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Apstra Makes Multi-Vendor

SOFTWARE-DEFINED NETWORKING a Reality

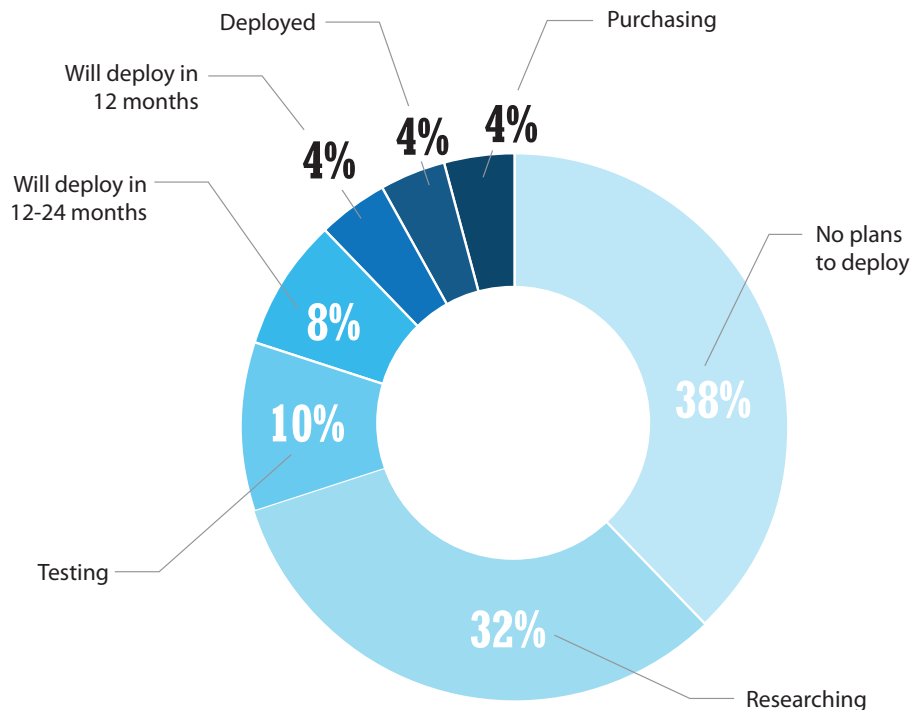**WHITE PAPER**

Prepared by
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INTRODUCTION: THE PROMISE OF SDN IS YET TO BE REALIZED

For decades, the architecture of data center networks remained the same. Vertically integrated, monolithic solutions that locked customers in had become the norm. These products were slow to change, rigid in architecture and did not allow the network to achieve any level of agility. At the same time, virtualization had taken server and storage industries by storm. In these markets, virtualization is the norm; and compute is now a highly agile resource, leaving the network behind.

A few years ago, software-defined networking (SDN) burst on the scene and promised to change everything. Software-defined networks were going to bring seamless, multi-vendor networks to the data center that had the same level of agility as compute has today. No longer would the network be the thing that holds the company back. Networking had finally evolved away from the world of proprietary protocols and locked-in solutions. However, despite the promise, SDN deployments have been slow. The ZK Research 2016 Network Purchase Intention Study shows that only 4% of companies today have a software-defined network deployed (Exhibit 1). These are primarily massive, cloud-scale organizations with hundreds of PhD-level engineers that have seemingly unlimited resources in terms of both people and dollars.

Exhibit 1: **SDN Deployments Are Lagging**

What is the status of software-defined networking in your organization?

ZK Research 2016 Network Purchase Intention Study

ABOUT THE AUTHOR

Zeus Kerravala is the founder and principal analyst with ZK Research. Kerravala provides tactical advice and strategic guidance to help his clients in both the current business climate and the long term. He delivers research and insight to the following constituents: end-user IT and network managers; vendors of IT hardware, software and services; and members of the financial community looking to invest in the companies that he covers.

Developing turnkey solutions is in opposition to the original vision of SDN, which promised an agile data center built on best-of-breed or lower-cost components.

