



# The Apstra Operating System (AOS) Value Proposition

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## INTRODUCTION

In the past decade, enterprises have been frustrated with the lack of agility of their own IT infrastructures and, as a result, have opted to move some of their applications and assets to the public cloud. In doing so, they have chosen increased agility at the expense of relinquished control and increased, unpredictable costs.

More recently, in response to customer demand, network infrastructures have come a long way in transforming from vertically integrated to loosely coupled and horizontally architected. Network devices have become dramatically more “open” in the process, with Linux-based hardware operating systems, programmatic access to their configuration and capabilities, and high-resolution access to telemetry data. This loosely coupled architecture drives a shift in capabilities that offers the potential of dramatically increased agility as well as significantly reduced Total Cost of Ownership (TCO) through simpler operations and choice of hardware.

The Apstra Operating System (AOS) is built to help organizations realize this potential. AOS achieves this by:

1. Enabling agility through an intent-driven platform that empowers operators to rapidly convert their business intent into specific designs and blueprints
2. Avoiding outages through a state-driven platform that collects and reacts to telemetry in real-time, continuously validates that the infrastructure is performing as intended, and alerts the network engineers of any anomalies
3. Abstracting the specifics of the implementation and hardware from the high level intent, hence dramatically reducing TCO and increasing operational scalability through powerful automation and hardware choice

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## DELIVER INFRASTRUCTURE AGILITY

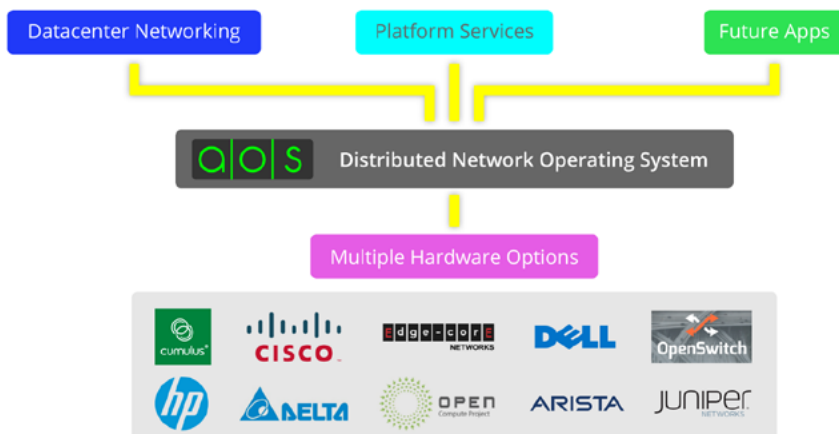
Enterprises need to expand their business and address new market opportunities. This requirement for business agility is constrained by the agility of the underlying infrastructure. Today, a significant portion of the time required to provision those resources is spent with the networking teams - in most cases, provisioning these resources takes weeks to months. Such network bottlenecks have a profound impact on an organization's ability to deliver new business services or roll-out new business applications, which, in turn, impacts their top line.

This lack of agility has been the primary reason why some organizations have moved some of their workloads to the cloud; simply put, it takes minutes to provision resources in the public cloud, a task that takes days, weeks, or months in a traditional enterprise IT environment. However, as more workloads are moved to the cloud, the cost of maintaining those resources increases dramatically over time, which has a significant effect on the bottom line. For some enterprises, moving to the public cloud is not possible because they cannot give up privacy, security, or control.

Ideally, customers should have the ability to build a private cloud that provides the agility they need, yet allows them to retain control of their workloads, while keeping CapEx and Operational costs to a minimum.

# AOS Solution Overview

Turnkey Capabilities Automating Delivery of Network Services  
Extensible Distributed Operating System  
Integrations with Multiple Hardware Options



The Apstra Operating System (AOS) allows network engineers to stand up new physical infrastructures or create a multi-tenant environment in minutes rather than days. AOS then enables those engineers to operate these infrastructures with full visibility, simplicity, and control. Irrespective of whether they're connecting bare metal servers, virtual machines, or containers, and regardless of whether they are using Openstack or vCenter, network engineers are now empowered to provision network resources dramatically faster and operate them dramatically more simply.

AOS is vendor agnostic, enabling enterprise customers to procure the networking devices that best meet their needs. The choice of hardware is thus completely separate from the choice of operational model. This helps the customer optimize their infrastructure to meet their needs or optimize TCO by leveraging the hardware, vendor, or hardware Operating System that best fits their needs.

Moreover, because AOS automates all aspects of designing, building, deploying, and operating network services, the time it takes to activate an L2 or L3 network is reduced from weeks to hours. Using AOS turn-key applications, network engineers can get their network services running in record time.

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## DAY 0

With the AOS Design Tools, network engineers can experiment with various designs, reference architectures, intent statements, or device architectures. The resulting templates can be shared with team members. Once they've settled on a template, AOS allows them to experiment with specific device models, cable maps, IP address allocations, or protocol settings.

## DAY 1

Once network engineers have settled on a specific build, they are able to create a blueprint and allocate specific IP addresses and other resources using the AOS resource management features. AOS resource management can be driven either through the AOS WebUI or the AOS RESTful APIs, hence allowing coordination with the enterprise's existing tools, such as their favorite IPAM systems.

Before deploying a blueprint on physical hardware, network engineers can deploy a blueprint to a simulated environment. AOS supports commonly used virtualized environments such as VirtualBox or vSphere. AOS also supports Cloud environments such as Ravello.

