

Magic Quadrant for Data Center Networking

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VIEW SUMMARY

The data center networking market is evolving rapidly. Simplicity and agility are of increasing importance for networking and data center architects, but availability remains paramount. Enterprises should evaluate the different vendor approaches and architectures, with a particular focus on software-related capabilities.

Market Definition/Description

Data center networking solutions provide logical and/or physical network connectivity within enterprise data centers. Data center networking requirements are evolving rapidly after a period of architectural stability that lasted more than 15 years. While speed, density and scale increased during that period, the underlying architecture relied on an oversubscribed three-tier hierarchical approach.

The new style of Web-scale IT that is run in hyperscale organizations like Google, Facebook and Amazon has changed the paradigm for delivery of IT services. Forward-leaning and mainstream enterprise organizations are now attempting to deliver increased agility, improved management and/or reduced cost for their constituents.

The influence and lessons from hyperscale cloud deployments have had major repercussions in the enterprise data center networking market, where much smaller networks can benefit from this experience. Thus, the data center networking market is being transformed with new architectures, technologies and vendors that specifically target solutions to:

- Improve and simplify network operations activities to align more closely with business goals and broader data center agility through the use of northbound APIs and increased programmability and automation of the network
- Address the changing size and density within the data center
- Account for shifts in application traffic patterns
- Provide solutions that are open and standards-based to increase interoperability, foster innovation and reduce vendor lock-in

The foundational building blocks of a data center network include both hardware and software, which can be acquired together or independently of each other.

Hardware

Hardware includes network switches that servers and other infrastructure elements are cabled into. With the exception of VMware, all the vendors in this research sell hardware switches. Today, we observe that most new data center builds require 10 Gigabit Ethernet (GbE) server access at the edge, with a 40GbE backbone. Outside of very large-scale data centers, we have not yet seen substantial demand for 25GbE, 40GbE or 50GbE server access or 100GbE backbones. In addition, new 25GbE and 50GbE interface initiatives are emerging, but we have not yet seen mainstream demand. The idea physical network topology for most typical enterprise data centers includes a one- or two-tier leaf/spine physical switching architecture delivered as an Ethernet fabric. In addition, most switching vendors now utilize merchant silicon in their hardware portfolio. Thus, while hardware differentiation still exists, the differentiation is shifting toward software.

Software

All the vendors in this research provide data center networking software in varying degrees. Traditional data center networking software has been coupled with (a) hardware and (b) the administrative (that is, operational) interface. While this traditional approach to data center networking is still widely deployed today, data center networking software is in the middle of transformational change. Emerging technologies (such as software-defined networking [SDNs], Ethernet fabrics and switching disaggregation) allow for traffic forwarding decisions to be programmatically defined and/or decoupled from hardware and operational interfaces.

Regardless of whether traditional or modern approaches are utilized, the key software components of a typical enterprise data center network include:

- Switching operating system (OS): The operating-system software that runs on individual physical network switches
- Virtual switch: The virtual switching software that runs on physical servers running hypervisors and VMs
- Management software: The network management software used to manage networking infrastructure
- Controller: Centralized software that implements a control plane and policy management that can be programmatically accessed via external systems

All data center networks will require at least one of these components, but may not require all of them. For example, in a nonvirtualized data center, virtual switches are not needed. Further, these components can be acquired together (from a single vendor) or individually. This creates a dynamic in the market where vendors in this research can simultaneously be both competitors and partners, given the usage scenario.



NOTE 1 TYPES A, B AND C COMPANIES

Gartner defines Type A, B and C companies as:

- Type A companies are more aggressive and willing to take risks to achieve competitive goals and distance from their competition. They are generally more technologically sophisticated than the other types.
- Type B companies tend to be fast followers once the risks are mitigated and proof points have been established.
- Type C companies tend to be risk-averse and less achievement-oriented, and they are willing to delay usage until after a considerable part of the market has adopted a technology.

NOTE 2 CISCO ARISTA LITIGATION

On 5 December 2014, Cisco filed a complaint against Arista in the California Northern District Court. Details of the filing can be found at "[Cisco Systems, Inc. v. Arista Networks, Inc.](#)"

EVALUATION CRITERIA DEFINITIONS

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

What's Changed?

Vendor Acquisitions

Two notable acquisitions occurred during 2014, including Lenovo acquiring IBM's x86 server and data center switching portfolios and China Huaxin (a publicly traded investment firm) acquiring a controlling 85% investment in ALE's (formerly Alcatel-Lucent Enterprise) enterprise business.

Differentiation Shifting Toward Software

Over the past 12 months, vendors have continued to leverage merchant-based silicon within their switching portfolios. In addition, there is a strong focus from vendors on executing against their SDN strategies. Thus, differentiation between vendor solutions continues to shift toward software (including management, provisioning, automation and orchestration) with hardware capabilities (such as bandwidth, capacity and scalability) becoming more standardized.

Most Gartner client interactions in the last 18 months regarding data center networking now include virtualization, management and orchestration rather than the "speeds, feeds and protocols" mentality that was dominant for many years.

