

# SOFTWARE-DEFINED NETWORK ORCHESTRATION ARRIVES

GLUE NETWORKS' SDN ORCHESTRATION ENGINE BRIDGES VENDOR ISLANDS

## EXECUTIVE SUMMARY

Business transformation is happening as companies exploit technology to drive a competitive edge. But manually managing the pace of change in today's constrained networks is breaking the business model and holding companies back from the innovation they seek. To be more agile, businesses need to address their network orchestration with tools that can automate the management and configurations of their network equipment.

Glue Networks is the first to deliver **software-defined network orchestration** (SDNO), with a patented automation engine that includes multi-vendor support and the ability to gradually automate brownfield networks. The engine helps abstract the complexity of underlying hardware, creating a flexible and adaptable orchestration layer. The model-driven Gluware platform delivers end-to-end coverage, from the datacenter out to the WAN and LAN components. Glue Networks says their tools can reduce configuration time by almost 88%, accelerating project schedules while reducing both the cost and time to deploy and manage network services.

## TODAY'S CUSTOMER NEEDS

IT is at an inflection point as the complexity of today's networking grows exponentially against a set of resources that is either being constrained or reduced. This dynamic is diminishing overall business agility as the network becomes the bottleneck. Those seeking to be more agile are finding that the network is most often their source of pain and the element that blocks their ability to capture business opportunities.

Software-defined networking (SDN) is a networking strategy that is starting to gain momentum as a mechanism for businesses to be more agile. But underneath this software overlay is an increasingly abstracted set of hardware that still needs to be managed and optimized to keep the business running. As companies digitize every aspect of their business—from medical records to product telemetry—the network is straining under all of this instrumented, measured, and analyzed data.

While businesses are changing and everything is being automated and digitized, administrators are not keeping pace, still manually responding to configuration and change management. The gap in this process is costly and can expose the business to unnecessary risk in the event of an all-too-often human error. To become agile, businesses need to move from manual to autonomic. Businesses need an engine that can automate both the deployment and change management of network devices.

While customers are spending increasingly more time and money on network management, complexity is increasing faster than they can handle. As a mechanism to lock customers in, large vendors create automation tools to cover their own products, but almost every customer lives in a multi-vendor world where this strategy falls short. IT demands tools that can manage **any** vendor's product with a consistent set of capabilities. By some estimates, 80% of IT's networking time is spent on operations, just keeping things running, and 67% of networking budgets are spent on operations, not buying new hardware. Some customers even hesitate to use a product's full feature set out of fear of adding complexity, thus potentially missing out on some of the true product benefits. But if a customer can reduce their operational costs, then they can drive that savings back into designing a better network architecture or attacking new business opportunities that demand a more agile infrastructure.

Many equipment decisions about brownfield networks were based on previous investments in products and ecosystems, not necessarily on the best product to meet future needs. As these brownfield installations continue to influence future directions, customers need a way to escape that vicious cycle and start to innovate. Automation of brownfield networks and automation across multiple vendors' products are both essential if IT is ever to break away. In addition to tackling the challenge of brownfield environments, IT should consider not just the hardware as brownfield. Any new solution should work with existing monitoring, analytics, and workflow tools and require as little programming / coding knowledge as possible so administrators can focus on the task, not the tools.

## GLUE NETWORKS DELIVERS SDNO

Glue Networks is a software-defined network orchestration company that has developed software to automate multi-vendor enterprise networks, reducing network complexity and lifecycle management costs while boosting agility. Enterprises are investing heavily in business digitization, instrumentation, and analytics. However, responding to network needs is still a largely manual process. Manually building and maintaining enterprise networks is a time-intensive and costly process that does not allow enterprises to

respond and change at the rate that lines-of-business need. Glue Networks is working toward the next frontier of enterprise networking innovation, moving from human to autonomic change. While networking vendors have been attempting to automate their own products with minimal success, Glue Networks has created a credible solution to automate across multiple vendors and deliver enterprises the automation and orchestration they require for network agility. Glue Networks takes a unique approach by not requiring any software component to be installed on the device; each device runs totally native, insulating it from additional complexity or security concerns that come from introducing additional software into the stack.