But what about the rest of the industry? Before software-defined networks can become a mainstream technology that all companies can deploy, the following challenges must be overcome:

Manual configuration: Networks are built on a number of repeatable elements, but their configuration must still be done by hand. This leads to lengthy delays in network changes.

Dashboard sprawl: Each network vendor has its own dashboard and "single pane of glass" to help manage the infrastructure. This means that if an organization wants to adopt a multi-vendor strategy, it must run several management tools as well as correlate and analyze the information manually. This might be sufficient for basic tasks such as monitoring whether network elements are up or down, but any kind of advanced tasks like correlating incidents and predicting failure are impossible to do.

Lack of interoperability: Despite the industries' efforts to standardize protocols, multi-vendor interoperability remains largely a myth. Most companies do not have the time or resources to conduct interoperability testing among multiple vendors and white box solutions.

Lack of engineering talent: A multi-vendor environment requires engineers who are skilled in each vendor's operating system. Most organizations do not have the resources to train engineers to work on three to five vendors' platforms.

Lack of automation: One of the value propositions of SDN is that network operations can be fully automated. However, automation requires high-level developers to write code, particularly in multi-vendor environments. Most businesses do not have developers as part of their network operations team.

In an effort to address some of these challenges, some vendors have developed turnkey solutions—but doing so is in opposition to the original vision of SDN, which promised an agile data center built on best-of-breed or lower-cost components. Turnkey solutions may overcome some of the challenges listed above, but they create an even greater lock-in scenario that limits choice, flexibility and agility.

## SECTION II: UNDERSTANDING THE FINANCIAL IMPACT OF NOT BEING ABLE TO FULFILL ON THE VISION OF SDN

Business and IT leaders often find it risky to be early adopters of technology trends. However, with SDN, ZK Research believes it's riskier to *not* adopt software-defined networks. The following are some quantitative and qualitative reasons why organizations should make evolving to a multi-vendor software-defined network a top priority now:

Faster time to market: In this digital era, businesses that can get new services to market first will gain a competitive edge. Those that can't will fall farther behind and will eventually be challenged to even stay in business. Any new business service will likely require IT to make changes to the network, and the manual nature of managing network changes leads to long lead times. In fact, ZK Research calculates that 27 days is the average time required to just start making network changes. The agile nature of a software-defined network enables businesses to start making changes at the speed the business requires. On average, businesses that deploy a multi-vendor software-defined network can implement new services 13 times faster than with traditional networks.

Higher uptime through the reduction of human error: The ZK Research 2016 Network Purchase Intention Study found that human error is the largest cause of network downtime (Exhibit 2). This happens when network engineers make multiple changes through scripts and then must manually apply them to every device in the company. This multi-step, multi-device nature of change management is almost impossible to scale. This becomes exponentially more complex in multi-vendor networks. With a software-defined network, changes can be auto-