When the network team is ready to deploy a blueprint, they can use AOS generated cabling diagrams as applicable to stand up the hardware infrastructure. They then use AOS device management capabilities to get devices under AOS control. AOS Continuous Validation is initiated at that point, collecting high resolution, real-time telemetry and providing feedback to the network engineers. They can then proceed to use AOS to automatically deploy a blueprint to those devices.

## DAY 2+

From the point at which AOS deploys a blueprint to a production environment, the network operator uses AOS Operations capabilities to operate and maintain their networks. AOS will collect service-relevant telemetry in real time and generate alerts if there are any deviations that affect the network operator's intent, hence insuring the network continuously delivers on the user-specified business intent.

Network operators also use AOS Operations capabilities for future maintenance operations - device replacements, device upgrades, or to increase the size of the infrastructure network.

In summary, AOS empowers the the network team to:

1. Automate all aspects of Day 0 network design using AOS Design Tools
2. Automate Day 1 building and deploying networks using AOS Build and Deploy Tools
3. Day 2 and on, operate and maintain their networks through Continuous Validation using AOS Operations

## ELIMINATE INFRASTRUCTURE DOWNTIME

Industry analysis shows that enterprises average 1 to 2 outages a year. These outages result in millions of dollars in lost revenue and damage to corporate reputation. The consequences are even more devastating for large organizations.

When business services are down due to the network, the impact duration is longer, and the affected areas of the business are more widely impacted. When a server fails, workload orchestration techniques take the server out of service and business applications are rarely affected. The network, on the other hand, spans large portions of infrastructure and acts as the spinal tissue interconnecting all devices and other workloads. When the network fails, major business outages can occur.

To help with this critical problem, enterprises have invested in an ever increasing, disparate set of tools used to collect telemetry information from the network. Unfortunately, the stand-alone tools have proved to be cumbersome to networking professionals in various ways:

1. They collect telemetry for the purpose of collecting telemetry. The end user ends up with mountains of data without an effective ability to extract the right insight from this data.
2. They do not relate back to original intent; therefore, it is up to the network operator to correlate the telemetry data with intent and configuration data.
3. They often use outdated methodology in gathering the data. SNMP or show commands, as examples, fail to scale or provide information that is granular enough to be helpful.

AOS empowers networking professionals with a new approach through Continuous Validation features:

1. AOS collects real-time, expectation driven telemetry that relates to the network service AOS implements. Telemetry that is not pertinent to the network service is not collected.
2. AOS specifically watches in real time for any deviations between the network engineer's intent and the reality. For example, if a specific BGP session needs to be up, but is down, then AOS will detect the anomaly and generate an alert.
3. AOS continuously runs tests designed for the specific scenarios enumerated in user intent that describe the user's expectation from the service.

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AOS's intent-driven Continuous Validation virtually eliminates outages across the AOS managed infrastructure. Thus, the network team can ensure their network infrastructure is always ready for business.

## ENABLE INFRASTRUCTURE OPERATIONAL SCALABILITY

AOS empowers network engineers and operators to focus on the tasks that are of the highest value to the business. Instead of writing configurations from scratch, they describe high level business intents and review/adjust generated configurations as needed. Instead of running show commands on various platforms, they get alerts that specifically point out the issues that are preventing their infrastructure to work as expected.

Without AOS, network engineers are required to learn the command lines, philosophy, or APIs that pertain to a new vendor platform before they are able to build and operate an infrastructure that uses this new platform. With AOS, they are able to get their infrastructure up and ready for business first, then learn about the new platform, if they are so interested.

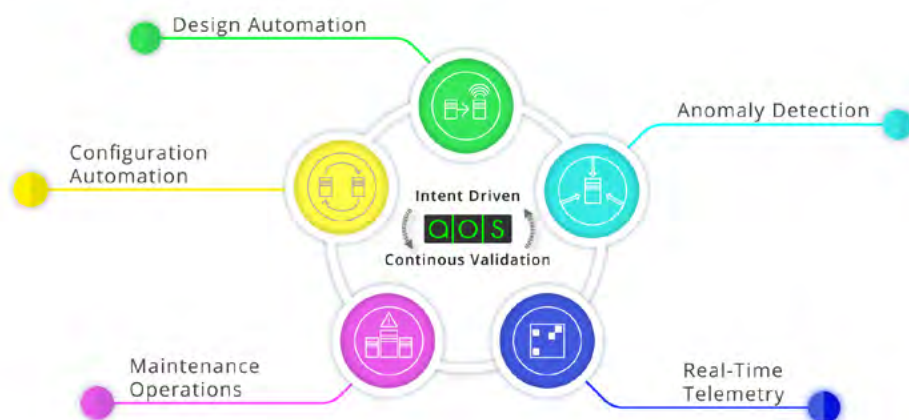
In addition, AOS decouples operations from the choice of hardware. This means that network engineers are able to choose the device vendor, model, type, and operating system that works best for their business without the risk of lock-in. They can adapt a hardware vendor agnostic model that is critical to keeping their private cloud's TCO under control, while utilizing the best hardware for their needs.

As a result of these two factors, AOS can easily increase operational scalability and improve TCO by an order of magnitude.

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## Continuous Validation

A New Integrated Approach for Vendor-Agnostic Network Automation





## CONCLUSION

The lack of proper tooling has compelled enterprises to move some of their applications and assets to the public cloud, choosing increased agility at the expense of relinquished control and increased, unpredictable costs.

The Apstra Operating System (AOS) changes the game by enabling enterprises to take advantage of the latest advances in networking and build agile and cost effective network infrastructures in support of their private clouds.

In summary, AOS is the ideal foundation for enterprises interested in building private clouds to support their business needs. For more information, please contact [sales@apstra.com](mailto:sales@apstra.com).