

# BRINGING DEV OPS TO WAN ORCHESTRATION

AGILITY & FLEXIBILITY SHOULDN'T ONLY BE LIMITED TO APPLICATION DEVELOPMENT

## EXECUTIVE SUMMARY

The complexity of today's WAN environments breeds inflexibility and inefficiency. Managing the deployment and operation of WAN connections has proven to be both manual and time consuming, driving up costs to companies deploying them. Any delays in rolling out new services means that businesses miss out on opportunities that could drive new revenue streams. With Gluware 1.0, Glue Networks introduced a cloud-based Software-Defined WAN (SD WAN) orchestration platform that allowed businesses to deploy faster and create more efficient hybrid WANs, while also reducing both the deployment as well as operational costs.

Agile businesses are leveraging strategies like Dev Ops to try to drive better efficiency and shorten application development cycles, hoping to rein in the cost of IT. However, Dev Ops focuses on application development, not the network. Further complicating matters, the largest Dev Ops challenges are not technical, they are organizational and cultural. What is required to drive better efficiency and automation in the network world is a development environment that helps drive more automation, but without forcing a wholesale organizational shift or forcing network engineers into a completely new role. The new Gluware 2.0 platform has potential to fill this gap by bringing Dev Ops functionality to SD WAN orchestration

## AGILITY FOR NETWORK ENGINEERING

The business world is moving quickly, and companies need to be more agile to keep up. Technologies like cloud, Internet of Things (IoT), Big Data / analytics, and mobility are all driving massive changes in not only the amount and types of network traffic but also in the patterns of that traffic. Data changes are requiring businesses to rethink how they address networking, which is sorely out of step. As opportunities are coming up faster, companies either need to be able to deploy new resources or change existing resources to capture more revenue. Unfortunately, based on the state of today's networks, these changes are most often too challenging. IT complexity is increasing, running head-on into the need for businesses to move faster. Companies that can reduce their network complexity stand the best chance of succeeding in the future, because they will have a timelier reaction to events and trends.

Traditional IT has been holding companies back, and they now realize that to thrive, they need to turn IT into a service. This is driving the move towards software-defined datacenters and cloud technologies. IT is slowly embracing the addition of external public cloud services, but if they do not continue to speed up this innovation, then they run the risk of departments going around them and heading directly to the service providers to get what they need. Previously, companies would deploy only a handful of applications per year, but in today's fast-paced world, it may now be dozens of applications per week. Over those years network changes were merely bolted on top of the previous, leading to a complex and convoluted mesh inside the company. Remote branch offices often felt the brunt of a lack of innovation as WAN complexity, which drove a huge amount of customization and cost, made connecting or changing almost impossible. In today's "always on" world, businesses are becoming more geographically dispersed and becoming more global. International subsidiaries and supply chain linkages are pushing businesses for better WAN connectivity to the remote locations.

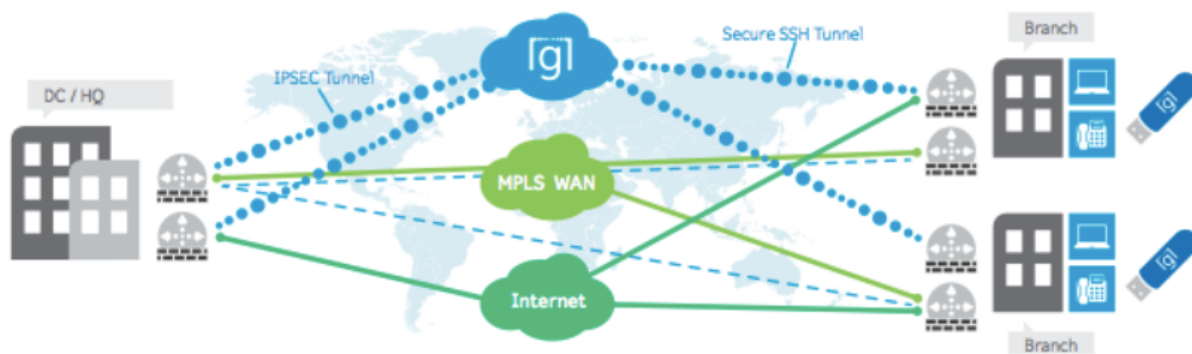
Dev Ops is rapidly becoming the standard for application development in agile companies. It has fundamentally changed how applications are created by helping drive down the amount of time between coding and when the business can begin capitalizing on new revenue streams. Unfortunately, Dev Ops is focused on application development, so those benefits don't extend out to the network. The networks (and especially WANs) need to evolve. Leveraging some of the best practices from Dev Ops could help this evolution. But the change to a more agile environment for networks will never be a light switch transition, so for any strategy to be considered, it needs to be able to coexist with the investment in current tools and equipment.

