

The Total Economic Impact™ Of Juniper Apstra

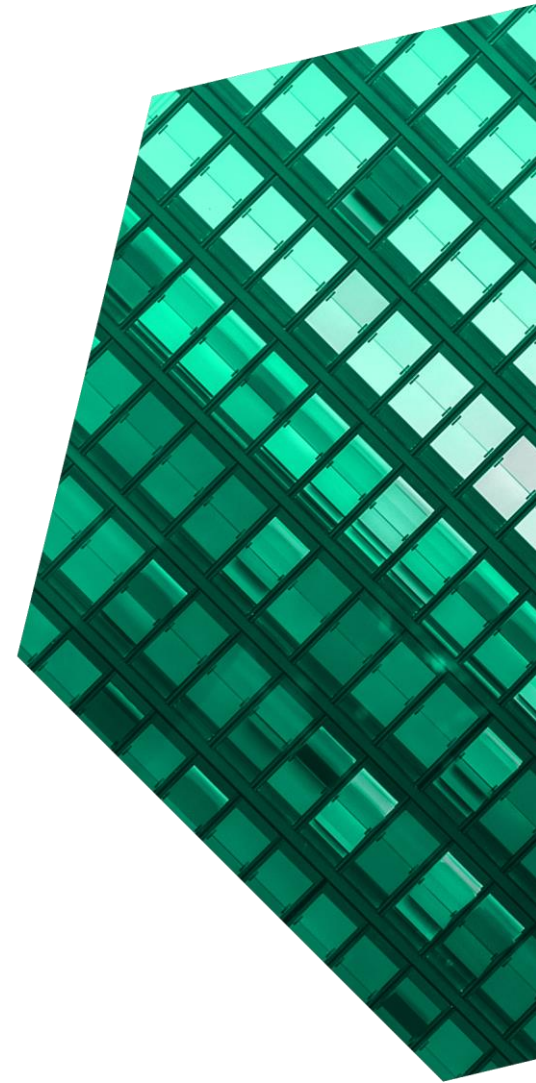
Cost Savings And Business Benefits
Enabled By Apstra

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Executive Summary

Juniper Apstra is a software platform that helps companies automate and validate the design, deployment, and operation of data centers. It supports multivendor data centers, providing a unified source for analytics and root-cause problem identification and rectification. Users of the solution speak of favorable outcomes like data center planning cost reductions, implementation and operations cost savings, and existing tools replacement cost savings.

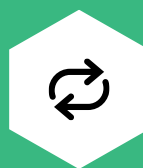
Juniper Apstra enables enterprises, cloud service providers, and communication service providers to proactively automate the design, deployment, and operation of data center networks. The solution is low-code and efficient in managing multivendor environments from a centralized application. The solution gives network teams a tool with which to simplify all stages of the data center service lifecycle, reducing configuration errors and ensuring network reliability and security.

Juniper commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential return on investment (ROI) organizations may realize by deploying Apstra.¹ The purpose of this study is to provide readers with a framework to evaluate the potential financial impact of Apstra on their organizations.

To better understand the benefits, costs, and risks associated with this investment, Forrester interviewed four decision-makers with experience using Juniper Apstra. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization.

Interviewees said that prior to using Apstra, their organizations struggled with inefficient design processes; code-intensive and expensive manual configuration tasks; and labor-intensive network failure tracking and maintenance activities. These challenges were costly, leaving them with data center

KEY STATISTICS



Return on investment (ROI)
320%



Net present value (NPV)
\$725K

**Three years analysis*

networks that couldn't easily scale to support changing business requirements.

With Apstra, the interviewees' organizations gained a centralized platform that efficiently managed a multivendor data center network at scale without being limited by any vendor's proprietary device requirements. Key results from the investment include day zero, day one, and day two+ cost savings; tools replacement cost savings; faster time-to-market; easier scalability of networks; and standardized network configurations.

KEY FINDINGS

Quantified benefits. Risk-adjusted present value (PV) quantified benefits include:

- **Day zero: Design cost savings.** The solution reduces requirement scoping and design time by 60%. With Apstra, the composite organization reduces the number of FTE hours used for design and preparation of data center networks. Using templates and building blocks within the

solution reduces requirements' scoping and design time, saving more than \$73,000.

- **Day one: Deployment cost savings. The solution reduces implementation time from 24 hours to 2 hours per device.** Apstra significantly reduces the FTE hours needed for the composite organization's day one activities. The intuitive graphical user interface (GUI) of the solution makes it easier and faster to configure switches, test deployment scenarios, and create operations documentation. It also reduces the time needed to validate and ensure that cabling is done right. Apstra reduces implementation time from about 24 hours to 2 hours per device, saving more than \$72,000.
- **Day two+: Data center operations savings. The solution reduces FTE hours needed by 60%.** The composite organization experiences

significant savings from using Apstra to manage ongoing data center operations. The Apstra solution eliminates many manual processes and provides a single source of truth for network visibility. The software automates and validates both the data center network architecture and its operation. Leveraging these attributes helps the composite organization save over \$448,000 from data center operations costs.