Exhibit 2: Human Error Is the Primary Cause of Downtime

What is the main cause of network downtime in your organization today?
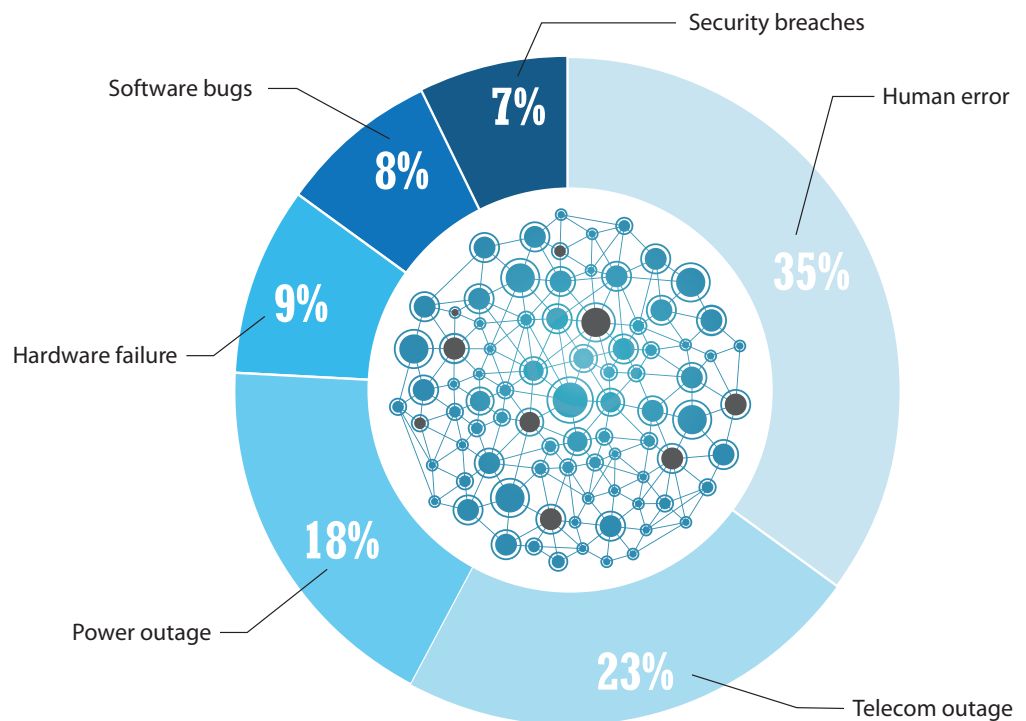
ZK Research 2016 Network Purchase Intention Study

mated. By adopting a software-defined network, unplanned downtime due to human error can be reduced from 35% to zero.

Higher worker productivity: According to ZK Research, workers are, on average, 14% less productive due to poor application performance and availability. Unplanned network downtime, poor network design and long troubleshooting times all directly contribute to a loss of productivity. Organizations spend billions of dollars every year trying to make workers more productive. However, if businesses could just optimize the performance of existing applications, they could achieve a double-digit improvement in productivity. The higher availability and better performance of a software-defined network will directly lead to increased worker productivity.

Increased network agility: IT agility is a key to becoming a digital organization. This is one of the reasons why businesses have spent approximately $12 billion globally on compute, storage and application infrastructure to improve IT agility, according to ZK Research. A multi-vendor software-defined network can deliver the same level of network agility that exists within the other parts of IT, meaning businesses will get a better return on the IT investments they have already made.

Better network utilization: Historically, network utilization has ranged between 30% and 35%. Businesses overbuild networks to accommodate peak periods, but they rarely need all of the capacity purchased. A software-defined network can be scaled up and down quickly, meaning organizations can provision for the norm and "burst" when required. This can improve network utilization from where it is today to 70% or even more. The implication of improved efficiency is more revenue for the providers achieved by the increase in network utilization.

Reduction of operational staff: In a multi-vendor network, network operations requires a large staff to manage the diverse infrastructure. In fact, the current ratio of network operators to server administrators is 10-to-1, underscoring the impact of server virtualization. A software-defined network can significantly reduce the number of people required to run the network and enable businesses to redeploy those individuals for more strategic purposes.

The vision of SDN was to make networks operationally simple and agile, and to give businesses a choice of hardware platforms. Also, software-defined networks will bring operational simplicity and agility, enabling organizations to take advantage of digital trends faster than the competition. What's required is a management tool that can transform multi-vendor software-defined networks from a vision into a reality.

Software-defined networks will bring operational simplicity and agility, enabling organizations to take advantage of digital trends faster than the competition.

SECTION III: APSTRA ENABLES MULTI-VENDOR SOFTWARE-DEFINED NETWORKS

Apstra, a Silicon Valley–based startup founded in 2014, is singularly focused on removing the barriers of shifting to a vendor-agnostic software-defined network. The vendor's distributed operating system, AOS, can be thought of as a distributed platform for the data center network.

Apstra provides automation for the entire lifecycle of network services—from the design/build phase through the deployment/operate phase. The solution takes a fully integrated approach to running the network and starts with business intent that is fed into a closed-loop system (Exhibit 3). The data center operator then selects a pre-configured, validated template and applies any constraints to it, which creates a blueprint for deployment. AOS uses this blueprint to deploy a configuration to the physical network, gathers telemetry and enforces intent, ensuring the deployment is in line with business requirements.

