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Cisco Data Center Network Manager
Comparative Assessment Test Summary

Cisco DCNM 11

Arista CloudVision Portal

CISCO

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Executive Summary

The modern-day data center has evolved from managing a few switches to the complex task of overseeing data center fabrics, compounded by multi-site, multi-cloud implementations. An administrator who once managed a handful of physical switches, now must handle a more complicated, dispersed physical network that includes virtualized workloads and public clouds. Given that data center elements each require a high-standard of compliance for integrity and reliable functionality, the administrator needs to have visibility into every detail of this complex network from a single pane-of-glass.

Introduction to Cisco Data Center Network Manager

Cisco Systems, Inc. offers the Data Center Network Manager (DCNM) solution as a comprehensive way to aid customers looking to easily deploy, manage, monitor, operate and maintain modern data center deployments. By using automation, extensive visibility and reliable operations, DCNM offers the most powerful data center manager Cisco has produced to date, simplifying network operations while lowering costs. It is the recommended management solution for data center NX-OS deployments, premiering also as a storage networking management tool.

The DCNM solution includes Cisco's best practices and advances fabric tools to handle growing networks. Customers look to DCNM for its unparalleled VXLAN EVPN fabric deployment and management – discovering and connecting existing or new unprovisioned Nexus switches, help customers quickly and easily build new VXLAN-EVPN fabrics using the DCNM fabric builder in minutes. A complicated process such as a switch RMA and replacement, requires only a few clicks – with no manual configuration changes.

DCNM provides granular, scalable visibility for deep-dive troubleshooting, functionality and maintenance operations that data center customers can truly benefit from. The Topology View shows not only the network switches but also other connected entities such as virtual machines, container workloads, physical servers, multiple fabrics, inter-fabric connectivity, switch health and search functions. Customers can view these metrics in real-time to identify bottlenecks for optimized resource allocation for a smoother network experience.

Deployment consistency and configuration compliance is fully supported by DCNM, which constantly checks for proper switch-to-fabric configurations with autocorrections for any errors. The bottom line: DCNM makes fabric management simple and reliable.

What We Tested

By engaging with Miercom, an independent, comparative analysis was performed by comparing two data center network management packages: Cisco DCNM, with latest version 11.3(1), and an offering by Arista Networks – the CloudVision Portal (CVP), version 2019.1.1. These solutions were assessed for functionality regarding configuration and deployment, change control, network visibility and real-time fault identification.

Summary of Brownfield Deployment Observations

What customers need is a management platform to address issues incurred by upgrading or adding to an existing network – known as brownfield deployment, as opposed to a new, greenfield deployment. Despite data center complexity, this management solution should intuitively accelerate deployment while ensuring operational compliance to help continue operations without downtime or cost.

We find for brownfield deployments, Cisco DCNM excels beyond its competition:

- ✓ Provides intelligent configuration and resource usage inference
- ✓ Validates all configurations
- ✓ Ensures there is no resource conflict
- ✓ Simple, two-click process

Arista CVP did not offer the same service, showing poor brownfield deployment:

- ✗ No transparency during importing
- ✗ Lack of resource tracking
- ✗ Lacks understanding and validation of switch configurations
- ✗ No detection, or alert, of an IP address conflict between an interface or loopback of an imported and existing switch – resulting in possibly disastrous effects on the network
- ✗ Does not "understand" the network deployment per se; it essentially just reads the running configuration from the switches as a bunch of ASCII EOS CLIs

Key features of these packages were tested using comparable configurations of each vendor's network devices and respective network management package installations. Many features were fully supported by Cisco DCNM but were either not offered or only partially available on the Arista CVP. These features truly benefit customers looking to simplify and automate the complex processes of data center provisioning and policing through a centralized management solution.

Key Findings of the Cisco DCNM

- **Configuration & Deployment.** Exceptional support of extendable web-based GUI, topology-based provisioning, link awareness, resource visibility and management and "one touch" automated configurations for not only devices, but the entire fabric – including physical, virtual, containers and multi-cloud.

- **Policy Templates.** DCNM allows users to pre-provision internally or externally connecting physical and logical fabric links using link policy templates supporting Cisco's best practices for the most common deployment scenarios. The links are automatically associated with real-time health statistics for each interface; this data can be exported to daily or weekly reports. These policy templates can be easily customized specifically for the data center's needs.