- **Tools replacement cost savings of over \$358,000.** Apstra replaces the composite organization's legacy tools that are used for tasks such as network monitoring, failure detection, or maintenance. On average, Apstra replaces two legacy tools and is more expansive in its functionality.

Some of the biggest benefits are the amount of time and cost savings associated with day zero and day one tasks, how much faster that can happen while doing it with less resources. The other benefit is the ongoing sustainability of the network because people are making changes on the controller and the controller is the one pushing the configuration. It has allowed us to have a much more standard configuration across the board.

— Data center systems architect, energy

Unquantified benefits. Benefits that are not specifically quantified for this study include:

- **Multivendor management.** Interviewees spoke of Apstra's ability to help their organizations manage different vendor devices within their data center networks. This eliminated the need to completely replace devices within the network fabrics as they scaled. It lowered training and personnel costs, and helped data center operators gain bargaining power in vendor negotiations.
- **Faster time-to-market.** Interviewees told Forrester that using Apstra allowed them to increase how fast they could stand up a new data center or scale an existing one by about 50%. Apstra comes out of the box already equipped with templates and building blocks that can be easily adapted to various data center networking needs. The network automation features within it simplified processes across all stages of a data center services' lifecycle.
- **Scalability of the data center network.** Using Apstra enabled the interviewees' organizations to scale their data center networks easily by taking advantage of the extensibility of spine/leaf topographies and manageability of a centralized controller.
- **Configuration consistency and standardization across all data centers.** Interviewees applauded the ease of configuration standardization. Since a single configuration can be pushed from a central controller (the Apstra solution) to all selected multivendor devices, the solution makes it easier to retain the same configuration and push it out to each new device when needed.
- **Operating system (OS) management and upgrading.** With the Apstra solution, interviewees' organizations upgraded operating systems for multiple devices simultaneously. The

solution automatically validated OS upgrades to ensure they were supported and then pushed out the same files to all intended devices

Costs. Risk-adjusted PV costs include:

- **Juniper Apstra license cost of \$201,000 over three years.** This includes the Apstra solution license fees Juniper provided for the composite organization.
- **Proof of concept (POC) and training cost of \$25,500 over three years.** This is the cost the composite organization incurs internally. It covers the costs of investigating the suitability of Apstra and the training of employees on how to adopt and use it.

The decision-maker interviews and financial analysis found that a composite organization experiences benefits of \$952,000 over three years versus costs of \$227,000, adding up to a net present value (NPV) of \$725,000 and an ROI of 320%.



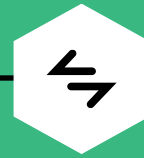
ROI
320%



BENEFITS PV
\$952K

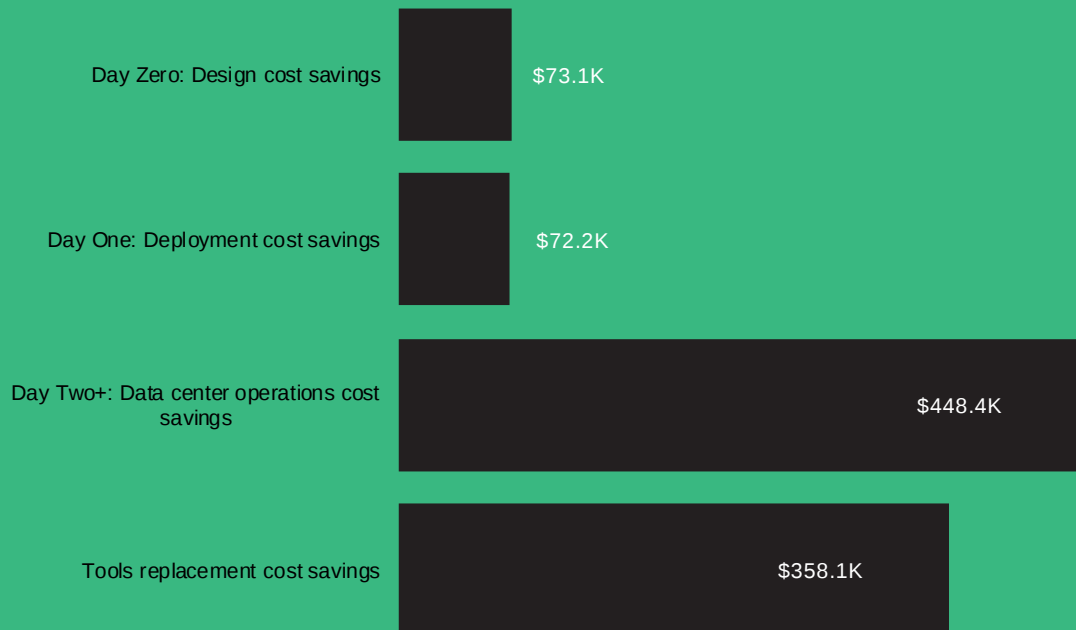


NPV
\$725K



PAYBACK
<6 months

Benefits (Three-Year)



TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in the Apstra solution.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that the Apstra solution can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Juniper and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the study to determine the appropriateness of an investment in Apstra.