The following are the key benefits of the Apstra solution:

Operational simplicity and agility: Apstra is built on turnkey solutions in the form of templates that have a DevOps feel to them, enabling organizations to move to an agile, rapid development model. The inputs to the solution are based on business intent, so it addresses business needs and not just technology requirements. The solution works across the entire lifecycle, including days 0, 1 and 2+.

Exhibit 3: Apstra Continuous Validation Offers a New Integrated Approach for Vendor-Agnostic Automation
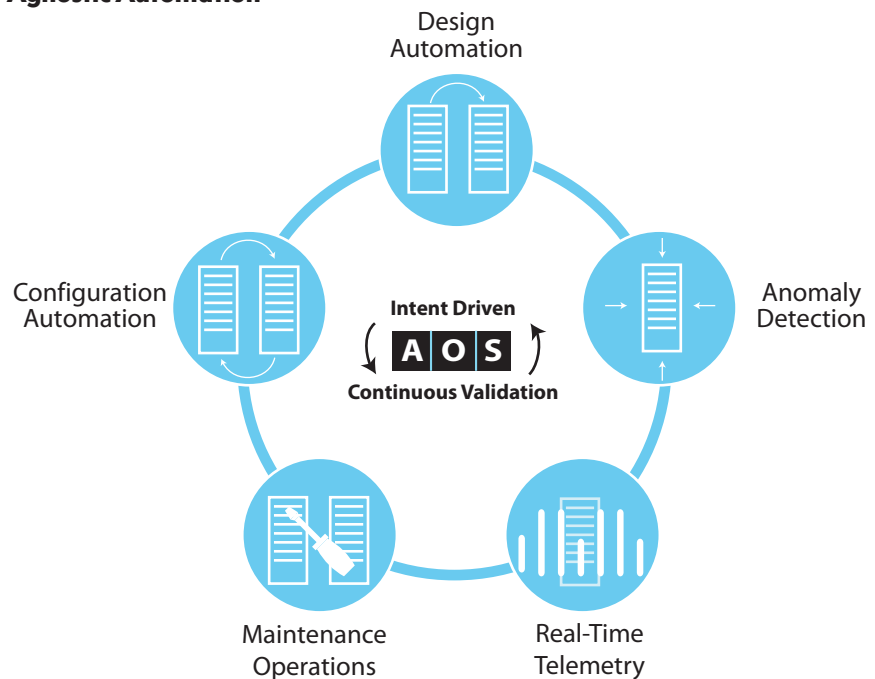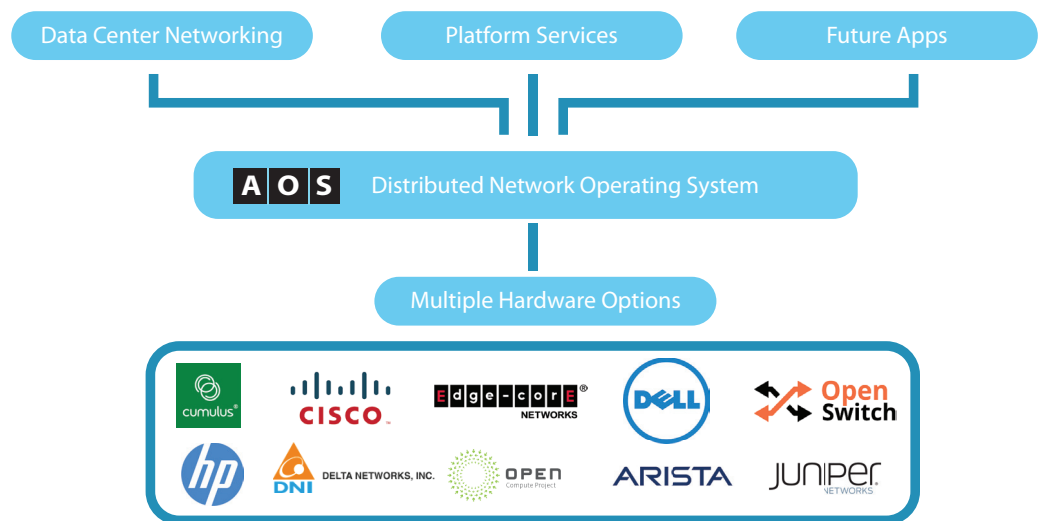

Apstra

Operational control and visibility: Apstra gathers real-time, high-resolution telemetry information. The telemetry facilitates intent-based anomaly detection, enabling data center operations to move to a more proactive management model. Also, the rich information enables the solution to continuously validate configurations and network topology.