SDN Garner Mainstream Interest

Many of the vendors included in this Magic Quadrant made significant progress to fulfill their networking (SDN) strategies. From the user perspective, 2014 became the year of early mainstream SDN "tire kicking" as the market evolved beyond the "marketecture" announcements that largely categorized 2013. SDN-related inquiry volume in 2014 has increased two or three times, largely due to clients looking to evaluate SDN solutions. Interest in these SDN technologies now includes both Type A and Type B clients (see Note 1), who often cite the following drivers when exploring SDN and related technologies:

- Faster provisioning of workloads
- Improved security
- Enhanced management
- Reduced expenditures on networking hardware/software
- Reduced operational expenditures
- Reduced vendor lock-in
- Concern over making long-term investments that are absent SDN capabilities

We estimate that there are now roughly 1,000 SDN mainstream enterprise data center implementations, approximately three times more than a year ago. Over the past year alone, Gartner has taken over 250 SDN-related inquiries, including more than 50 regarding comparisons between VMware NSX and Cisco ACI.

SDN Overlays

Several vendors included in this Magic Quadrant provide overlay network capabilities, which create virtual networks on top of the physical network. These solutions typically integrate the provisioning of network and compute resources for a more agile infrastructure. While this is an important development, it is also important to consider how various overlay solutions are implemented: The overlay is still fully dependent on a physical underlay network, and issues of network control and visibility are critical to ensure the reliability of overlay solutions. We are starting to see developments to improve the coordination of SDN overlays with the physical network. This creates an interesting dynamic in the market because overlay vendors can both partner and compete with traditional network switch vendors.

White-Box and Disaggregated Switching

Interest and adoption of white-box switching has increased significantly within hyperscale data centers over the past several quarters. White box switches are generic, off-the-shelf switching platforms that are supplied by original design manufacturers (ODM). Buyers of white-box switches must acquire and integrate their own choice of network software for these platforms. White-box switching now accounts for more than 5% of all data center ports shipped and is growing well above market rates. Inspired by hyperscale deployments, an increasing number of Type A organizations are showing interest in white-box switching.

This has resulted in a new style of switching that Gartner refers to as branded white-box (or "brite box") switching. Brite-box switching disaggregates network switching hardware from software but addresses several of the shortcomings of "pure" white-box switching, such as acquisition, integration and support. The ecosystem for this style of switching is just starting to materialize. For example:

- Dell supports running network OSs from Cumulus Networks and Big Switch Networks on their hardware.
- Juniper Networks supports brite-box switching via white-box hardware that runs an optimized version of Junos software.
- HP recently announced a brite-box solution with white-box hardware and Cumulus software.
- Emerging vendors such as Big Switch and Pica8 provide switching OSs that can be run on top of white-label switches.
- The Facebook Open Compute Project (OCP) Wedge provides a reference platform for others to develop commercial solutions.

Over the next 12 months, we anticipate many further examples of these business models and partnerships becoming commercially available (see "The Future of Data Center Network Switches Looks 'Brite'").

Open Networking

The vendors supporting a more open approach to SDN responded to market drivers with an increasing support for OpenDaylight (ODL) as their platform of choice. While nearly all the vendors in this research are participants in the OpenDaylight consortium, more importantly, multiple vendors have released flagship SDN products that are based on OpenDaylight code, including Avaya, Brocade and Extreme Networks. The potential for widespread support of OpenDaylight hints at the potential for the emergence of a third ecosystem in the SDN market that will drive more innovation and portability of features and operating environments (current market presence and influence in the data center will allow Cisco and VMware to establish more closed ecosystems). For more information, see "Cool Vendors in Enterprise Networking, 2015."

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

Converged Infrastructure/Integrated Systems

While most SDN-based solutions are offering greater disaggregation and choice, we see a countertrend among one segment of the market that is characterized by purchases of integrated systems. In order to simplify operations and improve provisioning times, converged infrastructure has gained popularity. Last year, converged infrastructure accounted for 7% of the data center infrastructure market (which includes network, storage, servers and related management components), with year-over-year growth of 57%. The networking implications of these technologies are that they are largely prescribed, which results in the transfer of the physical access layer network buying decision from what was solely a networking decision to a server/storage/network decision. Examples of this include integrated reference architectures from VCE Vblock and NetApp FlexPod and integrated systems from Dell, HP and Lenovo, as well as emerging solutions from vendors such as Nutanix and SimpliVity.

What Is Required in New Data Center Networks?

We have described an environment that has undergone substantial change and that offers the opportunity to deliver networking capabilities in very different, more agile and cost-effective ways.

Many of the vendors in this research provide "good enough" solutions to solve today's data center networking requirements. However, ample differentiation between vendors exists, including cost, architecture, and how vendors are addressing emerging and future requirements. Moving forward, modern data center network solutions must address:

- The need for simplified and automated network architectures
- Improved network agility
- Changing data center network size and density
- Changing application architectures
- Innovation and choice
- Migration and investment protection

Simplified Networks With Improved Agility

Data center networks must address an increasing business demands for faster, service-based delivery of IT. This is driven by real-time business requirements and the availability of more agile options within and outside of traditional corporate IT. These options (often delivered based on virtualized and cloud platforms) have highlighted suboptimal network operations paradigms (including static and manual provisioning and configuration activities), which increase time-to-delivery services, lower network availability, increase operational expenditures and make it increasingly difficult to scale the environment.