Juniper reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

Juniper provided the customer names for the interviews but did not participate in the interviews.



DUE DILIGENCE

Interviewed Juniper stakeholders and Forrester analysts to gather data relative to the Apstra solution.



DECISION-MAKER INTERVIEWS

Interviewed four decision-makers at organizations using the Apstra solution to obtain data with respect to costs, benefits, and risks.



COMPOSITE ORGANIZATION

Designed a composite organization based on characteristics of the interviewees' organizations.



FINANCIAL MODEL FRAMEWORK

Constructed a financial model representative of the interviews using the TEI methodology and risk-adjusted the financial model based on issues and concerns of the decision-makers.



CASE STUDY

Employed four fundamental elements of TEI in modeling the investment impact: benefits, costs, flexibility, and risks. Given the increasing sophistication of ROI analyses related to IT investments, Forrester's TEI methodology provides a complete picture of the total economic impact of purchase decisions. Please see Appendix A for additional information on the TEI methodology.

The Juniper Apstra Customer Journey

■ Drivers leading to the Apstra solution investment

Interviews			
Interviewee	Industry	Region	Major data centers
Networking engineer	Financial services	USA	2
Principal data center engineer	Hosting and management services	Europe	4
Global head of security engineering	Risk, insurance, and consulting	Global	6
Data center systems architect	Energy	Global	13

KEY CHALLENGES

Interviewees told Forrester about the importance of a multivendor networking solution and scalable data center network fabrics for their organizations. To solve these issues, some started out using internal manual processes, while others depended on the solutions provided by individual device vendors.

The interviewees noted how their organizations struggled with common challenges, including:

- **Configuration inconsistency within data center network devices.** Interviewees said using manual process led to inconsistency in how individual devices were configured depending on the employees who did it. This caused challenges for other IT teams as they faced diverse configurations while performing their tasks. The inconsistency affected reliability, which in turn affected speed in getting things done. A data center systems architect for an energy organization said: “We struggled with configuration consistency in our environment. A lot of times, people would configure certain things differently on different switches. On one part of the data center, somebody has configured different things on a port or on a switch and then you go to another switch and it’s not there. It always made supporting the devices harder.”
- **Complicated, code-intensive networking solutions.** Interviewees told Forrester that vendor solutions or other third-party solutions were complicated and needed specialized skills to operate. A principal data center engineer for a hosting and management services organization explained: “Our old solution did basically the same thing that Apstra does. It was a fabric controller. The problem was that it was massive. First, the controller itself required a lot of resources. The other thing was that it was too complicated. It went so deep into the details that for plain engineers, it was not needed.”
- **Inefficiencies in running multiple vendor devices within a data center network.** Interviewees also expressed concerns about being limited by device vendors. They couldn’t operate multiple vendor devices efficiently with their formal tools, limiting their ability to leverage vendor specific benefits within their data center networks. A global head of security engineering at a risk, insurance, and consulting organization said: “Being able to support multivendor devices was a very important part for me. It’s difficult to have engineers that know how to do everything; they are generally specialized, especially in the networking space. Having to support multiple

vendors required different people that you had to train or hire, and we didn't really want to do either of those things. Both of those were expensive. So, the goal was to come up with a way to support a multivendor environment and how to automate it in a way that's going to allow us to be much more flexible."

- **Slow speed-to-market.** Interviewees also talked about how long it took to either set up a new data center or to scale an existing one. This caused challenges for their core business delivery. A global head of security at a risk, insurance, and consulting organization elaborated: "We wanted to deliver things more quickly for the business. That was the pain point and we wanted to improve at that. We wanted the network to be always available and we wanted to deliver new services much more quickly."

SOLUTION REQUIREMENTS

The interviewees' organizations searched for a solution that could:

- Replicate and maintain consistency in the configuration of similar devices within the entire data center network.
- Be low-code and easier for junior staff to operate.
- Support a multivendor environment without requiring siloed skill sets.
- Provide templates or building blocks that speed up design, implementation, and deployment of data centers.

COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and a ROI analysis that illustrates the areas financially affected. The composite organization is representative of the four decision-makers that Forrester interviewed and

is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

Description of composite. The composite organization is a business-to-consumer services company. It has a strong brand with global operations, \$3 billion in annual revenue, and 7,500 employees. It has two major production data centers: one in North America and one in Europe

Deployment characteristics. The composite organization operates standard five-stage spine/leaf design data centers. Each data center has six spine switches and 24 leaf switches in total.