## SOFTWARE-DEFINED WAN CHANGES THE GAME

Software-Defined Networking (SDN) is gaining momentum in the market as businesses look to technology that will let them break away from the chains of traditional networking. The importance of SDN will continue to grow, and SDN is [predicted](#) to be a strong influencer in up to 80% of all network spend by the end of 2020. SDN builds a virtual overlay on top of the physical product, allowing for faster deployment and changes. One element of SDN, Software-Defined WAN (SD WAN), takes the virtual overlay and programmability and builds that out for remote branch office locations. [Glue Networks introduced Gluware 1.0](#) with a goal to abstract the complexities of SD WAN management. The zero-touch network provisioning and lifecycle management tool leveraged the cloud for faster deployment and easier management of WAN solutions.

Through the abstraction of the WAN management, WAN resources can be modeled and deployed faster, bringing and then keeping remote locations online faster for better productivity. Glue Networks estimates that network engineers can see up to a 38% reduction in the operational time that was normally spent in tasks like testing, deploying, and managing equipment.

FIGURE 1: SOFTWARE-DEFINED WAN WITH HYBRID CONNECTIVITY OVER MPLS AND INTERNET



One of the biggest benefits of an SD WAN is the ability to create a hybrid WAN environment, something that Gartner [claims](#) will be “the new normal”. Combining high quality Multiprotocol Label Switching (MPLS) with high bandwidth / low cost broadband internet service brings better cost effectiveness and more flexibility. With a hybrid WAN, traffic can be segmented across the appropriate carrier, removing bulk traffic from more expensive MPLS and segmenting it to the more cost effective broadband internet connection. This brings better overall QoS, traffic scaling, and lower cost. By using a hybrid WAN, customers can free up valuable bandwidth on their more critical MPLS, possibly even reducing carrier costs as the less-critical web traffic is handled by a lower-cost connection. And should there be an interruption to either connection, traffic can be seamlessly rerouted, maintaining connectivity.

SD WAN accelerated the deployment and management of remote network locations, because it lowered the barriers to deployment from a time, complexity, and cost perspective. The ability to more easily launch and connect remote locations made it easier to justify either opening or connecting remote branches. And that reduction in complexity was also instrumental in driving better productivity from network engineers.

## GLUWARE 2.0: DELIVERING AGILITY FOR NETWORK ENGINEERS

With more companies demanding agility and a need for better network orchestration and management, it seems natural to bring the agile Dev Ops concepts to networks, but previously nobody had. One of the reasons is that they require significant cultural and organizational adjustments, leaving many companies hesitant to introduce these changes into networking, as the network is a mesh that touches too many end points with too much interdependency between devices and applications.

Glue Networks has now released Gluware 2.0, a network-aware orchestration platform which can create a more agile environment for network engineering. Built around the network engineers' workflow and lifecycle, Gluware 2.0 integrates the development, testing, deployment, and management of networking features into a single platform. It allows companies to take advantage of the kinds of methodologies that they might normally find in a Dev Ops application environment without having to make a wholesale change or commit 100% to a new structure. **Networks can now be managed like applications, and applications can become more network-aware and programmable.**