Changing Size and Density

The size and density of data centers are changing, with several macro trends driving both the expansion and contraction of data centers:

- Server and data center consolidation requires IT organizations to centralize compute resources and reduce the number of physical data centers, resulting in fewer, but larger, corporate data centers.
- Increasing compute density using multicore, multsocket servers, combined with virtualization and storage convergence, is reducing the physical footprint required. Workloads that used to take multiple racks of servers are now being delivered within a portion of a single rack.
- The migration of applications toward external cloud services also reduces the space requirements within the corporate data center.

Changing Application Architectures

Typical enterprise applications have become more distributed, increasingly independent from specific servers and more elastic in their deployment. Also, newer applications like big data have more stringent bandwidth, latency and interface buffer requirements than traditional applications. The resulting and increasing requirement to efficiently deal with east-west traffic has resulted in several recent innovations, including:

- Higher-performance, low-latency top of rack (ToR) switches
- The emergence of one- or two-tier physical switching architectures
- The increasing use of fixed-form-factor core switches
- More intelligence and traffic forwarding at the server access layer (through the use of virtual chassis or chassis-clustering solutions)

These approaches improve server-to-server performance and evolve the data center network toward providing a homogeneous set of capabilities for all connected compute resources.

Long-Term Innovation and Choice

Disaggregation, SDN and open networking offer an opportunity for transformational change within the networking marketplace. The decoupling of hardware and software and the disaggregation of the control and data planes represent the potential for a fundamental improvement in how networks are designed, procured, managed and evolved. These advances enable third-party applications to run on emerging network solutions with a potential for a substantial increase in long-term innovation. This innovation — couple with an open, disaggregated and/or SDN-based marketplace — is clearly disruptive to what has traditionally been a tightly integrated, hardware-centric model.

Migration and Investment Protection

While new technology and business model innovation is critical, vendors also need to be concerned with providing investment protection for existing investments and migration plans from currently deployed architectures to the new ones.

Magic Quadrant

Figure 1. Magic Quadrant for Data Center Networking



Vendor Strengths and Cautions

Arista Networks

Arista is by far the fastest-growing vendor in this Magic Quadrant and now has a strong hold on the No. 3 ranking in terms of data center (DC) networking revenue market share and interest from Gartner clients. Arista provides an agnostic physical network solution that can be integrated in any data center network architecture. Arista provides a simple product architecture that scales from small to very large data center environments. The vendor has invested in its EOS software to provide features to assist network and application deployments. Arista is in the process of expanding its target customer base from early, technically astute buyers to the broader mainstream enterprise and increasing its geographic reach outside of North America and Europe. Arista has traditionally been the price/performance leader in DC networking; however, increasing adoption of merchant silicon-based switches and aggressive pricing by competitors is quickly narrowing the gap. Organizations should consider Arista for any data center network solution, provided the vendor has demonstrated local account and engineering coverage.

Strengths

Arista provides tight integration with a wide range of software orchestration and SDN solutions, and it allows its customers freedom of choice without lock-in to any one architecture.

Arista has built a flexible software environment (Arista EOS) with strong features that include network telemetry and application visibility capabilities along with extensible APIs.

Arista proposes solutions that are rightsized for the environment and that take advantage of various Arista form factors, which contributes to a more efficient and often cost-effective design.

Arista provides high-performance solutions with deep buffers and low latency to deal with the complexities of modern DC applications.

Cautions

Geographic coverage is still thin in Asia/Pacific and emerging markets compared with more established vendors, and Arista is still ramping up its internal process and channel programs to better serve the mainstream market.

Arista does not support converged storage and data networks where FC (or FCoE) is a requirement.

Although Arista's networking solution is a very flexible and sound network foundation, organizations looking for a dynamic orchestration systems will need to integrate it into an external orchestration system.

Recent legal challenges from Cisco represent an increased level of perceived risk for some potential customers. Organizations should have their legal department assess the risk associated with this issue (see Note 2).

Avaya

Avaya is one of the smallest players in this Magic Quadrant based on current revenue (now less than 1% of DC networking revenue), though it still maintains a large installed base of legacy solutions. Avaya's current solution — based on its Fabric Connect architecture — provides a highly automated solution that allows for simplified virtual machine (VM) mobility and optimized east-west traffic flows with simple extensibility across and between data centers. Until very recently, Avaya data center solutions have lacked meaningful go-to-market investments (in sales, system engineering and marketing), which has severely limited market opportunities and stifled growth. The launch of dedicated sales and engineering teams should improve Avaya's abilities in 2015. Consider Avaya (after confirming local support capabilities) when configuration simplification is a priority.

Strengths

Avaya provides a highly automated solution, including high-performance multicast capabilities that requires less configuration and management attention than competing solutions.

Based on client inquiry and end-user survey results, Avaya scores consistently above average in delivering appropriate solutions on budget and meeting customer expectations and requirements.

Avaya has a strong history of providing highly resilient data center network architectures, which carries through to its current portfolio.

Avaya's Fabric Connect solution provides a seamless extension between data centers and to the campus and branch to provide a simplified enterprise network solution.