Instead of a massive effort where everything has to be automated at once, Glue Networks enables enterprises to gradually automate brownfield, multi-vendor network environments, bringing control, security, and awareness to the process. With support for 13 vendor operating systems already included with this release, Glue Networks is continuing to add new vendors and new OSs about every three weeks. Their solution extends those multi-vendor capabilities across the entire network, bringing control, security, and awareness to the LAN, WAN, and datacenter as well.

### *THE GLUWARE PLATFORM*

Glue Networks initially created Gluware to showcase their solution for software-defined WAN overlay networks, one of the thornier challenges to solve. There were many capabilities inherent to the base product. Over time we are seeing Gluware expose these capabilities to customers based on use cases and needs as customers gain experience with the platform. The focus for Glue Networks in delivering this product is not rote standardization but instead the concept of massive customization.

To describe how Gluware works, it is important to highlight that it is one of the first products on the market to be truly **declarative**. In network programming, this means an administrator can address the problem by stating what they want to occur, leaving the underlying engine to determine, based on the node, how to execute the command. The engine chooses the appropriate method at runtime then communicates down to the device. In a declarative world, if X is connected to Y and you want it to move it to Z, you simply say connect X to Z. The underlying engine ensures the connection between X and Y is removed, because you have declared the new connection. In traditional network configuration, the administrator has to deal with start / stop commands any time there is a change, not only connecting X to Z but issuing the command to disconnect X from Y. In the declarative world, you only need to describe where you are going and the engine does the rest.

Gluware's semantic engine uses JSON for data structure along with their own modeling framework called FLOW, a JavaScript extension that contains the intent of the network engineer, avoiding the problem with CLI commands not being recognized. Both together are interpreted by the engine in real-time, and as the engine talks to the node, it can read back and understand what was already written, enabling it to interact and truly engage. While CLI is used heavily to manage networks, one of the biggest challenges is the amount of scripting that must be used just to issue a single command down to the device. Sometimes thousands of lines of very specific (and unfortunately non-reusable) code are required. But the engine can reduce this as it understands, through the models, what is inside each box. Glue Networks is targeting "one line of code for one CLI command", meaning that commands can be not only issued easily but can be reused easily, in a variety of different ways, to drive better efficiency.

Flexibility in design was important for the product, and this capability flows through to the end user. Two of the biggest challenges for network orchestration are tied to handling existing environments and accessibility. Existing environments ("brownfields") present a challenge, because there is already a host of devices deployed and some tools require an "all or nothing" strategy to deploy. But Gluware can be employed on as much or as little of an environment that a customer chooses. For accessibility, Gluware enables modeling of the view, so the devices are abstracted relevant to the situation and user, allowing a developer to expose as much or as little as an engineer needs to do their job. Visibility can vary from exposing every knob and switch all the way down to a single on / off switch, helping reduce the number of errors based on human interaction (the leading cause of network issues).

Additionally, this selective exposure enables IT to gradually migrate brownfields, depending on how much they want to automate using Gluware over time. In the case of a device having multiple functions, like firewall and load balancer, IT could assign Gluware to manage part of the device and still use the original vendor tools for the other part. Or if multiple groups need access to different functions based on roles, Gluware can expose only those capabilities that the administrator needs.