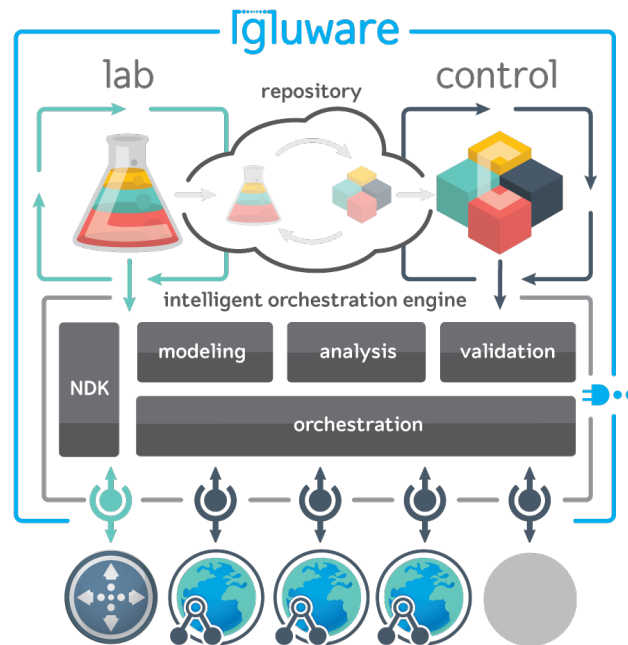
Instead of trying to push network engineering completely over into the application developer realm, Gluware 2.0 brings the two sides together in the middle. It brings Dev Ops benefits while still allowing the customer to maintain their existing infrastructure for fast time-to-market solutions. This reduces risk as the changes are less impactful than uprooting the department and processes simply to start all over again.

## THE FIRST NETWORK-AWARE ORCHESTRATION PLATFORM

Gluware 2.0 is a network-aware orchestration platform that spans the creation, modeling, deployment, and lifecycle management of the WAN.

As an orchestration platform, it is composed of several components that can be used in a variety of manners to help network engineers streamline both their processes and networks. The components include both the standard base products as well as add-ons, allowing the orchestration elements to more accurately reflect the network needs.

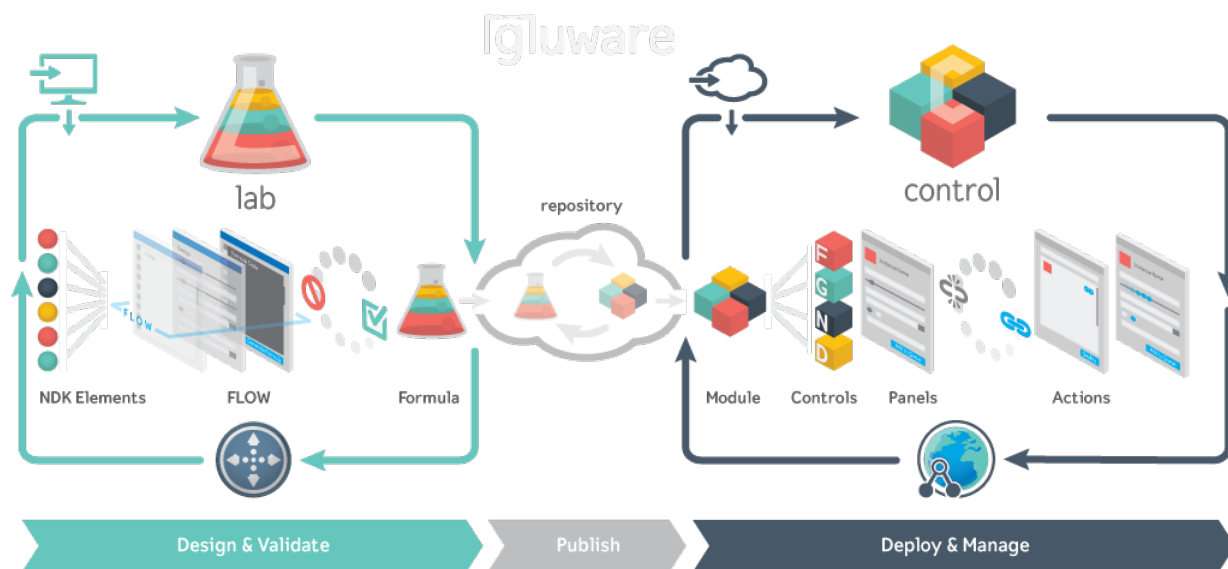
FIGURE 2: THE GLUWARE 2.0 PLATFORM



The Gluware platform helps drive better efficiency for the business. Its two major components, Lab and Control, are where most of the work happens, with an Intelligent Orchestration Engine to tie it all together.