Cautions

Avaya is currently one of the smallest vendors in this Magic Quadrant based on data center revenue and has a limited (though growing) number of dedicated resources for networking. Account coverage and channels capabilities can be scarce, so enterprises should ensure skilled resources are available to support new implementations.

Avaya has been late to announce SDN-based offerings, entering the market in 1H15 with its SDN Fx architecture.

Avaya's automated data center fabric is based on the Shortest Path Bridging (SPB) protocol, which has not been widely adopted by any other vendor. This can lead to integration challenges in multivendor environments.

Brocade

Brocade's data center networking solution is centered on its VCS automated fabric technology and its Vyatta SDN controller. Brocade has a long and deep history as a data center vendor through its market-leading SAN solutions and is a leader in converged data network and storage offerings. Its VCS fabric architecture, supported on the VDX switching portfolio, provides a strong level of built-in fabric automation and can be combined with high-end routing to connect DCs and external resources. Brocade is a leading contributor to the OpenDaylight SDN initiative and a strong supporter for an open SDN ecosystem. Consider Brocade when you require an automated data center networking fabric.

Strengths

The vendor provides an automated fabric with zero-touch configuration capabilities to assist initial deployment and expansion of the fabric.

Brocade is a major contributor to ODL and has increased investments and innovations in its software portfolio with the Vyatta ODL-based SDN controller and a range of network function virtualization (NFV) software features, helping to drive an open SDN ecosystem.

Brocade offers a subscription-based procurement option that can help with economic justification for new investments, and it provides an ability to upgrade to new technology without a capital outlay.

Brocade provides solid integration with OpenStack and VMware (vCenter, vRealize and NSX), including a hardware bridge for NSX-MH.

Cautions

Gartner clients have reported that Brocade solutions are among the highest-priced offerings when looking at competitive alternatives. However, recent additions to the VDX portfolio should allow Brocade to offer more competitively priced options.

Brocade's channels are not as mature or as broad as many leading competitors.

Brocade does not offer a converged data center infrastructure of its own. However, it is integrated into other converged solutions, such as EMC's VSPEX and VSPEX Blue, Hitachi Unified Compute Platform (embedded and ToR), and Fujitsu vShape.

As reported via client inquiry and survey results, some customers have reported issues with code quality.

Cisco

Cisco has long been viewed as the "safe choice" of enterprise network personnel and remains the global market leader by a wide margin when measured by port shipments or revenue. Cisco is in the middle of a significant challenge to protect its large installed base while keeping pace in the rapidly changing market. Cisco has a deep and broad portfolio of solutions that can meet all data center networking requirements, ranging from small or midsize businesses (SMBs) to enterprises and service providers, but with several overlapping and conflicting architectures. Gartner clients have complained about confusing choices that can lead to suboptimal product selection. Over the past year, Cisco continued to execute against its flagship data center networking solution and is now shipping Application Centric Infrastructure (ACI) software and hardware. ACI is a programmable Ethernet fabric that supports a centralized policy-based model versus a traditional device-centric command line interface (CLI)-based approach. Cisco should be included on all data center networking opportunities globally.

Strengths

Cisco has the largest installed base of any vendor in this Magic Quadrant, so there is a large number of enterprise personnel who are highly familiar with its products and solutions.

Cisco's network products are embedded in several integrated systems offerings — including VCE's Vblock, NetApp FlexPod and IBM VersaStack — which help organizations to rapidly build out infrastructure.

Cisco provides several products to help organizations unify logical and physical infrastructure, including vSwitches supported by VMware, Microsoft, Xen, KVM hypervisors and Linux Containers, as well as server blade switches that can be used in Dell, Lenovo and HP blade chassis.

In addition to networking, Cisco provides compute, storage networking, security and unified communications (UC) solutions, which appeals to customers looking to limit the number of vendors they purchase from.

Cautions

Based on client feedback and contracts reviewed by Gartner, Cisco is one of the highest-priced solutions in the market, even in competitive deals. Additionally, we often observe Cisco or its channel proposing overengineered solutions.

Cisco has a history of creating products that rely on closed and/or proprietary features, which leads to vendor lock-in.

Cisco's ACI platform provides limited investment protection for the existing Cisco installed base of Nexus and Catalyst equipment or for Cisco's UCS server architecture, and it currently lacks features such as FCoE support and external data center interconnect capabilities that many organizations have adopted.

Although Cisco ACI is now generally available, we have observed very limited market adoption and estimate that there are fewer than 25 large-scale enterprise production ACI installations as of late March 2015. Enterprise clients continue to report that Cisco has difficulty producing production references for ACI deployments.

Dell

Dell is a top-four player in the DC networking space when measured by port shipments and has grown revenue at above-market rates in the past year. It now has more than 24,000 Dell Networking customers. The vendor provides a solid portfolio of fixed, chassis and blade switches that can meet the needs of most enterprise. Dell sells primarily to customers with Dell servers or PCs and has a strong footprint in the midmarket. In late 2013, Dell completed a corporate privatization to gain financial flexibility as it transforms its business. Consequently, Dell has been the most innovative and disruptive mainstream data center networking vendor in the market over the past 12 months. In January 2014, Dell announced support for a radically new switching paradigm (disaggregation), allowing organizations to run third-party networking OS software on selected Dell hardware. This has sent ripples throughout the networking industry and caused other vendors to consider and/or respond with similar competitive offerings. Organizations with an existing Dell relationship should consider this vendor, as should larger organizations looking for an open-networking solution.