The underlying components of each data center are two super spines connecting two pods with two spines and 12 leaf switches (10 leaves and two border leaves) in each pod. These characteristics differ over three years:

- **Year 1:** The composite organization designs and implements one data center. Two FTEs operate this data center.
- **Year 2:** The composite organization designs and implements an additional data center. Four FTEs operate both data centers.
- **Year 3:** The composite organization continues operating the two data centers. Four FTEs operate both data centers.

Key assumptions

- **\$3 billion in revenue**
- **7,500 employees**
- **Operates two major data centers**
- **Standard five-stage spine/leaf design**

Analysis Of Benefits

■ Quantified benefit data as applied to the composite

Total Benefits						
Ref.	Benefit	Year 1	Year 2	Year 3	Total	Present Value
Atr	Day zero: Design and planning cost savings	\$42,120	\$42,120	\$0	\$84,240	\$73,101
Btr	Day one: Deployment cost savings	\$41,580	\$41,580	\$0	\$83,160	\$72,164
Ctr	Day two+: Data center operations cost savings	\$110,323	\$220,646	\$220,646	\$551,616	\$448,421
Dtr	Tools replacement cost savings	\$144,000	\$144,000	\$144,000	\$432,000	\$358,107
Total benefits (risk-adjusted)		\$338,023	\$448,346	\$364,646	\$1,151,016	\$951,793

DAY ZERO: DESIGN AND PLANNING COST SAVINGS

Evidence and data. Interviewees said that after deploying Apstra, they witnessed productivity improvements in the FTEs used. This was seen in day zero savings through fewer FTE hours used for preparation and design tasks.

- A data center systems architect at an energy company said: “For day zero or any sort of preconfiguration, Apstra significantly reduced the amount of effort because everything is templated and you are just selecting from different options. You don’t have to generate these. I remember in the old setup, we had to create all our own template configurations. They were just files that people had saved with all the configurations that you would copy and paste into every device where you would change things like hostnames, management internet protocols (IPs), etc. But there was a lot of time that went into prepping that. With Apstra, I would say it’s one-eighth of the time required to do that.”
- To reiterate the impact of using Apstra, a global head of security engineering at a risk, insurance, and consulting company said: “Design time was

definitely less, something like three months down from six. Again, there was still upfront work to do. You still had to define all your templates and blueprints and build those with Apstra. But it was definitely simpler and more formulaic, more programmatic, and then the actual deployment was much simpler.”

Modeling and assumptions. This benefit represents the FTE resources needed to perform day zero tasks for a standard five-stage spine/leaf design. Forrester assumes the following:

- Performing day zero tasks for one data center takes six months for one senior engineer.
- Using the Apstra solution saves 60% of FTE hours from using manual processes.
- Day zero tasks are only done for two years when a new data center is designed and deployed.
- A fully burdened hourly pay rate for a senior engineer is \$75.

Risks. The decision-makers interviewed for this study came from diverse industries, economic zones, and data center sizes and designs. This injected numerous risks in the modeling of this benefit, including the following:

- The average hourly pay rate for senior engineers varies across economic/geographical zones.
- Individual organizations need different layouts, designs, and data center sizes depending on industry needs.
- The skill sets of design engineers differ between individual organizations.

- Business needs differ and determine how many FTEs are deployed to facilitate the speed of designing a new data center.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$73,000.

Day Zero: Design And Planning Cost Savings

Ref.	Metric	Source	Year 1	Year 2	Year 3
A1	FTE hours using manual processes (6 months with 1 FTE senior engineer)	Interviews	1,040	1,040	0
A2	FTE hours using Apstra (40% of manual process)	Interviews	416	416	0
A3	FTE hours saved (60% of manual process)	A1-A2	624	624	0
A4	Number of data centers prepared	Assumption	1	1	0
A5	Average hourly pay rate for a senior engineer	Assumption	\$75	\$75	\$75
At	Day zero: Design and planning cost savings	A3*A4*A5	\$46,800	\$46,800	\$0
	Risk adjustment	↓10%			
Atr	Day zero: Design and planning cost savings (risk-adjusted)		\$42,120	\$42,120	\$0
Three-year total: \$84,240			Three-year present value: \$73,101		

DAY ONE: DEPLOYMENT COST SAVINGS

Evidence and data. Interviewees told Forrester that implementation tasks were labor intensive before they deployed Apstra. Configurations were manual and not consistent depending on the number of employees working on the network.

- To explain the difference his organization observed, a data center systems architect at an energy company said: “We used to log into each individual switch and then make the configuration changes. With Apstra, you just do it centrally in the GUI and then it knows that it has to push that config to other switches. It will just do that automatically.”