- **Day 0 Installation.** With Cisco DCNM, this is easily done through its GUI interface and one touch option using one of two views – the default Topology View or the List View. The Topology View shows devices on the network, allowing for multiple, simultaneous switch deployment.

- **Fabric Building.** The DCNM fabric builder outperforms the Arista FabricBuilder by offering the ability to compare new and old configuration scripts to accept or correct the CLI scripts for the deployment process. The DCNM fabric builder allows switches to be associated with specific roles that, in turn, result in appropriate configuration generation for those specific switches. The configuration generation process in the fabric builder employs various resources such as IP addresses, loopback IDs, VLANs, VNIs etc. that are derived from user-defined resource pools.

- **Change-Control Workflows.** Cisco DCNM offers customizable change-control workflows for operations such as VXLANs and multi-site, tenant-routed multicast services. The DCNM fabric builder includes an embedded, integrated Configuration Compliance to validate and synchronize all configurations within the underlay, overlay, interfaces and others driven through the DCNM policies based on user-intent. This feature further builds on customization of Cisco's best practices policy templates. Configuration Compliance can be run periodically or on-demand to immediately trigger a compliance check.

- **VXLAN Management of Cloud Services.** Easy management of VXLAN BGP EVPN fabric to the public cloud was achieved with Cisco DCNM using IPSec tunneling between on-premise and Azure cloud services with management similar to any other Nexus device. It offers discovery, visibility, configuration control and compliance, built-in best practice templates, license management, upgrades and more.

- **Layer 4-7 Application Service Integration.** DCNM also proved topology visualization, control and integration of L4-7 service appliances attached to a VXLAN EVPN fabric, as well as defining custom service policies for traffic redirection.

- **Application Framework.** The DCNM infrastructure supports an extensible microservices based framework that readily supports scale-out. The DCNM App center offers applications, either as default for standard functionality or for licensed download. These applications collect data for each switch, coordinating data, to assist the customer with provisioning and visibility as a user-friendly way to approach what would have been an overwhelming, complex infrastructure.

- **Network Visibility.** The Network Insights applications on DCNM actively monitor complete flows for fabric-wide views, data correlation and diagnosis. Topology overlay and awareness provide greater visibility and provisioning, as well as native switch-role awareness. Deep VXLAN visibility supports operation and maintenance for virtual machines.

- **Real-time Fault Identification.** The device analyzer locates network endpoints related to the underlay and overlay fabrics for useful troubleshooting, showing a green or red status for systems that are up or down.

- **Inline Controller Upgrades.** Cisco DCNM inline upgrades enable customers to upgrade to the latest release by imposing the newest version to the existing DCNM.

- **In-Service Software Upgrade (ISSU).** Cisco DCNM allows for switch software upgrades and patches while maintaining minimal traffic disruption.

- **Virtual Memory Manager.** Cisco DCNM allows for native integration with Virtual Machine Managers (VMM) to provide a correlated view of compute + network. Arista does not support this feature.

Based on our hands-on testing of both the Cisco Data Center Network Manager and Arista CloudVision Portal, we found Cisco's product offered superior capabilities and ease of use, and automated, "one-touch" provisioning based on templates and best practices. We estimate a trained technician can perform tasks with the Cisco package 50 to 300 percent faster than when using Arista's offering. As a result, we proudly award Cisco's Data Center Network Manager the *Miercom Performance Verified* certification.

Rob Smithers, CEO

Miercom

Test Summary

	Cisco DCNM	Arista CVP
Graphical User Interface (GUI)	Supported+	Partially Supported
	Provides extendable web-based GUI and supplies extensions for other vendors (not tested). Multi-faceted and varied GUI appropriate for each management task performed. CLI is also a supported option if desired.	Pre-built Configlet called Fabric Builder interface is written in Python, downloadable from github.com. It is quicker than manually creating management CLI files. Third-party devices are supported via CLI only. However, this interface is not an *interactive* GUI, applying scripts only to specifically building VXLAN fabric.
Topology-based Provisioning	Supported	Not Supported
	Supports topology-based provisioning and is link-aware.	No topology-based provisioning supported. Managed nodes are arranged in groups. CVP also lacks link awareness.
Resource Management	Supported	Not Supported
	Provides management and visibility of resources, including IP addresses, Loopback IDs, Port-channel IDs, subnets, VNI and VLAN numbers.	No support of resource management. The user is unable to check VLANs or IP addresses; for example, there is no visibility of which IP addresses or VLAN numbers are in use.
Configuration Automation	Supported+	Not Supported
	Provides impressive "one touch" capability for configuring new devices. With little required user input, the DCNM system can apply a board range of templates and best practices – producing device configurations, as well as configuration of network links and connections.	Primarily CLI-based configuration; CVP's role in configuration automation is used mainly to push command-string configurations to switches. Arista offers a pre-built Configlet Builder application downloadable from github.com to automatically import configurations. While this Configlet facilitates device configuration generation via widgets and Python scripts, applying these configurations to new switches still requires a fair amount of manual intervention.