Strengths

Dell has taken one of the most open, agnostic and standards-based approaches to meeting customer requirements in the data center.

In addition to networking, Dell provides PC, compute and storage infrastructure, which appeals to customers who prefer to purchase their infrastructure from a single vendor.

Dell has integrated its networking components into integrated systems offerings from both Microsoft (Microsoft Cloud Platform Solution [MCPS]) and VMware (EVO), which is beneficial for clients looking to quickly deploy infrastructure.

Dell is the No. 3 vendor in terms of 40GbE port shipments after Cisco and Arista Networks, which is a key requirement for high-performance data centers.

Cautions

Gartner clients have reported stability issues with Dell's networking software in specific usage scenarios.

The vendor has limited visibility outside of existing Dell accounts, rarely showing up on client shortlists in environments that are not running other Dell products.

While very innovative, Dell's support for disaggregated switching models is new, and Gartner estimates that there are fewer than 100 production enterprise deployments as of March 2015.

Dell has traditionally delivered products via a direct sales model, so it has an immature channel compared with other vendors. When working with Dell channel partners, check references and make sure they have several implementations of similar scale before committing.

Extreme Networks

Extreme has focused on completing the assimilation of Enterasys Networks and now has over 14,000 total enterprise customers. In the data center, Extreme remains a smaller vendor with roughly 2% market share (measured either via revenue or port shipments), and we do not often find them on clients' competitive shortlists. Over the past year, since the Enterasys acquisition, Extreme has focused on rationalizing its portfolio, and it revamped its channel and partner programs to better support data center networking customers. In addition, the vendor launched several new hardware switches and its SDN controller, a hardened version of OpenDaylight. Extreme should be considered by enterprises in North and South America and Europe that are looking for a pure-play data center networking provider.

Strengths

Gartner clients cite very strong customer service, which is confirmed in research surveys.

Extreme has a deep and broad portfolio of data center networking equipment with a 15-plus-year history of providing high-performance and reliable data center network solutions.

Extreme aggressively prices its data center networking solutions in competitive scenarios.

Extreme has an open and standards-based approach to address emerging data center networking requirements, including widespread support for OpenFlow, an SDN controller based on OpenDaylight, and support for multiple APIs, including Network Configuration Protocol (NETCONF).

Cautions

Extreme is one of the smaller vendors in this research and is growing below market rates. Thus, organizations should ensure there is appropriate local sales and support coverage.

Extreme's once-promising partnership with Lenovo to deliver integrated systems faces uncertainty given Lenovo's acquisition of IBM's networking portfolio. Organizations should vet the roadmap of both Lenovo and Extreme surrounding this partnership before committing to an Extreme/Lenovo converged solution.

For those looking for a converged server storage network solution, Extreme is not a choice because it is a network-focused vendor.

Although the vendor provides high-performance solutions that address the needs of large-scale environments, Extreme's current offerings lack several capabilities that many larger and advanced "forward-lean" organizations desire, such as VMware NSX integration and support for Puppet and Chef.

HP

HP is the No. 2 player in the data center network market, with strong global reach, though it did not match market growth rates during 2014. HP has a broad portfolio of fixed, chassis and blade switches that meets the needs of all enterprise organizations. However, Gartner clients have cited issues of overlapping solutions, which can make product selection problematic. The competing blade switch

offerings (6125XLG and Virtual Connect) are an impediment to HP's integrated systems sales and make it challenging for HP Networking to leverage HP's market-leading server footprint. HP is a strong proponent for open SDN and disaggregated switch architectures with comprehensive device and controller support combined with its commercialized SDN App Store. Organizations should consider HP for any data center network solution, especially those looking for open and standards-based solutions.

Strengths

HP has taken a very broad and standards-based approach to meeting a wide range of customer requirements. This is backed by our Gartner research surveys, where they were rated as the most open vendor in this analysis.

HP's Comware software provides support for enhanced Layer 3 features, FCoE, fabric and SDN environments at one standard price, with a common hardware portfolio.

HP offers a complete converged infrastructure offering with network, compute and storage, with management by HP's OneView.

While still running on its own controller (as of May 2015), HP has committed to supporting the OpenDaylight framework as it becomes scalable and robust, and to porting its SDN App Store environment to run in OpenDaylight-based solutions.

Cautions

Gartner clients often comment that, despite its global reach, HP channels are not as strong as expected when dealing with network opportunities.

Gartner clients can be confused with conflicting server- and network-centric blade switch offerings. The lack of integration of HP's Virtual Connect blade switch into the HP Networking hardware and software architectures results in some organizations considering alternative solutions with stronger integration between network and compute offerings.

HP and its channels sometimes undersell HP maintenance offerings, which can lead to support challenges for some customers.

HP's support of multiple SDN use-case options — including Helion OpenStack with its Virtual Cloud Networking application, VMware NSX, and its own HP Distributed Cloud Networking (DCN; based on Alcatel-Lucent's Nuage Networks) and HP Networking Virtual Application Networks (VAN) solutions — can lead to customer uncertainty.