- A principal data center engineer at a hosting and management services company explained another situation where Apstra helped save FTE hours during implementation. This interviewee focused on how much easier it was to lay the cabling within the fabric without having to test them individually. The principal data center engineer explained: “Initially when you’re putting all the cabling together in the fabric, you can just put it reasonably wherever you need. Basically, the order isn’t that big of a deal. You can put it wherever and Apstra calculates the topology for you. It provisions it based on that cabling and how you did it logically. So, if you wanted to put a

cable in port 20, but somebody put it in port 64, that's okay, it's going to work."

Modeling and assumptions. This benefit uses the average amount of time used to configure, provision, test, and validate a switch using manual processes versus using the Apstra solution. Forrester assumes the following:

- The baseline average time needed per switch is 24 hours.
- The Apstra solution cuts this baseline time to less than 2 hours.
- Mid-level engineers perform the implementation tasks.
- The fully burdened hourly rate for a mid-level network FTE is \$70.

Risks. The decision-makers interviewed for this study came from diverse industries, economic zones, and data center sizes and designs. This injected numerous risks in the modeling of this benefit, including the following:

- The skill sets of FTEs doing the implementations differ between individual organizations.

"It took considerable time to provision a network before Apstra came along because each switch and build was configured separately. We tried to do templating as best as we could, but there was a lot of configuration drifting and other kinds of stuff going on as well." *Networking engineer, financial services*

- The number of different vendor devices within each organization's network and how fast they can download and validate configurations.
- The complexity of the design and the layers of spin/leaf devices.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of \$72,000.

Day One: Deployment Cost Savings

Ref.	Metric	Source	Year 1	Year 2	Year 3
B1	Deployment FTE hours per switch using manual processes	Interviews	24	24	0
B2	Deployment FTE hours per switch using Apstra	Interviews	2	2	0
B3	FTE hours saved	B1-B2	22	22	0
B4	Number of switches provisioned	Composite	30	30	0
B5	Average hourly pay rate for a mid-level network FTE	Assumption	\$70	\$70	\$70
Bt	Day one: Deployment cost savings	B3*B4*B5	\$46,200	\$46,200	\$0
	Risk adjustment	↓10%			
Btr	Day one: Deployment cost savings (risk-adjusted)		\$41,580	\$41,580	\$0
Three-year total: \$83,160			Three-year present value: \$72,164		

DAY TWO+: DATA CENTER OPERATIONS COST SAVINGS

Evidence and data. Day-to-day operations and maintenance of data centers is where most interviewees told Forrester their organizations saw significant cost savings. In the past, they hired senior-level engineers to ensure smooth operations, but with the Apstra solution, they can delegate many tasks to junior-level technicians. Beyond direct cost savings, this adds the benefit of freeing up senior-level resources from day-to-day operations so that they can work on higher-value projects to improve the business.

- A principal data center engineer at a hosting company explained: “In the old days, you had to take into consideration the knowledge of the network engineers. Not all of them had a knowledge of different vendor devices. Now what they need to know is how to click and read the commands. That’s it from the operations angle basically. We don’t need to ask a network engineer to have previous experience with each device type. It’s nice to have, but it’s not mandatory anymore because all they’re doing is clicking.”
- The global head of security engineering at a risk, insurance, and consulting company also emphasized how much the Apstra solution helped in this area. The interviewee said: “We’re able to have automated workflows without having the very specialized resources required for network automation. Our engineers can work in this platform and automate a lot of stuff instead of having to learn how to do a Python script, which is a more difficult skill to find in the networking community. It’s helping us get more of what we want with the resources we have as opposed to

having to go recruit, especially with limited resources.”

Modeling and assumptions. This benefit looks at the FTE hours needed to operate an average data center. Those FTEs are then scaled to accommodate for the size of the composite organization’s data center characteristics. Forrester assumes the following:

- The composite organization deploys one data center in Year 1 and an additional one in Year 2.
- Two FTEs support each data center’s operations effectively.
- Junior-level engineers handle operations tasks effectively.
- The average hourly fully burdened rate for a junior engineer is \$52.

Risks. Interviewees explained that their data centers were at various stages of equipment and devices lifecycles. Operations work tickets occurred for a wide variety of reasons depending on the size, complexity, and age of these data centers. These factors introduced risk to the realization of this benefit including the following:

- The quality and design of the original data center influences how much daily maintenance is needed.
- The skill sets of operations engineers differ between organizations and operational regions.
- The complexity of individual data centers.
- Configuration consistency on the devices within the data centers.
- Differences in the pay rate of operations FTEs within organizations.

Results. To account for these risks, Forrester adjusted this benefit downward by 15%, yielding a three-year, risk-adjusted total PV of \$448,000.