- **Gluware Lab** is the working area where functional controls can be built and modeled to the needs and workflows of the business. By including functions that are based on real-life data from large companies that have deployed these resources, network engineers can model based on best practices, thus helping lower the risk of deployment issues and ensuring better uptime and stability for the business.
- **Gluware Control** handles deployment and management. Through error checking and consistency checking, network functions are constantly monitored and validated to help ensure uptime and productivity. Reducing the time to deploy and manage helps drive better operational cost by reducing the amount of “hands on” time needed with these processes.
- **Gluware Intelligent Orchestration Engine** provides a set of capabilities that help boost network engineer productivity through modeling, analysis, validation, and orchestration of the platform, allowing for more seamless automation. The Gluware NDK contains the product-specific functional pieces that are aligned to a networking vendors’ specific network devices.

FIGURE 3: THE GLUWARE 2.0 PLATFORM MIMICS THE NETWORK LIFECYCLE FROM DESIGN & VALIDATE THROUGH DEPLOY & MANAGE



The orchestration platform creates an open environment with APIs that can be used on existing hardware. With the ability to orchestrate existing “brownfield” environments, Gluware 2.0 has **network-aware capabilities** that can scan the network and bring in existing network device information. This allows for automation of existing systems by transforming those systems into code that the Gluware platform can then manage or manipulate. The current platform supports Cisco products, taking much of the pain out of Cisco WANs. Adding additional vendors would be an NDK-level modification which is not an intrusive change to the Gluware platform.

Recent Wall Street summaries of Cisco earnings pointed to the inevitability of SDN, but with the caveat that it would probably be 10 years before the full transformation occurs. Between now and that full transition, network vendors will continue to sell new products, and customers will be unlikely to rip out existing infrastructure just to gain some new incremental features. Any solution targeting this market needs to recognize this reality and adapt to it.

Vendors who adopt a strategy of **coexistence** will enable customers to take advantage of the capabilities within pockets of their networks where it makes the most sense—helping to drive better near-term time to market while they continue their journey towards a fully software defined infrastructure. Gluware 2.0 can be deployed on existing



networks, and because it is network-aware it can import in all of the appropriate information about the existing network structure and devices. **It allows the underlying physical assets to remain in place**, so that network engineers can change configurations quickly, without having to install the functionality across the entire network.

## GLUWARE 2.0 DRIVES CUSTOMER BENEFITS

The key driver for companies to move to Dev Ops on the application side was the need to drive more agility, reducing the time between feature requests and application releases. If a business can get new functionality into production quicker, they can start to capitalize faster, turning code into revenue streams.

Today's world of agile application development promises to bring new functionality online faster, but much of that **time-to-market value is lost if the network is holding up implementation**. Extending these concepts to the network removes this bottleneck and enables businesses to better capture these revenue streams or react to changes in the market more quickly. With a network-aware orchestration platform, resources can be developed, deployed, and managed with fewer steps, more automation, and error checking that provides immediate feedback.

One of the principles of Dev Ops is that smaller application changes can be done quickly to speed processes, then through automated error checking, immediate feedback is provided. The current, batched "deploy and pray" methodology creates too many unnecessary risks and brings the potential for interruption as well as driving too many rollbacks. The act of updating configurations was generally easy in the past, as it only required deploying a new configuration and then restarting the device. However, when one looks at the full process, including all of the testing before and checking after, the process was not merely minutes, it could be hours or days (possibly even longer if rollbacks had to happen). But with an automated orchestration platform, **that process can be shrunk to about 90 seconds including all of the error checking**, enabling much more rapid updates that can happen more frequently.

With the ability to be used on existing equipment, the environment can be deployed easily and grow as more equipment is brought in under the control of the orchestration platform. This enables faster changes to the business environment and brings a better level of productivity for both network engineers as well as developers, because now the network can be moving in greater harmony with application development.

As a network-aware orchestration platform, Gluware 2.0 helps to reduce the number of manual processes needed and reduces the number of exceptions that need to be handled. With a more integrated development model and better orchestration, network teams can create more repeatable deployments that leverage best practices, as the functions built into the Gluware NDK represent the collective knowledge of leading companies.

Real-time validation and error checking is critical for reducing the opportunity for errors to be introduced into the network environment. Through error checking, constant policy enforcement, and error handling, network engineers can ensure that the deployed changes and updates are not creating issues for networks. Real-time validation enables a network engineer to make smaller incremental changes more quickly and more often, instead of waiting for a particular window to deploy a large number of changes. This lowers the probability of having to roll back updates because a single problematic change impacted dozens of other good changes that were part of the same update window. Additionally, because updates can be deployed individually, troubleshooting time can be decreased as issues with new deployments can be more easily tied back to a particular change. Through all of the change management, state monitoring and policy enforcement are needed to ensure that the network is running in an optimal state both before and after any changes are applied.