Huawei

Huawei continues to expand its enterprise data center networking solutions and, as a relatively new entrant, is able to offer flexible alternatives. Huawei's Cloud Fabric architecture, CloudEngine switching platforms and agile SDN controller are built on open standards aligned with Huawei's goal of fostering open SDN innovation in the market. Huawei made significant strides in 2014 in delivering on its SDN plans and continues to be an active contributor to technology working groups and standards bodies, including OpenStack, OpenDaylight and Open Networking Foundation (ONF). While global in scale and reach, the vendor's data center products are primarily delivered in China, the Asia/Pacific region and other emerging markets. Huawei should be considered in Asia and developing markets, especially when there is a need for a high degree of scalability and port density.

Strengths

Huawei has a broad data center switch portfolio based on its CloudEngine portfolio, including scalable chassis architectures and fixed form factor (FFF) leaf and spine switches.

Huawei has a broad set of open SDN options to be able to deliver software overlays, a full SDN infrastructure and hybrid solutions, all based on standards to allow third-party integration and enhancements to its architecture.

Huawei offers a complete converged infrastructure data center offering with network, compute and storage.

Cautions

Outside of China, Huawei rarely shows up on client shortlists. Huawei has limited, although growing, sales and channel resources in North America and Western Europe.

While Huawei clearly has global scale, its opportunities and awareness can be limited in some markets due to political concerns and increasing East-versus-West barriers and competition.

Gartner clients have observed that Huawei needs to improve sales processes and documentation.

Huawei has relatively poor marketing communications, messaging to enhance company visibility and differentiation. This means that it is not considered for all potential opportunities in its target markets and geographies.

Juniper Networks

Juniper has an extensive and broad set of data center networking capabilities and is a top-four vendor when measured via port shipments or revenue. However, Juniper has lost visibility in the market over the last 12 months, and now lags behind Cisco, Arista and HP in client inquiry interest. Juniper's marketing messaging during 2014 confused many traditional mainstream enterprise customers. Juniper now boasts over 5,000 customers for its MetaFabric, which is the umbrella architecture that covers its data center portfolio composed of EX and QFX switches, Contrail SDN software, QFabric Ethernet switching fabric data center routing and security. Organizations with large-scale data center networks should include Juniper on their shortlists.

Strengths

Juniper has a strong track record in supporting demanding, mid- to large-scale data center environments in both enterprise and service provider environments.

Juniper has an open and well-thought-out roadmap to address emerging data center networking requirements.

In competitive deals that Gartner reviews, Juniper aggressively prices its solutions.

Juniper offers an open and interoperable architecture, including Open APIs, brite-box switches, support for disaggregated switching and an open-source SDN controller.

Cautions

Gartner clients have reported instances of software instability in the EX9200 switching platform, and we've witnessed a decline in the level of customer satisfaction and support (at least partially triggered by a migration to a new support system).

Many Gartner clients have indicated confusion with Juniper's multiple data center switching options, which can lead to product selection challenges.

Juniper's long-term commitment to support mainstream and midmarket enterprise data center network environments is a concern due to confused messaging during 2014.

While the vendor has recently launched the Contrail cloud "stack," which includes compute and storage, Juniper is still primarily a network and security-focused vendor, which limits its market to those looking for an independent network layer.

Lenovo

Lenovo is a new entrant into this Magic Quadrant due to its recent acquisition of IBM's x86 server business and related blade and server access networking portfolio. IBM focused solely on the data center access and did little to create a more comprehensive end-to-end data center network solution. However, as part of Lenovo, we are seeing a resurgence of innovation and a desire to offer more complete converged infrastructure solutions. Lenovo's strategy is to leverage merchant silicon-based fabric solutions to provide DC network solutions that can support over 2,000 server ports in a zero-touch configuration fabric. Consider Lenovo data center networks for all Lenovo x86 server deployments.

Strengths

Lenovo has a large data center server footprint that can be leveraged for a growing networking portfolio.

Lenovo provides an automated fabric solution that simplifies deployment.

Lenovo has a strong roadmap to offer a more complete data center solution via open and standards-based architectures.

The Lenovo networking team has a heritage of driving new technologies into the market. It is one of the first to ship 10GbE top-of-rack switches and to provide software for early VMware deployments.

Cautions

Lenovo has limited awareness and exposure to data center opportunities outside of its x86 server business.

Lenovo has traditionally only targeted the server access layer and has limited experience designing and deploying complete data center network solutions.

Lenovo does not have a chassis-based offering to address very large enterprise environments.

Current customers need to ensure consistency of support and business relationships as the business transitions from IBM to Lenovo.

VMware

VMware provides virtual switching and SDN overlay capabilities for virtualized data centers. VMware yields a high degree of influence in the data center due to its position of incumbency in the virtualization market. As a result, VMware's NSX SDN overlay product garners a high degree of interest from VMware customers. Over the past year, VMware has focused on increasing adoption of NSX via training the global channel and highlighting specific usage scenarios such as intra-data-center security (microsegmentation) and self-service provisioning. We believe VMware has the largest installed base of any SDN solution in the market today. VMware is the only vendor in this research that does not provide hardware, so organizations must design, operate and manage the physical data center network infrastructure separately. This puts VMware in a unique position because it is both a partner that cooperates with many of the vendors in this market as well as a competitor for influence and software elements within the data center. VMware should be considered for organizations looking to increase networking agility or security within highly virtualized data centers, unless the primary hypervisor vendor is Microsoft.