Day Two+: Data Center Operations Cost Savings					
Ref.	Metric	Source	Year 1	Year 2	Year 3
C1	Average FTE hours used to operate a data center annually without Apstra	Interviews	4,160	4,160	4,160
C2	Average FTE hours used to operate a data center annually with Apstra	C1*40%	1,664	1,664	1,664
C3	FTE hours saved per data center	C1-C2	2,496	2,496	2,496
C4	Percentage of manual FTE hours saved per data center	Composite	60%	60%	60%
C5	Number of data centers serviced	Interviews	1	2	2
C6	Average hourly pay rate for a junior engineer	Assumption	\$52	\$52	\$52
Ct	Day two+: Data center operations cost savings	C4*C5*C6	\$129,792	\$259,584	\$259,584
	Risk adjustment	↓15%			
Ctr	Day two+: Data center operations cost savings (risk-adjusted)		\$110,323	\$220,646	\$220,646
Three-year total: \$551,616			Three-year present value: \$448,421		

TOOLS REPLACEMENT COST SAVINGS

Evidence and data. Deploying the Apstra solution replaced some tools that interviewees' organizations used previously. Many used manual processes, depending on the data center lifecycle, and third-party tools for network monitoring, software updating tasks, and network disruptions troubleshooting.

The global head of security engineering at a risk, insurance, and consulting organization explained: "We had some homegrown automation tools. Basically, we developed our own as required. We used some open-source tools and different modules, but they were all costly in man hours. Apstra helps with the big stuff — the automation, the configuration consistency, troubleshooting, and the ability to keep the network up and running."

Modeling and assumptions. Forrester considered the average number of tools that the interviewees'

organizations used across all the stages of their data centers' lifecycle. Forrester assumes the following:

- The size of the data center.
- The number of different vendor devices possible in a data center of this size.
- Complexity of the design and the use case of the data center.
- The composite organization completely replaces two tools with Apstra.
- The average license cost for each tool replaced is \$80,000 per year.

Risks. The interviewees provided diverse explanations for the number of tools that the Apstra solution replaced in their environments. This diversity injected numerous risks in the modeling of this benefit, including the following:

- The size and complexity of a data center will affect the number of legacy tools used and whether the Apstra solution can replace them.
- The length of contracts with legacy tools and how fast they can be phased out of the environments.
- Other uses for the legacy tools, and whether they support other business use cases that the Apstra solution does not.

- The lifecycle stage of an individual organization's data center network and whether it has legacy assets and devices that the Apstra solution doesn't support.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a three-year, risk-adjusted total PV of \$358,000.

Tools Replacement Cost Savings					
Ref.	Metric	Source	Year 1	Year 2	Year 3
D1	Average number of tools used before Apstra	Interviews	2	2	2
D2	Average annual license cost per tool	Interviews	\$80,000	\$80,000	\$80,000
Dt	Tools replacement cost savings	D1*D2	\$160,000	\$160,000	\$160,000
	Risk adjustment	↓10%			
Dtr	Tools replacement cost savings (risk-adjusted)		\$144,000	\$144,000	\$144,000
Three-year total: \$432,000			Three-year present value: \$358,107		

UNQUANTIFIED BENEFITS

Additional benefits that customers experienced but were not able to quantify include:

- **Multivendor management.** Interviewees spoke of Apstra's ability to help their organizations manage different vendor devices within their data center networks. This eliminated the need to completely replace devices within network fabrics as they scaled. A principal data center engineer at a hosting and management services company explained: "I would buy Apstra over and over again before other products, just because I have multiple options here. Nobody wants to be vendor locked. Especially larger data center operators, nobody wants to get locked by the vendor and then be charged over and over again for support and everything else. I'm going to go with Juniper because I'm going to get a better deal from Juniper this year. Maybe next year, I'm going to

get a better deal from someone else. Who knows? My fabric is all the same. The intrusion prevention system (IPS), the maintenance, everything is the same from my perspective." Since Apstra can support a multivendor environment, it lowered training and personnel costs and helped data center operators gain bargaining power in vendor negotiations.

- **Faster time-to-market.** Interviewees told Forrester that using Apstra helped them improve how fast they can stand up new data centers or scale existing ones by about 50%. A data center systems architect at an energy company said: "What used to take us more resources and more time, we're able to do now with less resources and less time. We have three dedicated engineers and they spent six months doing the prep and three months doing deployment tasks.

Now, we're able to reduce that significantly. What used to take us three people, we can do with one and what used to take six months, we can do in three. It's definitely less people and less time. But for us, most of the benefit has been the design and the deployment of the network faster."

- Scalability of the data center network.** Another important benefit interviewees told Forrester was the ability to scale the data center network faster, easier, and cheaper. The global head of security engineering for a risk, insurance, and consulting organization explained: "Scaling was another big selling point. We are constantly adding capacity, and this makes it very easy to add new pods. It used to be a lot of configuration work and different teams. Now, we're hoping to make it just a standard operational practice and reduce engineering requirements significantly. Maybe a day or two of work instead of a couple of weeks, and then reduce the actual deployment to a week or two as opposed to six to eight."
- Configuration consistency and standardization across all data centers.** Interviewees also talked about the overall benefit of having consistent configurations across all data centers in a network. Interviewees emphasized how this has benefited their organizations since data centers used to be siloed and the technicians couldn't efficiently operate across organizations' networks. A data center systems architect at an energy firm explained: "Even though we had a standard, we never had a way to enforce that the standard was configured across the board in that manner. Using a tool like Apstra with a centralized controller that pushes very standardized configurations, there is little chance for somebody to mess that up or to put in their own take on it. That was one reason to adopt Apstra. Just to have that standard configuration across the board."

