Sieć Ethernet Fabric jako sieć nowej generacji.

Łatwość w implementacji i idealny rozkład ruchu w warstwach od 1 do 3.

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Ethernet Fabrics vs. Legacy Networks

AUTOMATION, EFFICIENCY AND SCALE ON-DEMAND

**CLASSIC, HIERARCHICAL ARCHITECTURE**

- **Inflexible**: Rigid architecture, optimized for legacy client/server applications
- **Inefficient**: Spanning Tree disables links to prevent loops, limiting network utilization
- **Complex**: Each switch managed individually
- **VM-ignorant**: No concept of server virtualization

**ETHERNET FABRIC ARCHITECTURE**

- **Flexible**: Topology freedom, optimized for east/west traffic patterns and virtualized applications
- **Efficient**: All links in the fabric are active with Layer 1/2/3 multipathing
- **Simple**: Entire fabric behaves as logical switch
- **VM-aware**: Facilitates VM/network interoperability
1. Host sends frames

2. RB1 adds TRILL header and outer MAC header

3. RB3 removes TRILL header and associates MAC-H with RB1

4. Target receives frames

Known unicast destinations are forwarded RBridge hop by RBridge hop toward the egress RBridge

TRILL Encapsulation

Ethernet frame in Fabric
Adding a new switch to an Ethernet Fabric

Automatic Fabric Creation and Expansion

Automatic Trunk Creation
Utilizing ECMP Paths

- TRILL supports up to 64 ECMP paths
- RBridges are required to maintain frame ordering internally
- When multi-pathing is used, all frames for an order-dependent flow must be sent on the same path if unicast
- ISL-InterSwitchLink – Frame-by frame ASIC controlled distribution
- Two Paths – ECMP is used
- More Bandwidth – the same cost!
ECMP in VCS Fabric

Switchport MAC | RBID | I/F | Hop
--- | --- | --- | ---
A | 1 | 1 | 2
 | 1 | 2 | 2

[ ISL Trunk ]
Packet-based Load-balancing (proprietary ASIC implementation)

[ ECMP in Fabric ]
Hash based on Src/Dst MAC, Src/Dst IP, VID, TCP/UDP port on Ingress VDX (Flow base)
Multipathing at Multiple Network Layers

Dramatic increases in network utilization and reliability

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>BENEFIT</th>
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</thead>
<tbody>
<tr>
<td>L1: Trunking with frame striping</td>
<td>Near-perfect load balancing across all links in a trunk group</td>
</tr>
<tr>
<td>L2: Equal Cost MultiPathing (ECMP)</td>
<td>All links utilized with flow-based load balancing</td>
</tr>
<tr>
<td>L3: Fabric load balancing across multiple L3 gateways</td>
<td>Improved scalability and resiliency</td>
</tr>
</tbody>
</table>
Multipathing at Multiple Network Layers

Layer 3 VRRPe Multipathing

Traditional Solution VRRP

Brocade Efficient SPF VRRP-E
VM Aware Network Automation

- No need for manual configuration of MAC addresses and port profiles; Less error-prone
- Minimizes procedural delays between server and network IT teams
- Eases configuration of multiple VCS fabrics
- Protection against VM/MAC Spoofing via secure vCenter Communication

Diagram showing network components and configurations with labels for NAS, iSCSI, FCoE, FC, NAS, and iSCSI.
Brocade VDX Switch and VCS Fabric Evolution

RAPID PACE OF INNOVATION

Product Milestones/Announcements

Announced Brocade VDX/VCS June 2010

Brocade VDX 6720 January 2011

Brocade VDX 6710 and 6730 September 2011

Brocade VDX 8770 October 2012

Cumulative Installed Base

FY Q3 10  FY Q4 10  FY Q1 11  FY Q2 11  FY Q3 11  FY Q4 11  FY 2012

20+ Customers  100+ Customers  200+ Customers  300+ Customers  950+ Customers

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Brocade VDX 6700 Fixed Configuration Family

NETWORKS THAT JUST WORK

- Ethernet switches upgradeable to fabric architectures
- Unmatched scalability for any size data center or cloud
- Broadest array of connectivity options for servers and storage
- Features superior size, weight, and power characteristics critical for today’s data center environments
Brocade VDX 8770 Modular Switch