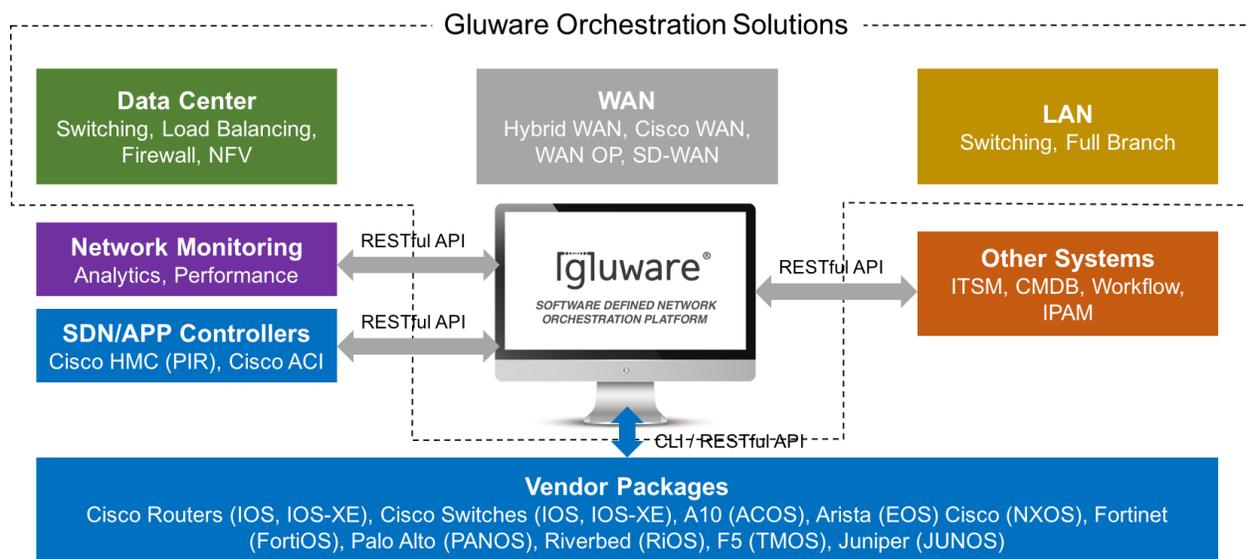
Gluware is primarily composed of two pieces: Lab, which enables an engineer to build new and customize existing models, and Control, which deploys and manages those models on the network. Control can be modified in a variety of ways, from pre-built quick start models to deep configuration. Engineers can optimize the commands required for deployment. This optimization can reduce the lines of code required to deploy an A10 load balancer to only 54 lines, versus the thousands of lines of scripts that would be required traditionally.

Gluware delivers the configuration oversight to address the most common outages; primary in that category are human errors. Gluware can automatically detect and remediate any deviation that occurs from manual changes. The Gluware modeling allows devices to be easily swapped in the case of failure, even if the replacement device is a different model or a different vendor entirely. Gluware can even handle a service provider failure and enable a network to sustain the loss of connectivity from a carrier, completely changing the architecture on-the-fly when issues arise.

Deployment can be done as a cloud-based service, for those who want flexibility to manage their system from any location. For those who require all of their services to run from behind their firewall, a new on-premises capability has been added. The ability to plug into existing data analytics tools and network monitoring tools means that customers can leverage their existing investments instead of having to change out both tools and processes to adapt to this new system.

Modeling can be done in a matter of days. This speed enables the rapid deployment of Gluware capabilities across the network, which reduces the amount of operational time and cost required for network change management.

**FIGURE 1: THE GLUWARE ECOSYSTEM MODEL**



Gluware provides network orchestration to help administrators take control of their networks in a customer-directed manner; it provides control and automation to make IT teams more efficient with customer savings in both time and budget.

## DOCUMENTING THE SAVINGS

Glue Networks shared information with MI&S about a recent customer deployment for a global pharma customer maintaining a hybrid WAN over 600 sites and serving more than 100,000 users. The customer needed a fully automated system and, as always, was hoping to deploy as quickly as possible.

The Gluware solution enabled the customer to use their existing hardware (no additional training or expense was required) and to deploy using their general IT staff (no additional specialists were required). The first phase of 50 branches (with 3 datacenters and 6 head ends) was rolled out quickly. Based on that smooth rollout, the second set of 150 branches is currently underway.

When completed, Glue Networks' customer expects to save about \$3M annually in network transport cost, mostly due to the savings from the hybrid SD-WAN. Because they were able to deploy and migrate 8x faster with Glue Networks, they are estimating that the project deployment savings will be close to \$1.75M. Even building out the proof-of-concept was accelerated, requiring half the resources of the traditional process. What would have been 100,000 lines of code and 1,500 config lines per node has been significantly reduced, enabling the system to be run by half an ops headcount instead of the 7 heads that would have been required when using traditional methods.

The customer ended up with a highly customized architecture that is completely automated. The results were strong enough that the customer is working to extend this solution to WAN acceleration, firewall, LAN and datacenter automation, all capabilities that other Glue Networks customers have in production now. Below are Glue Networks' estimates for saving across the four projects.