Strengths

VMware's virtual switching solutions are widely deployed across VMware's installed base with a deep feature set and a proven track record of reliability.

Due to its pricing models, VMware's NSX allows organizations to incrementally adopt SDN without requiring large upfront capital investments.

VMware NSX can run on top of any appropriately provisioned IP-based Ethernet network.

NSX microsegmentation is an innovative mechanism to provide intra-data-center security (east-west) in a cost-effective manner compared with traditional appliance-based approaches.

Cautions

The value of NSX is dramatically diminished in environments that are running Microsoft Hyper-V (currently not supported by NSX) and/or that are not highly virtualized. Also, VMware NSX comes in two versions — NSX for vSphere (NSX-v), which has a richer set of networking functions based on VMware's vSphere Distributed Switch (vDS), and NSX for Multi-Hypervisor (NSX-MH), which relies on Open Virtual Switch (OVS). NSX-v has more ecosystem integration, stronger security features and integration with vSphere orchestration capabilities. NSX-MH relies on integration with OpenStack.

There is limited visibility between the NSX virtual overlay and physical underlay networks, which can impact overall network visibility and increase time to troubleshoot and repair problems.

There is a very limited number of large-scale deployments (more than 10,000 VMs) of the NSX for vSphere version, so large data centers should carefully evaluate current VMware capabilities and deployment expertise.

VMware is new to the networking business with immature channel and sales coverage, which can negatively impact deployment. Current customers give VMware low ratings for network integration and support capabilities. Organizations should ensure their local support teams have undertaken multiple implementations of similar scale before committing.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants and MarketScopes as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant or MarketScope may change over time. A vendor's appearance in a Magic Quadrant or MarketScope one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a

reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

The data center networking market is extremely dynamic and innovative, as vendors attempt to bring new ideas and solutions to the enterprise market. We track a number of vendors that do not yet meet our inclusion criteria, because we believe they have the potential to impact this marketplace over time and to provide advice to our clients that ask about smaller, innovative vendors. Vendors being actively tracked in this market include ALE Enterprise (formerly Alcatel-Lucent Enterprise), Alcatel-Lucent Nuage, Allied Telesis, Big Switch Networks, Cumulus Networks, D-Link, Mellanox Technologies, Microsoft, Midokura, NEC, Netgear, Oracle, Pica8, Pluribus Networks, Plexxi, Quanta Computer and PLUMgrid.

Added

Lenovo was added due to its acquisition of the x86 server and related data center networking technologies from IBM.

Dropped

ALE (formerly Alcatel-Lucent Enterprise) was dropped because it did not meet our revenue criteria.
IBM was dropped due to the sale of its data center networking hardware assets to Lenovo.

Inclusion and Exclusion Criteria

Vendors included in this Magic Quadrant must:

- Provide hardware and/or software that address the emerging enterprise data center networking requirements outlined in the Market Definition/Description and Market Overview sections.
- Produce and release enterprise data center networking products for general availability as of 1 November 2014. All components must be publicly available and included on the vendor's published price list. Products shipping after this date will only have a significant influence on the Completeness of Vision axis.
- Demonstrate relevance to Gartner clients via a minimum of \$50 million of annual product revenue in the enterprise data center networking market based on our quantitative analysis and estimates of the DC market. Revenue includes all data center networking hardware and software, but excludes services revenue.
- Demonstrate at least 500 enterprise customers that use its data center networking products in production environments as of 1 November 2014.
- Demonstrate production enterprise data center customers with at least five customers supporting data center networks of more than 500 physical servers.

Evaluation Criteria

Ability to Execute

The following provides some insight into the criteria Gartner uses when evaluating a vendor's Ability to Execute. At a high level, our analysis of Ability to Execute attempts to capture how well a vendor is performing across the primary functional units of the business — product, sales/channels, marketing, service/support and financial:

- Product/Service:** Evaluates vendors by looking at their overall portfolios, including the ability to deliver and manage all hardware and software aspects of data center networking. This includes Ethernet fabric architectures, core/spine switches, ToR/leaf switches, virtual switches, blade switches, SDN controllers, SDN applications, and the relevant management, orchestration and control of the architecture. We consider product and architectural migration strategies, and the ability to address virtualization, latency and scalability issues for both north-south and east-west traffic. More emphasis is placed on capabilities that would apply in open environments, including disaggregation and SDN, because many of those areas cross the boundaries of the IT architecture, making proprietary protocols a challenge.
- Overall Viability (Business Unit, Financial, Strategy, Organization):** Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue to invest in and offer the product and advance the state of the art within the organization's portfolio of data center switching products.
- Sales Execution/Pricing:** Evaluates presales and go-to-market activities of both the vendor and its channels, and includes an analysis of how the vendor interacts with its potential customers. The second aspect of this criterion includes our evaluation of the cost-effectiveness of the solutions for capital purchase and long-term maintenance and the ability to recognize and position the most appropriate solution in specific sales situations.
- Market Responsiveness and Track Record:** Assesses the ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the provider's history of responsiveness.
- Market Execution:** Focuses on how the vendor is perceived in the market and how well its marketing programs are recognized. For data center network infrastructure, the evaluation focuses on how well the vendor is able to influence the market around key messages and attributes related to operational agility, changing size and density requirements, and new application architectures. An additional indicator for this criterion is how often Gartner clients consider a vendor as a possible supplier in a shortlist evaluation. The change in momentum in this indicator is particularly important.
- Customer Experience:** Looks at all aspects of the customer interaction, with a heavier weighting on postsale service and support activities.
- Operations:** This criterion was not ranked.