Hardware-agnostic solution: The solution is the only hardware-agnostic data center management solution available today. A systems approach is taken in which network devices are treated as simple components with assigned roles. Apstra has all the necessary drivers for supported hardware and is able to gather telemetry information directly from the network devices. Supported hardware includes the following (Exhibit 4):

Arista	Edgecore Networks
Broadcom	HP
Cisco	Juniper
Cumulus	Linux
Dell	Open Compute Project
Delta Networks	OpenSwitch

Exhibit 4: Apstra Solution Overview

Apstra

Apstra's solution enables network operations to align better with the goals of the CIO and the business.

Community-based innovation: Apstra has opened up its platform and made it accessible to developers. The community of developers can add to the innovation by creating new templates and integrating into third-party systems, which creates drivers to other legacy network devices. Also, the telemetry and state streaming has been made available to analyze the data and gather insights that could not have been realized before. The power of the community can grow the value of the solution exponentially.

Apstra's solution is unique in the networking industry, and it enables network operations to align better with the goals of the CIO and the business. The vendor-agnostic, agile, intent-based platform can deliver on the vision of SDN without the associated risks.

This is a big undertaking, but Apstra benefits from its team's strong domain knowledge:

Mansour Karam, Apstra's CEO and co-founder, has spent the last 10 years focused on the business results the CIO wants and the agility the network engineer needs through his early roles at Arista, where he worked with the first customers to define the company's user requirements, and then at Big Switch Networks with its early attempts at SDN.

David Cheriton, the distributed systems expert, Google and VMware investor, and Arista and Granite Systems co-founder, understood the need for extensibility and has given the Apstra team a funding structure similar to Arista's and the ability to attract a top-notch engineering team.

Sasha Ratkovic, Apstra's CTO and co-founder, is an abstraction expert and a Distinguished Engineer from Juniper who was the first to present group policies to OpenStack back in 2012.

SECTION IV: CONCLUSION AND RECOMMENDATIONS

In the digital era, businesses must move quickly to remain competitive. Organizations have spent literally billions of dollars evolving the compute, storage and application platforms to increase the level of IT agility. However, the network has yet to evolve. SDN has made big promises, as it was supposed to enable companies to have a choice of network hardware and increase control and visibility while making the network operationally simpler.

However, this vision has yet to be realized, and many organizations have found the complexity level of software-defined networks to be significantly higher than that of running legacy networks. Apstra's platform enables businesses to evolve to a software-defined network by masking the complexity from the operations team. Using Apstra, organizations can manage the network in terms of business intent and be able to move with digital speed. ZK Research believes that IT and business leaders must make software-defined networks a top priority and therefore offers the following recommendations:

Deploy software-defined networks now. Each IT era brings with it new tools and processes. In the digital era, the network must become an agile resource—and software-defined networks are the key enabler of this transition. Organizations that don't embrace software-defined networks will quickly fall behind the competition, as the lag time between business decisions and technology changes will be too great.

Embrace multi-vendor networks. In the SDN era, network innovation will happen at a much faster rate than before. Locking the business into a single vendor may have worked in the past, but doing so will limit the company's ability to take advantage of new features from different vendors. It's important to have the flexibility to take advantage of low-cost white boxes, innovation from startups and the platforms of established vendors.

Shift to an intent-based operational model. Changes to data center infrastructure must be made through the lens of business requirements. An intent-based operational model combined with a system like Apstra can take into account business requirements and automate operations so the network can become a flexible, dynamic resource.

The Apstra team understands they can't address every use case on day one, but the company has a focused plan and has clearly designed AOS for the long term to address the network transformation.

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