IT budgets have been under strain for quite some time now. The proprietary nature of networking often contributes more pressure on that budget than some of the other components like servers and storage that have more open and flexible options. By implementing an automated WAN orchestration platform, both businesses and network engineers can find more value.

For businesses, there is a clear **reduction in capital cost** by moving to an SD WAN approach, but those savings pale in comparison to the **operational cost savings** that come from the greater productivity of the networking staff and the business benefits of being able to move faster and capture more revenue opportunities. In addition to the savings that companies can realize, there are benefits at the staff level as well. For network engineers there is an ability to boost productivity which increases the value of the engineers to the company. Because this new environment leverages current equipment and does not force a wholesale change, engineers are not forced to drop the past and simply become application developers; instead they expand their knowledge and functionality while still using their existing networking skills.



## THE COMPETITION IS NOT DELIVERING

Most of the market today still relies on “deploy and pray” strategies for updating network devices. For those trying automation, various solutions exist today, but most are missing a layer to orchestrate new features and policies in a standardized, automated, and repeatable manner while providing sufficient customization to meet enterprise-level requirements. The current class of controllers needs to mature before they truly meet the needs of customers.

Almost any other SD WAN solution is going to require either an additional hardware device at the remote branch, or a forklift upgrade of the existing HQ WAN equipment. The Gluware 2.0 solution enables a business to continue to leverage their current investments in their Cisco hardware and IWAN products, but it adds an orchestration layer on top to manage the overall solution with capabilities that the Cisco products just cannot deliver. Today many customers rely on a combination of WAN tools for enterprise network management, monitoring, and handling the prescriptive policy automation. But the typical combinations of on-premise tools generally do not provide the same level of functionality as this single cloud-based product.

## CALL TO ACTION

Businesses are becoming more global and more dispersed while they are also trying to handle the transformation from the static, rigid structures and processes of the past towards the more flexible and agile future. SD WAN is squarely at the intersection of these two trends, but it suffers from a lack of flexibility. With agile development environments for applications, the natural question becomes, “Why can’t I have this capability for my WAN as well?” Previously that choice really did not exist, but with an automated WAN orchestration platform the opportunity is much closer to reality.

The upcoming network transition will play out similarly to the recent server transition. With the introduction of virtualization to servers, the hypervisor became the focus of innovation as the hardware simply became the commoditized underlay. As virtualization became more pervasive, the hypervisor became less critical and joined the hardware as part of the underlay with the virtualization tools (and now containers) becoming the focus of innovation. **Today network hardware is headed down the path of commoditization.** As SDN becomes more pervasive, the SDN controllers could begin to meld into the underlay, with the real innovation then happening above at the application and orchestration layers.

**The future of networking will be managed by software, fully orchestrated, programmable, and agile.** The products that will be successful in driving this vision will either be focused on the upper layers of the stack, or they will have the ability to evolve to a higher layer because the lower layers will simply become a commoditized underlay as SDN continues to gain momentum and importance. An automated WAN orchestration platform is a good example of the kind of platform that is aligned with the future vision of networking. But to be successful, an automated WAN orchestration platform will need to be able to integrate into an existing environment then brought in gradually, as it makes sense, without overcomplicating the network, as Gluware 2.0 is able to do.

The Glue Networks solution, as it stands today, is focused on Cisco hardware. With Cisco holding the majority market share, this makes sense as Glue's entry into the market. Ultimately, as we heard at the Spring 2015 [ONUG](#) meeting, multivendor solutions are the preferred path, so we would expect that Glue will need to expand support to more vendors in the future in order to better align with customers' needs.

We recommend that businesses who are looking for a WAN orchestration solution to help drive more agility and flexibility take a look at the new Gluware 2.0 network-aware orchestration platform.

## IMPORTANT INFORMATION ABOUT THIS PAPER

### *AUTHOR*

[John Fruehe](#), Senior Analyst at [Moor Insights & Strategy](#)

### *PUBLISHER*

[Patrick Moorhead](#), Founder, President, & Principal Analyst at [Moor Insights & Strategy](#)

### *EDITOR / DESIGN*

[Scott McCutcheon](#), Director of Research at [Moor Insights & Strategy](#)

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