Future Ready Networking Solutions for the Datacenter

Dell EMC Forum, Frankfurt
Alexander Thiele
24.10.2017
“Alexa, connect my DC in Frankfurt with my Backup Datacenter in Amsterdam…”
Automation through Open Networking?
Our vision for the network is open

Closed Networking

- Proprietary architectures & management tools
- Hundreds of protocols
- Proprietary networking OS
- Proprietary ASICs

Open networking

- Standard orchestration & automation tools
- Optional SDN/NVO controller
- Any networking OS
- Open standard hardware
- Merchant silicon
Dell EMC is **challenging** the networking **status quo**

**Traditional Networking**
- Proprietary architectures
- Proprietary software
- Proprietary ASICs

**Open Networking**
- Business agility
- Innovation velocity
- Investment protection

**Shifting the paradigm**
powered by Open Networking

- > 50% faster deployments & changes
- Based fully on Open Source
- Fast resource availability
Open Networking means unprecedented choice and capability

- Feature-rich L2/L3 Campus networking
- Data Center fabric & in-rack switching
- Campus
- Networking
- Enterprise IT services
- Compute
- Storage
- Networking
- Management
- Enterprise WAN
- SDN fabric & network tapping solutions
- Linux on the switch, unified server, network management
- Virtualization-centric fabric optimized for Nutanix, Big Data, VDI
- WAN, MPLS/VPLS functionality
- Carrier cloud/data center
- Carrier Core IP/MPLS over long-haul DWDM
- Metro Ethernet VPLS/MPLS over metro DWDM
- Hosted private cloud
- Public cloud
- Internet/Web
- Branch/Office
- Remote Office
- OS6
- OS9, OS10
- YES WE'RE OPEN
Unlocking R&D investment through open source

**Open Networking**

- Standard orchestration & automation tools
- Optional SDN/NVO controller
- Any networking OS
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**Linux/Open Source Apps - $0**

**OS10 Enterprise Edition**

**OS10 Open Edition - $0**

**3rd Party Applications**

**Linux Foundation OpenSwitch**

**Switch Abstraction Interface (SAI)**

**Open Networking Install Environment (ONIE)**

**OCP SONiC**

**Linux Foundation**

**DELL EMC**

**OpenSwitch**

**Barefoot Networks**

**Broadcom**

**Cavium**

**Innovium**

**DELL EMC**
Gartner Magic Quadrant for Datacenter Networking

Gartner MQ in Summary:

- DC Networking is growing: +15% yoy (EMEA)
- The CLI Is Dead; the API Is Cool
- Value Continues to Shift Toward Software
- Fabrics Are the New Normal
- Analytics and Intent-Based Networking
- Open Networking
- HCI clusters need Networking Fabrics
Dell EMC Networking

1. **Offers** you an **alternative** to your existing Network

2. **Enables** cloud and new workloads through innovative **Open Networking Solutions**

3. **Integrates** in your Dell EMC Server, Storage Solutions & covered by ProSupport

**Future-Ready Enterprise**
Back up
### Modular Servers

<table>
<thead>
<tr>
<th>MXL/IOA</th>
<th>FN-ION</th>
<th>PowerEdge M1000e</th>
<th>PowerEdge FX2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attach</strong> MXL/IOA blade to M1000e purchases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attach</strong> FN-ION to PowerEdge FX2 purchases</td>
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</tbody>
</table>

### Rackmount Servers

<table>
<thead>
<tr>
<th>S3000</th>
<th>S4000/S4100</th>
<th>S5100/S6010/Z9100</th>
</tr>
</thead>
<tbody>
<tr>
<td>1GbE</td>
<td>10GbE</td>
<td>Multi-rate rack server @ 10/25/40/50/100GbE</td>
</tr>
<tr>
<td><strong>Attach</strong> S3000 to servers with 1GbE</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attach</strong> S4000 &amp; S4100 to servers with 10GbE</td>
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</tr>
<tr>
<td><strong>Attach</strong> S5100 for 25G, S6010 for 40GbE &amp; Z9100 for multi-rate 100GbE</td>
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</tr>
</tbody>
</table>

**Networking attach options – Servers**
Networking attach options – traditional storage

### FC and FCOE Storage

- **MXL/IOA**
  - PowerEdge M1000e
  - Converge LAN and SAN with MXL/IOA for FCOE, NPG, and FC Direct Attach
  - Attach Brocade FC to M1000e for native FC applications

- **FN-iOM**
  - PowerEdge FX2
  - Converge LAN and SAN with FN2210S for FCOE, NPG, and FC Direct Attach
  - Attach FN410 to PowerEdge FX2 purchases for FCOE

- **S5000/S4148U**
  - Rack server @ 1/10/40GbE + FC8/16/32
  - Attach S5000/S4148U to converge LAN and SAN environments
  - Provides optional NPG and FC Direct Attach capability

### iSCSI Storage

- **MXL/FN-iOM**
  - PowerEdge M1000e/FX2
  - Attach MXL/IOA (M1000e), FN-iOM (FX2) for classic or lossless iSCSI with DCB support
  - Automatic iSCSI detection and optimization
  - Classic or lossless iSCSI with DCB