Table 1. Ability to Execute Evaluation Criteria

Evaluation Criteria	Weighting

Evaluation Criteria	Weighting
Product/Service	High
Overall Viability (Business Unit, Financial, Strategy, Organization)	Medium
Sales Execution/Pricing	High
Market Responsiveness and Track Record	Medium
Marketing Execution	Medium
Customer Experience	High
Operations	No Rating

Source: Gartner (May 2015)

Completeness of Vision

Evaluations for Completeness of Vision attempt to determine how well the vendor understands and is preparing for future market conditions, as well as how it is shaping the future market:

Market Understanding: Assesses the vendor's ability to look into the future and drive new ideas into product roadmaps and offerings. In this market, leadership in driving the data center network to address increased network agility, size/density, changing application architectures, openness, choice and investment protection are good examples of what we are looking for. This includes the vendor's strategies around open networking, disaggregation, SDN and other emerging architectural approaches.

Marketing Strategy: Evaluates the ability of the vendor to influence the market through its messaging and marketing campaigns. Vendors that incorporate and drive the three key data center network market transitions demonstrate an ability to use their marketing strategies to their advantage.

Sales Strategy: Evaluates how the vendor exploits new business models that are emerging due to market and technology transitions.

Offering (Product) Strategy: Evaluates how the vendor invests in R&D to continue to innovate in the key market transitions identified in the Market Definition/Description section. This includes roadmaps around open networking, disaggregation, SDN and other emerging architectural approaches.

Business Model: The soundness and logic of a technology provider's underlying business proposition.

Innovation: Measures the vendor's ability to drive innovation to satisfy emerging data center networking requirements and how the vendor invests in new transformational technologies to move its business and the market forward. A key attribute in the data center market is for the vendor to innovate in technology areas that best meet market requirements.

Vertical/Industry Strategy and Geographic Strategy: These criteria were not ranked.

Table 2. Completeness of Vision
Evaluation Criteria

Evaluation Criteria	Weighting
Market Understanding	High
Marketing Strategy	Medium
Sales Strategy	Low
Offering (Product) Strategy	Medium
Business Model	Medium
Vertical/Industry Strategy	No Rating
Innovation	High
Geographic Strategy	No Rating

Source: Gartner (May 2015)

Quadrant Descriptions

Leaders

A Leader has demonstrated a sustained ability to meet the changing needs for mainstream data center architectures. A Leader also has the ability to shape the market and maintain strong relationships with its channels and customers, while offering solutions for the data center infrastructure market.

Challengers

A Challenger has demonstrated sustained execution in the marketplace, and has clear, long-term viability in the market, but has not shown the ability to shape and transform the market.

Visionaries

A Visionary has demonstrated an ability to increase the features in its offering, to provide a unique and differentiated approach to the market. A Visionary has innovated in one or more of the key areas of data center infrastructure, such as management (including virtualization), security (including policy enforcement), SDN and operational efficiency, as well as cost reductions.

Niche Players

A Niche Player has a complete or near-complete product offering, but does not have strong go-to-market capabilities (such as for channels) or has geographical limitations. A Niche Player has a viable product offering and, in some cases, will be an appropriate choice, depending on the usage scenario.

Context

This Magic Quadrant focuses on data center networking solutions to solve the emerging requirements for a scalable, high-performance and simply managed network that places the network into a more cohesive data center architecture. The data center networking market, as described in this research, is still emerging as architectures and vendor differentiation continue to be developed.

Because the market is rapidly changing and requirements are significantly different from in the past, organizations should ensure that they understand the shifts in application architectures and how they impact the network. Data center organizations should carefully evaluate alternate approaches and vendor solutions to arrive at the most appropriate future architecture.

Market Overview

This Magic Quadrant includes vendors that provide networking hardware and/or software solutions within enterprise data centers, in support of an organization's applications and services.

This Magic Quadrant focuses on the current and emerging requirements and technologies in the enterprise data center networking market today. Technologies include data center core/spine networking solutions, server access switches (ToR and leaf), virtual switching, SDN solutions — including SDN overlays — and emerging trends toward leveraging open-source and disaggregated networking technologies in the data center.

As enterprises started to look more specifically at their business requirements, Gartner noticed a segmentation of the network infrastructure market and a shift in the buying practices — from making a homogeneous decision for all LAN switching requirements to one where requirements were disaggregated into three largely independent decisions (LAN access, campus core and data center networking). The campus edge, which includes wired and wireless access infrastructure, is now covered in "Magic Quadrant for the Wired and Wireless LAN Access Infrastructure."

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