Scaling next-generation data center fabrics

Brocade VDX 8770 Switch

4- and 8-slot chassis
384 ports of 10 GbE
96 ports of 40 GbE

KEY DIFFERENTIATION

- Brocade VCS fabric-enabled
- Scalability: Up to 8,000 ports in a fabric and 384,000 virtual machines per chassis
- 3.6 microseconds any-to-any port latency
- Multipathing at Layer 1/2/3 for best-in-class network efficiency and reliability
- Future-proofed:
  - 4 Tbps per slot backplane: ready for dense 100 GbE
  - SDN-ready with hardware assist for overlay networking, such as VXLAN and NVGRE
Clos Fabric Design
Medium Scale Fabric Design with VDX Switches

Network Design Objective:
250 Server Active-Active 10GE network with Low Latency L3 routing within the Fabric for predictable application performance for dense server deployments

No of Servers: 384
No of Server Ports: 768 10GE Ports
Oversubscription ratio: 8:1
VDX-6720-60 Switches: 12

Net Impact:
A scalable low latency (<5μsec) Ethernet Fabric that supports lots of East-West traffic in the DC for modern applications

Network Design Objective:
250 Server Active-Active 10GE network with Low Latency L3 routing within the Fabric for predictable application performance for dense server deployments

No of Servers: 600
No of Server Ports: 1200 10GE Ports
Oversubscription ratio: 8:1
VDX-6720-60 Switches: 12

Net Impact:
A scalable low latency (<5μsec) Ethernet Fabric that supports lots of East-West traffic in the DC for modern applications

* Depending on number of ISL links. Calculation for 8 Uplinks per VDX

Ref Arch 3: VCS Fabric with 2000 10GE Ports

Large Scale Fabric Design with VDX Switches

**Design Objective:**
A scalable network for 2000 10GE ports with (<15μsec) latency (any port to any port) and line rate connectivity for highly virtualized dense server deployments.

**No of Servers:** 1000

**No of Server Ports:** 2000 10GE Ports

**OS Ratio (Uplink):** 5:1

**VDX-8770-8 Switches:** 8

**VDX-8770-4 Switches:** 3

**Net Impact:**
A scalable Ethernet Fabric solution with predictable <5usec latency from any port to any port with Modular VDX-8K switches.

*Depending on number of ISL links, Calculation for 4 Uplinks per VDX.
DC Interconnect based on Metro VCS

connecting Data Centers by stretching a single Fabric

- ISLs running between data centers
- up to 1km (Standard ISL) Brocade (L1) trunking can be used (8x10G)
- up to 10km (LD ISL) lossless services (DCB, FCoE) can be provided
- up to 30km (LD ISL) standard Ethernet connectivity can be provided
Network Virtualization—Logical Networks

- Logical networks eliminate physical network limitations (e.g., MAC address and VLAN limits) to facilitate any-to-any connectivity and workload mobility
- Overlay/tunnel technologies: VXLAN, NVGRE, STT
- Brocade VCS Ethernet fabric is a superior transport for network virtualization—leading automation, efficiency and simplicity
- Brocade VDX data center switch ASICs are VXLAN-ready with software support in 2013; Brocade ADX VXLAN gateway demo now
**Brocade VDX 8770 Support for Network Virtualization**

Maintain visibility and apply policies on tunneled traffic

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**What Is Network Virtualization?**

A framework for overlaying virtualized Layer 2 networks over Layer 3 networks

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**Why Do Network Virtualization?**

- Network isolation for security, multitenancy
- Deliver workload-specific network services
- Better VM mobility, virtual asset utilization

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**Challenges in the Environment:**

- VxLAN/NVGRE/other protocol tunnels traffic from one server to another
- Traditional networking devices lose visibility into tunneled flows
- Existing networking policies start breaking

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**Tunneled Frame Format**

- **VXLAN example**

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**Brocade VDX 8770 Benefits:**

Regain network visibility, control of tunneled traffic

- Protocol-agnostic
- Future-proof implementation based on flexible, programmable hardware
- Line-rate services consistently applied

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The Brocade VDX 8770 is hardware-ready. Software support is planned for post-GA.
Leadership Through Innovation

- Data center networking is transforming with Ethernet fabrics
- Brocade pioneered and leads in Ethernet fabric networking
- The Brocade VDX family sets a new benchmark in fabric scalability and performance

Last Gartner report
Brocade
... The vendor should be considered for the shortlists of all data center network infrastructures and large cloud providers ...
Questions?

Thank You