- OS management and upgrading.** Interviewees described the ease with which they updated operating systems since it used to be tedious and time-consuming. A data center systems architect at an energy organization complained, "From an operational perspective, we spent a lot of time doing OS upgrades before adopting Apstra." This interviewee explained that the task became easier when working from a centralized platform with Apstra.

Another interviewee expressed this benefit a little differently. A network engineer at a financial services company said: "In our old environment, you had to log in to every switch, push the new OS upgrade to it, install it, and then schedule a reboot, and hope that everything came back. With Apstra, you tell it the OS you want and Apstra tells you if they support that version or not. So, you just follow the steps like you would normally do off any recommended OS from any vendor, when you load it in there. Apstra does a validation against that configuration as well, that way you know that your configuration is going to work with that version. You basically upload it to Apstra, check the devices that you want to upgrade, and it pushes it to them."

FLEXIBILITY

The value of flexibility is unique to each customer. There are multiple scenarios in which a customer might implement Apstra and later realize additional uses and business opportunities, including:

- **Adapting a data center network to meet changing business needs.** One of the biggest flexibility values interviewees noted was the ability to adapt their organizations' networks with Apstra. A data center engineer at a financial services organization said: "Within Apstra, the way you configure things is rack-based. You can just clone the rack, tell it what server is on what port, what kind of connectivity you have, and then you're done. Let's say there was an acquisition: On our spine switches, we can add enough to triple the size of the data center we had before. We can easily add another leaf or switch pair if we needed to, and there are different kinds of things that we can very quickly do that would have taken a long time before. I think expanding and contracting is much easier from that point of view."
- **Leveraging unique features from various vendors.** Interviewees also talked about a value in the flexibility of not having their networks tethered to a single vendor. They said that, as business needs change, different vendor devices may be better suited to serve their needs. Having a platform like Apstra ensures that they can pivot quickly if a particular vendor is not meeting current business needs. The global head of security engineering at a risk, insurance, and consulting organization said: "I think it's their vision that sold me on the product from the very beginning. Most products out there are proprietary, right? You can buy any system out there and they are going to be proprietary for the platform itself. We were looking for something multivendor. We wanted to make sure that we have flexibility. Like I said, it's all about being able to deliver more quickly for the business."

Flexibility would also be quantified when evaluated as part of a specific project (described in more detail in [Appendix A](#)).

Analysis Of Costs

■ Quantified cost data as applied to the composite

Total Costs							
Ref.	Costs	Initial	Year 1	Year 2	Year 3	Total	Present Value
Etr	Juniper Apstra license costs	\$0	\$49,500	\$99,000	\$99,000	\$247,500	\$201,198
Ftr	POC and training costs	\$10,718	\$8,395	\$8,554	\$0	\$27,667	\$25,419
	Total costs (risk-adjusted)	\$10,718	\$57,895	\$107,554	\$99,000	\$275,167	\$226,617

JUNIPER APSTRA LICENSE COSTS

Evidence and data. Interviewees told Forrester that Apstra is priced per device supported

Interviewees provided average design layouts and Juniper priced the devices depending on the layer occupied.

Modeling and assumptions. The composite organization's data center fabric is developed from an aggregation of characteristics gathered from interviewees. Forrester made the following assumptions:

- The composite organization designs and deploys one data center per year for the first two years of the model.
- Only one data center fabric is licensed for Year 1 and two for Years 2 and 3.
- The data centers only have two device layers for pricing: one spine layer and one leaf layer.

Risks. Interviewees' organizations face diverse business needs and have different data center characteristics. Some operate greenfield data centers, while others have brownfield data centers or hybrid environments within their data center networks. This diversity injected numerous risks in the modeling of this cost, including the following:

- The type of legacy devices within the data center network and whether they can be supported.
- The size and layout of the data center fabric.
- The business decision within individual organizations about greenfield, brownfield, or hybrid data center networks.

Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$201,000.

Juniper Apstra License Costs						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
E1	Number of spine devices	Composite		6	12	12
E2	Number of leaf devices	Composite		24	48	48
E3	Annual license per spine device	Juniper		\$1,500	\$1,500	\$1,500
E4	Annual license per leaf device	Juniper		\$1,500	\$1,500	\$1,500
Et	Juniper Apstra license costs	$(E1 \cdot E3) + (E2 \cdot E4)$	\$0	\$45,000	\$90,000	\$90,000
	Risk adjustment	↑10%				
Etr	Juniper Apstra license costs (risk-adjusted)		\$0	\$49,500	\$99,000	\$99,000
Three-year total: \$247,500			Three-year present value: \$201,198			

POC AND TRAINING COSTS

Evidence and data. Interviewees told Forrester that their organizations incurred costs related to POC and training of employees on how to use the Apstra solution. Interviewees provided the average number of employees used in POC and training, and the average fully burdened hourly pay rates.