	Cisco DCNM	Arista CVP
Virtual Machine Manager (VMM) Integration	Supported	Not Supported
	Provides capable VMM facility, organizing virtual machines (VMs) into appropriate domains and provides a correlated network and compute view. The Cisco package also provides high-level visibility of virtual machines.	No facility for managing a data center's VMs (e.g. VMware, RedHat) is supported.
Brownfield Configuration Import	Supported	Not Supported
	Provides real import of brownfield configurations, including associated resources used on every device within that deployment. The network can then be managed as if provisioned by the DCNM in the first place. Additionally, the Cisco package handles multi-site network deployments as well as multi-tenant operations.	Cannot import all the data of a previous configuration, to aid in generating a new or re-worked configuration. New or revised configurations must be manually re-entered or previous command strings must be edited.
Customizable Change-Control Workflows	Supported	Partially Supported
	Supports GUI-generated workflows for network operations (e.g. adding VXLANs, multi-site and tenant-routed multicast services). Supports integration of L4-7 service appliances attached to a VXLAN EVPN fabric, as well as defining custom service policies for traffic redirection. Supports ISSU for multiple endpoints with minimal downtime, customizable to the smallest number of fixes per upgrade package. Native change control is planned for a future DCNM release, as well as integration with ServiceNow.	Offers basic change-control; it is typically necessary to disable a device by putting it in maintenance or health-check mode before any change can be applied. Changes cannot be performed across multiple switches as ISSU is not supported. Supports Smart System Upgrade (SSU) that allows system software upgrades in small maintenance windows.
Data Plane Visibility	Supported+	Partially Supported
	Network Insights, an optional component of DCNM, actively monitors complete network flows including per flow latency, flow path, flow drops etc. It also provides fabric-wide flow views, with data correlation and diagnosis.	In the latest version, CVP can display traffic flows. This is based on sFlow, a standard (IETF RFC 3176) that monitors flows based on a sampling of transmitted data between endpoints.

	Cisco DCNM	Arista CVP
Device Analyzer	Supported+	Not Supported
	Offers ability to search for endpoints in real-time; an endpoint locator is part of a tool that provides correlated visibility for fabric (underlay/overlay, as well as endpoints) to provide a useful troubleshooting starting point. While not observed during testing, DCNM version 11.3 offers endpoint scalability.	The ability to find a network device is limited to a MAC-address search.
Topology Overlay Views	Supported+	Not Supported
	Supports various network topology views – including L2VNI, VRF and L3VNI. Third-party integration is included as of its last major release of DCNM in December 2019; one of the first supported vendors is Arista.	Topology overlay views, showing high-level fabric connectivity, are not supported in Arista's CVP. For example, CVP is unable to collect the necessary information to show what Layer-2 Virtual Network Interface (L2VNI) is deployed on which leaf node.
Third-Party Device Visibility	Supported*	Supported
	Planned third-party device integration for both provisioning and visibility for DCNM 11.3(1) and Network Insights Resources (NIR) following release 2.1. *While not observed during testing, DCNM version 11.3 offers this capability.*	Pulls standard-format data from third-party devices via SNMP.
Native Switch-Role Awareness	Supported	Not Supported
	Fully supports switch-role awareness.	Unaware of the role (e.g. leaf, spine) that a switch performs.
Topology Awareness	Supported	Not Supported
	Aware of both topology and switch for provisioning purposes.	Unaware of fabric or links. Changes to links or fabric members require that the configuration on related switches be manually added or removed.
Deep VXLAN Visibility for OAM	Supported	Not Supported
	Supports Operations and Maintenance functions via deep VXLAN visibility.	Does not support OAM functions. Lacks deep visibility of VXLANs.
In-Service Software Upgrades (ISSU)	Supported	Partially Supported
	Supports disruptive and non-disruptive ISSU options for minimal downtime.	Supports SSU since ISSU packages are unreliable – resulting in downtime.

About Miercom

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