learning
- Preserve Failure Boundary
- Built-in Loop Prevention
- Automated Multi-homing
- Site Independence

Nexus 7000
First platform to support OTV!
OTV at the Aggregation Layer

OTV Design Options

- No universal response where to place the OTV Edge Device
- Main Options:
  - OTV at the Core Layer
  - OTV at the Aggregation Layer (most common – discussed in this presentation)
OTV and SVI Separation

**Guideline:** The current OTV implementation on the Nexus 7000 requires the separation between SVI routing and OTV encapsulation for a given VLAN.

This separation can be achieved with having two separate devices to perform these two functions.

An alternative, **cleaner and less intrusive** solution is the use of **Virtual Device Contexts (VDCs)** available with Nexus 7000 platform:
- A dedicated OTV VDC to perform the OTV functionalities
- The Aggregation-VDC used to provide SVI routing support
OTV and SVI Separation
VDC Models

- Two different deployment models:
  - OTV Appliance on a Stick
  - Inline OTV Appliance

No difference in OTV functionality between the two models
The Inline OTV Appliance requires availability of Core downstream links
Sample OTV Topology
Fibre Channel over Ethernet (FCoE)
Fibre Channel over Ethernet (FCoE)

FCoE

- Mapping of FC frames over Ethernet
- Enables FC to run on a lossless Ethernet

Benefits

- Wire Server Once
- Fewer cables and adapters
- Software Provisioning of I/O
- Interoperates with existing SANs
- No gateway—stateless
- Standard – June 3, 2009
Traditional Data Center Design
Ethernet LAN and Fibre Channel SAN

- Physical and Logical separation of LAN and SAN traffic
- Additional Physical and Logical separation of SAN fabrics
- Purposely Built Networks
  - LAN: Loss and Out of Order Tolerant
  - SAN: Loss and Out of Order Intolerant
- Limited in Scale
Converged Access

- Shared Physical, Separate Logical LAN and SAN traffic at Access Layer
- Physical and Logical separation of LAN and SAN traffic at Aggregation Layer
- Additional Physical and Logical separation of SAN fabrics
- Storage VDC *(Nexus7000 only)* for additional management / operation separation
- Higher I/O, HA, fast re-convergence for host LAN traffic

**Edge-Core** Topology

- Use where Core switch is required to provide Storage services to many Edge devices

---

*Isolation* - *Convergence*

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Converged Network Fabrics w/ Dedicated Links

- LAN and SAN traffic share physical switches and traffic uses dedicated links between switches
- All Access and Aggregation switches are FCoE FCF switches
- Storage VDC *(Nexus7000 only)* for additional operation separation at high function Aggregation/Core
- Improved HA, load sharing and scale for LAN vs. traditional STP topologies
- SAN can utilize higher performance, higher density, lower cost Ethernet switches for the aggregation/core
- **Edge-Core-Edge** Topology connectivity to existing SAN
- Use where future growth has number of Storage devices exceeding ports in the Core
Agenda

- Virtual Device Context (VDC) Overview
  - What are VDCs?
  - VDC Types
  - Resource Allocation
  - Interface Allocation
  - VDC Operation and Management

- Consolidation with VDCs
- Segmentation with VDCs
- Advanced Applications and VDCs

- What’s new in NX-OS 6.2
- Q&A
What’s new in NX-OS 6.2

- F2e as an explicit module-type
- F2e interoperability in the same VDC with all M1/M2 modules
  - Unlocks a whole new world of designs in the same VDC
- Default VDC type will now include F2e
  - m1 m1xl m2xl f2e
  - Only applies to newly created VDCs in NX-OS 6.2
- ISSU from 6.1 to 6.2 will add f2e to all f2 VDC types
- More SPAN sessions and resources to allocate
Summary

- VDCs Unlock the full potential of Nexus 7000
- VDCs can be used for many uses
  - Consolidation – vertical and horizontal
  - Security and segmentation
  - Advanced applications
    - Overlay Transport Virtualization (OTV)
    - Fibre Channel over Ethernet (FCoE)
Course Objective

- What we learned…
- VDC Configuration Guidelines
- Common VDC Use Cases
- How to use VDCs with Advanced Applications
Additional References

- VDC White Paper on CCO

- 8GB RAM Flowchart

- Common Criteria Certification #10349
  http://www.niap-ccevs.org/st/vid10349/

- FIPS 140-2

- NSS Labs
  http://www.nsslabs.com/

- Verified Scale Guide on Cisco.com

- Follow us on Twitter - @CiscoNexus7000
Recommended Reading

NX-OS and Cisco Nexus Switching
Next-Generation Data Center Architectures
Second Edition