Modeling and assumptions. POC and training costs are aggregated from datapoints the interviewees provided. Forrester made the following assumptions

- Two senior engineers spend 40 hours each exploring and learning about the features of Apstra and whether a switch to the solution positively impacts the composite organization.
- To accommodate for attrition, the composite organization trains 50% more FTEs than it needs to operate each data center.
- Senior engineers are used for POC, testing, and deployment of Apstra, while lower-level employees are trained to operate the solution.

Risks. Interviewees' organizations face diverse business needs and have different data center characteristics. Some operate greenfield data centers, while others have brownfield data centers or hybrid environments within their data center networks. This diversity injected numerous risks in the modeling of this cost, including the following:

- The skill set of the FTEs used in each organization.
- The complexity, size, and layout of the organization's data center fabrics.
- FTE pay rates for individual organizations.
- Industry and compliance requirements that can influence the level of FTEs used

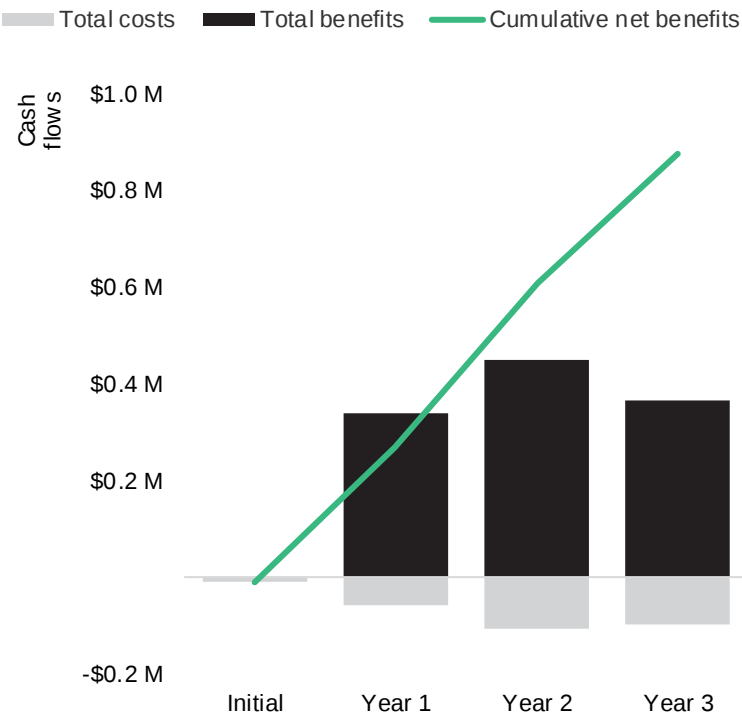
Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a three-year, risk-adjusted total PV (discounted at 10%) of \$25,000.

POC And Training Costs						
Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3
F1	Number of FTEs — POC (senior engineers)	Interviews	2			
F2	Number of hours	Interviews	40			
F3	Average hourly pay rate for senior engineers	Assumption	\$75			
F4	Number of FTEs trained — operations (operation admins)	Interviews	3	6	6	
F5	Number of hours	Interviews	24	24	24	
F6	Average hourly pay rate for operation admins	Assumption	\$52	\$53	\$54	
Ft	POC and training costs	$F1 \cdot F2 \cdot F3 + F4 \cdot F5 \cdot F6$	\$9,744	\$7,632	\$7,776	\$0
	Risk adjustment	↑10%				
Ftr	POC and training costs (risk-adjusted)		\$10,718	\$8,395	\$8,554	\$0
Three-year total: \$27,667			Three-year present value: \$25,419			

Financial Summary

CONSOLIDATED THREE-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Analysis (Risk-Adjusted Estimates)						
	Initial	Year 1	Year 2	Year 3	Total	Present Value
Total costs	(\$10,718)	(\$57,895)	(\$107,554)	(\$99,000)	(\$275,167)	(\$226,617)
Total benefits	\$0	\$338,023	\$448,346	\$364,646	\$1,151,016	\$951,793
Net benefits	(\$10,718)	\$280,128	\$340,793	\$265,646	\$875,849	\$725,176
ROI						320%
Payback						<6 months

Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

TOTAL ECONOMIC IMPACT APPROACH

Benefits represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.



PRESENT VALUE (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.



NET PRESENT VALUE (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made, unless other projects have higher NPVs.



RETURN ON INVESTMENT (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.



DISCOUNT RATE

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.



PAYBACK PERIOD

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

Appendix B: Endnotes

¹ Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

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