**TABLE 1: TIME & HEADCOUNT SAVINGS**

|              | <b>SD-WAN</b><br>(500 nodes) | <b>WAN</b><br><b>Acceleration</b><br>(150 nodes) | <b>Security /</b><br><b>Firewall</b><br>(250 nodes) | <b>LAN</b><br><b>Switching</b><br>(50,000 ports) | <b>Datacenter</b><br><b>Switching</b><br>(10,000 ports) |
|--------------|------------------------------|--|---|--|---|
| Time         | 88%                          | 75%  | 83%   | 50%  | 50%   |
| Deploy heads | 67%                          | 70%  | 60%   | 83%  | 85%   |
| Manage heads | 90%                          | 92%  | 88%   | 94%  | 85%   |

(Source: Glue Networks)

## EXTENSIBILITY

Initially positioned as a tool to automate SD-WAN deployment, Gluware has grown into a full-fledged orchestration tool. Customers can use Gluware to automate their network configuration tasks in several ways.

- **Accelerate deployment:** Traditional network deployment meant having to manually code all of the individual network features and services for each device, which is both time-consuming and error-prone. Through automation, engineers can accelerate time-to-deploy by defining features and services once and then reuse them across a range of devices without losing customizability.
- **Respond to capacity spikes:** When business spikes or a new opportunity arises, IT needs to be agile and respond quickly before that opportunity passes. Automation enables a business to respond to spikes more easily without having to rely on expensive and highly trained administrators. The ability to boot a router with a USB key and quickly bring the system up to a fully configured level allows IT to respond to outages (changes) or add capacity (upgrades) without fear of mismatched configurations causing problems.
- **Enhance security remotely:** Through lockdown and disable, administrators can configure and ship a device without fear it could be compromised in transit, reducing the possibility of nefarious access once deployed. Deployed network devices can be disabled, as in the case of devices being lost in chain-of-custody or employees being terminated. A highly secure local user and password location schedule can be maintained automatically instead of the traditional time-consuming manual process.
- **Improve audit compliance:** With the ability to analyze network state (comparing actual to ideal), administrators can address devices that fall outside of standard configurations, helping drive both IT and security compliance. Manual changes can be detected and administrators alerted of all manual changes to the network. Through a single configuration tool and a single-step remediation, administrators can keep the network running in its desired configuration and help enforce compliance with security regulations on access.

Each of these scenarios show the value of orchestrating common network tasks. For instance, adjusting a network model from a single VPN to a Dynamic Multipoint VPN (DMVPN) would normally take about two weeks to complete per location because of the headend, crypto, site routing, and CPE involved. But Glue Networks showed it could be done in only a few hours with a single engineer through automation and modeling.

### *BUILDING A COMMUNITY*

One aspect of this new extension of Gluware capabilities that interests MI&S is the fact that Glue Networks is opening the capability of the platform and launching a community initiative. As we study profiles of typical customers engaged in network transformation, we see they are predisposed to the collaboration that comes along with open source

and standards-based tools. In a nod to this customer desire, Glue Networks is making it easy for customers to share and enhance device models. An online repository lets administrators download models for devices that they have created. If an administrator models a new device that was not previously created, they can upload it to the repository, sharing it within their enterprise only or with other customers as well.

Administrators can test drive Gluware through the Gluware Community to learn how others are tackling their networking problems, share information, and exchange device models. To evaluate whether the Gluware platform is right for them, they can test drive Gluware Control from the site or download the Community Edition for Gluware Lab to try a pre-built multi-vendor solution in their own environment.

## CALL TO ACTION

As IT begins their journey down the path of network transformation, they must grapple with designing their future state, while at the same time not ignoring that close to 80% of their time today is spent just keeping everything running. As alternatives to traditional infrastructure and management are sought, software-defined networking is a natural choice. Along with an SDN strategy, software-defined network orchestration can assist by helping manage the physical hardware that sits underneath this virtual framework.

Tools that will drive efficiency in this new world must be multi-vendor, model-driven, and end-to-end, enabling administrators to deal with existing brownfield networks as they bridge to the future. It is unlikely that any customer, anywhere, would scrap their existing investment due to how much sunk cost is already in their network. Based on this existing investment, customers need to be in control of this transition, choosing both the pace of change and which pain points to address in the most logical order.

For those who are looking at automation and configuration management, SDNO is a highly-optimized solution for removing manual processes from configuration and management, getting the most from both resources and budget. MI&S recommends companies evaluate Glue Networks' unique SDNO capabilities. With the [Gluware Community](#), administrators can log in and “get their hands dirty” before deciding how to proceed. It is a low-risk way to drive better agility from your network.

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