Ron Fuller, CCIE® No. 5851
David Jansen, CCIE® No. 5952
Matthew McPherson

ciscopress.com
Recommended Sessions

BRKARC-3470 – Cisco Nexus 7000/7700 Switch Architecture

BRKARC-2081 – Cisco FabricPath Technology and Design

BRKDCT-2048 – Deploying Virtual Port Channel in NX-OS

BRKDCT-2049 – Overlay Transport Virtualization

BRKDCT-2237 – Versatile architecture of using Nexus 7000 with F and M-series I/O modules to deliver FEX, FabricPath and Multihop FCoE all at the same time

BRKDCT-2334 – Real World Data Center Deployments and Best Practice Session

BRKDCT-3144 – Troubleshooting Cisco Nexus 7000 Series Switches

BRKDCT-3445 – Building scalable data center networks with NX-OS and Nexus 7000.
Call to Action…

- Visit the **Cisco Campus** at the World of Solutions
- Get hands-on experience with **Walk-in Labs**
- **Meet the Engineer**
- Discuss your project’s challenges at the **Technical Solutions Clinics**
- Attend one of the **Lunch Time Table Topics**, held in the main Catering Hall
- **Recommended Reading**: For reading material and further resources for this session, please visit [www.pearson-books.com/CLMilan2014](http://www.pearson-books.com/CLMilan2014)
- **CL365** - Visit us online after the event for updated PDFs and on-demand session videos. [www.CiscoLiveEU.com](http://www.CiscoLiveEU.com)
Complete Your Online Session Evaluation

- Complete your online session evaluation
- Complete four session evaluations and the overall conference evaluation to receive your Cisco Live T-shirt
### VDC Types
Rebind Interface with F2e

Required to change SoCs allocated to the VDC from full L3 mode to **proxy mode** and vice versa

<table>
<thead>
<tr>
<th>Existing VDC Type</th>
<th>New VDC Type</th>
<th>Rebind Required?</th>
<th>Purpose</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2, F2e</td>
<td>M, F2e</td>
<td>Yes</td>
<td>F2e from L3 to Proxy</td>
<td>F2/F2e config loss</td>
</tr>
<tr>
<td>M, F2e</td>
<td>F2, F2e</td>
<td>Yes</td>
<td>F2e from Proxy to L3</td>
<td>M, F2e config loss</td>
</tr>
<tr>
<td>F2e</td>
<td>M, F2e</td>
<td>Yes</td>
<td>F2e from L3 to Proxy</td>
<td>F2e config loss</td>
</tr>
<tr>
<td>M, F2e</td>
<td>F2e</td>
<td>Yes</td>
<td>F2e from Proxy to L3</td>
<td>M, F2e config loss</td>
</tr>
<tr>
<td>F2, F2e</td>
<td>F2e</td>
<td>Yes</td>
<td>Enable F2e only features</td>
<td>F2, F2e config loss</td>
</tr>
<tr>
<td>F2e</td>
<td>F2, F2e</td>
<td>Yes</td>
<td>Enable F2e only features</td>
<td>F2e config loss</td>
</tr>
</tbody>
</table>
VDC Agg1 is f2e and we want to add the M series modules

N7K-2(config-vdc)# show vdc

Switchwide mode is m1 f1 m1xl f2 m2xl f2e

<table>
<thead>
<tr>
<th>vdc_id</th>
<th>vdc_name</th>
<th>state</th>
<th>mac</th>
<th>type</th>
<th>lc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N7K-2</td>
<td>active</td>
<td>00:24:98:eb:ff:41</td>
<td>Admin</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Agg1</td>
<td>active</td>
<td>00:24:98:eb:ff:42</td>
<td>Ethernet</td>
<td>f2e</td>
</tr>
<tr>
<td>3</td>
<td>Agg2</td>
<td>active</td>
<td>00:24:98:eb:ff:43</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
<tr>
<td>4</td>
<td>OTV1</td>
<td>active</td>
<td>00:24:98:eb:ff:44</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
<tr>
<td>5</td>
<td>interop</td>
<td>active</td>
<td>00:24:98:eb:ff:45</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
</tbody>
</table>

N7K-2(config-vdc)# limit-resource module-type m1 m1xl m2xl f2e
This will cause all ports of unallowed types to be removed from this vdc. Continue (y/n)? [yes] yes

Note: Warning (vdc 2): rebind interface is needed for proper system operation.
Please backup the running-configuration for interface by redirecting the output of "show running-config interface all".
Reapply the interface configuration after the "rebind interface" command.
Now VDC Agg1 supports M1 M1XL M2XL F2e interfaces