- **S4000/S4100**
  - Rack server @ 10GbE
  - Attach S4000/S4100 to servers with 10GbE
  - Automatic iSCSI detection and optimization
  - Classic or lossless iSCSI with DCB
Data Center Networking **architectural evolution**
From multilayer physical to flatter and virtual

- **Platform 1**
  - Mainframe computing
  - Proprietary Networking
  - Unix, x86 servers

- **Platform 2**
  - Server computing
  - Modular Core Switch
  - Top-of-Rack/Blade IO switch
  - Client computing

- **Platform 3**
  - Cloud computing
  - NVO/SDN Controller
  - Spine switch & OS
  - vSwitch/Top-of-Rack/Blade IO & OS
  - Open Networking

**Virtualization, automation**

- **Unix, x86 servers**
- **Virtualization, automation**

**Dell EMC**

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**Dell - Internal Use - Confidential**
Traditional and Cloud-Native IT

Coexisting IT paradigms

Client-server scale-up apps

Infrastructure resiliency

ITIL-based IT processes

Distributed scale-out apps

Application resiliency

DevOps based IT processes
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OS10 unlocks innovation

Open Networking

- Standard orchestration & automation tools
- Optional SDN/NVO controller
- Choice of networking OS
- Open standard hardware
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DELL EMC

BROADCOM
CAVIUM

Intel
DELL EMC
Open Networking made by Dell EMC

Open Ecosystem

vmware, Cumulus Networks, Microsoft, Big Switch Networks, Pluribus Networks, IP Infusion, Midokura

Common Infrastructure

OS9

Open Software-Defined Networking

OS10

COMING THIS YEAR
Recognized for our vision and execution

Gartner
Data Center Networking

2013

2014

2015

2016

Closed Networking

Open Networking

Also rans

As of May 2016

As of April 2014

Erfahrungsberichte von Dell Kunden

„Wir haben die komplette Dell Networking-Lösung in nur vier Stunden aufgesetzt. Da Dell die Switches vorkonfiguriert hatte, lief alles völlig problemlos.“

„Obwohl unsere IT-Investition nur ein Viertel im Vergleich zu früheren Ausgaben beträgt, profitieren wir mit unserer Dell und Microsoft Cloudlösung dennoch von einer deutlich höheren Leistung.“

„Es war von großem Vorteil, Server, Massenspeicher und Switches der Unternehmensklasse aus einer Hand zu beziehen. Da die Komponenten gut aufeinander abgestimmt waren, konnte die Netzwerklatenz reduziert und das Booten und Speichern der Dateien im Netzwerk beschleunigt werden.“

„Früher hätte es zwischen 30–45 Minuten gedauert, um ein neues Netzwerk auf einem Switch aufzusetzen, der nicht richtig konfiguriert war. Heute brauche ich hierfür inzwischen nur noch ein bis zwei Minuten.“

„Die Netzwerkgeschwindigkeit hat sich dank unserer Dell Netzwerk-Lösungen beträchtlich gesteigert.“

„Unseren Erfahrungen nach ist die Leistungsfähigkeit der Dell Networking Switches hervorragend.“
What is Intent Based Networking

“Don’t tell me What to do, Tell me What you want!”

1. **Translation and Validation** – The system takes a higher-level business policy (*what*) as input from end users and converts it to the necessary network configuration (*how*). The system then generates and validates the resulting design and configuration for correctness.

2. **Automated Implementation** – The system can configure the appropriate network changes (*how*) across existing network infrastructure. This is typically done via network automation and/or network orchestration.

3. **Awareness of Network State** – The system ingests real-time network status for systems under its administrative control, and is protocol- and transport-agnostic.

4. **Assurance and Dynamic Optimization/Remediation** – The system continuously validates (in real time) that the original business intent of the system is being met, and can take corrective actions (such as blocking traffic, modifying network capacity or notifying) when desired intent is not met.

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**Why IBN:**

“Networks are holding businesses back as most enterprise networks are complex, rigid, hard to change and slow to provision, hard-coded and downright slow to change any kind of security defenses *

Forbes.com

* IBN as defined by Gartner
# Intent Based Networking (IBN)

## Two categories of IBN

### 1. Configuration Intent
- Provide design intent
- IBN tools provision network rules and policies

### 2. Monitoring Intent
- Data Plane State Analysis
- Collect network state (switch forwarding databases)
- Continuous Network Verification in real time via mathematical modelling

## What is it

## Uses cases
- Network Compliance to regulatory standards
- Detecting potential failures
- Vulnerability assessment
- Pinpoint outages (e.g. loops, black holes)
- Network segmentation verification (e.g. VLAN leaks)
- Policy validation

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### Device based
- Traditional manual configuration

### Fabric based
- DevOps & Orchestrators

### Intent based
- Intent-based w/Verification
  - "Activate New Pod connect to HA"

### NLP based
- Self-operation w/ natural language
  - "Alexa – connect our SF DC to Amsterdam DC…"