N7K-2(config-vdc)# rebind interface
All interfaces' configurations of the current vdc will be lost during interface rebind.
Please back up the configurations of the current vdc. Do you want to proceed (y/n)? [no] yes

N7K-2(config-vdc)# show vdc

Switchwide mode is m1 f1 m1xl f2 m2xl f2e

<table>
<thead>
<tr>
<th>vdc_id</th>
<th>vdc_name</th>
<th>state</th>
<th>mac</th>
<th>type</th>
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</tr>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<td>active</td>
<td>00:24:98:eb:ff:42</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
<tr>
<td>3</td>
<td>Agg2</td>
<td>active</td>
<td>00:24:98:eb:ff:43</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
<tr>
<td>4</td>
<td>OTV1</td>
<td>active</td>
<td>00:24:98:eb:ff:44</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
<tr>
<td>5</td>
<td>interop</td>
<td>active</td>
<td>00:24:98:eb:ff:45</td>
<td>Ethernet</td>
<td>m1 m1xl m2xl f2e</td>
</tr>
</tbody>
</table>
Required to change SoCs allocated to the VDC from full L3 mode to *lowest common denominator (LCD)* mode and vice versa

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<th>Purpose</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>F3 F2</td>
<td>Yes</td>
<td>F3 to LCD</td>
<td>F3 interface config loss</td>
</tr>
<tr>
<td>F3</td>
<td>F3, F2e</td>
<td>No</td>
<td>N/A</td>
<td>None</td>
</tr>
<tr>
<td>F3</td>
<td>F3, F2, F2e</td>
<td>Yes</td>
<td>F3 to LCD</td>
<td>F3 interface config loss</td>
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<tr>
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<td>LCD to F3</td>
<td>F3 interface config loss</td>
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<tr>
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<td>None</td>
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<tr>
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F3-Series Interoperability with existing modules
Lowest common denominator on features and table sizes

- Please Note: Sup2 or Sup2E is required with F3 modules

<table>
<thead>
<tr>
<th>(F3, M2) VDC</th>
<th>(F3, F2E/F2) VDC</th>
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<td>Lowest Common Denominator</td>
<td>Lowest Common Denominator</td>
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<tr>
<th>VPC</th>
<th>Layer2</th>
<th>Layer3</th>
<th>FEX</th>
<th>FabricPath</th>
<th>VXLAN</th>
<th>MPLS</th>
<th>OTV</th>
<th>LISP</th>
<th>FCoE</th>
<th>Table Sizes</th>
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</table>
Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N77-F312CK-25 Allocates per-port to align ASIC resources.
Interface Allocation

Interface Allocation N7K-F306CK-25

Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N7K-F306CFK-25 Requires allocation in port groups of two to align ASIC resources.
Interface Allocation
Interface Allocation N7K-F132XP-15

Ports are assigned on a per VDC basis and cannot be shared across VDCs unless using FCoE.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N7K-F132XP-15 Requires allocation in port groups of two to align ASIC resources.
Ports are assigned on a per VDC basis and cannot be shared across VDCs unless using FCoE*

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC

N7K-F248XP-25 Requires allocation in port groups of four to align ASIC resources.

*FCoE on F2/F2e requires SUP2 or SUP2E
Interface Allocation
Interface Allocation N7K-M108X2-12L

Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

Each port on a N7K-M108X2-12L has its own ASIC.
Interface Allocation
Interface Allocation N7K-M132XP-12 and L

Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

N7K-M132XP-12 & L require allocation in port groups of four to align ASIC resources.
Interface Allocation

Interface Allocation N7K-M148GS-11 and L and N7K-M148GT-11 and L

Ports are assigned on a per VDC basis and cannot be shared across VDCs

*Note – The M1 48 port line cards have 4 port groups of 12 ports. Recommendation is to have all members of a port group in the same VDC

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC
Interface Allocation

Ports are assigned on a per VDC basis and cannot be shared across VDCs

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC

*Note – In NX-OS 6.2 when the port breakout feature is used all ports that belong to the same physical port can only exist in the same VDC
Interface Allocation
Interface Allocation N7K-M206QF-23L

Ports are assigned on a per VDC basis and cannot be shared across VDCs.

VDC A
VDC C

VDC B
VDC D

*Note – In NX-OS 6.2 when the port breakout feature is used all ports that belong to the same physical port can only exist in the same VDC.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

6 port 40GE module
Interface Allocation
Interface Allocation N7K-M224XP-23L

Ports are assigned on a per VDC basis and cannot be shared across VDCs.

Once a port has been assigned to a VDC, all subsequent configuration is done from within that VDC.

24 port 10GE module