The Network Symphony

Building a Foundation for the Digital Business

Introduction

Enterprises today have no choice but to be part of the digital economy. Whether you are just starting the digital transformation journey or are already running a digital native environment, it is crucial for you to keep moving forward.

In the opinion of Juniper Networks, organizations will not be able to take full business advantage of the digital marketplace without a virtualized and automated network as the foundation of their data center and cloud.

Simply put, this means powerful software running on top of a high-performance platform. It isn't a question of better networking software or better hardware. It is both, working together as an automated ensemble, able to react to changing conditions automatically.

Why Network? And Why Automation

For the IT organization, digital business isn't just about making it work, but making it all work together, all of the time. Integrated applications must mesh seamlessly regardless of the type of query, customer, or connection. A single webpage presented to a customer involves dozens of exchanges with a wide variety of applications and databases, legacy and modern, local and distant. And it all happens over the network, whether within the data center, between data centers, or out to a cloud.

But networks are changing. And they are becoming automated.

For most of the past 40 years, networks were largely hardware constructs: routers, hubs, switches, firewalls, transmission, etc. Software ran the individual machines, but the focus was on faster chips for greater throughput, or better optics for greater distance.

In the last few years, however, networking software has come into its own. Rather than merely running a single machine, higher level controllers and orchestrators allow the network to be viewed and securely managed as a whole, giving the network manager far greater peace of mind. This virtualization of the network enables applications to automatically order up the exact type of communications services they need without having to understand the physical elements in the network.

And it's about time, isn't it? After all, virtualization is nothing new in the compute or storage worlds. Running a modern data center is all about running the automated tools that manage the applications and workloads, which in turn run on the foundation of hundreds or thousands of virtual machines—machines whose ephemeral existence can be moved or stretched to more or fewer physical servers as demand fluctuates.

So, is software all that matters for connectivity in the digital world?

Yes, and no.

Without network control software, your IT organization will be unable to realize the incredibly sophisticated digital business models that your company's management team requires. Business models that are based on real-time information, interactions, and analyses that, by definition, are constantly changing. In addition, software is the only way to obtain the visibility that you need into what is happening across the entire data center and cloud environment. What applications are running where, how virtual machines are distributed within and between data centers, which workloads are in the cloud and which are local, how efficiently they're running, and over what networking elements they're flowing.

On the other hand, the virtual network is only as good as the physical infrastructure supporting it. Data now flows at speeds unimaginable even a decade ago. Nevertheless, software and applications have a seemingly insatiable demand for bandwidth and speed, so the physical underlay network continues to need the flexibility and scalability to allow the software to facilitate any-to-any communication links, across multiple data centers and environments.

The Network Is Like an Orchestra

This software/hardware duality is clear if you compare your network to an orchestra. Regardless of the quality of each individual component, the instruments and musicians are useless without music to play. The musical score is their software. The "hardware" and "software" come together to create the musical experience. But the most beautiful symphony in the world will lose its luster when played on inadequate instruments, by inexperienced musicians, or just poorly orchestrated. It may still be recognizable, but the audience experience will be diminished.

The same goes for your users or customers. Even the greatest application will be poorly received if it takes seconds or minutes to fully load, yet this is often the case with an underpowered network. Or you can have applications with instant response times that please users, but if you cannot rapidly increase their resources when demand spikes—including bandwidth and security—your IT goals will not be met. Not to mention that one single security breach can lead to loss of customer confidence, forever.

The IT environment of tomorrow will certainly be cloud-based, but the corporate data center will not disappear. Most enterprises will have a mix of locally controlled data center and cloud-based resources, and the mix will be constantly changing in a drive for the optimum mix of cost, performance, and control. As a result, the challenges faced by IT organizations will center on management of their data and applications:

- How much should I continue doing myself and how much should I move to the cloud?
- How do I get visibility into what is happening in the cloud? And how much is it costing me?
- How do I move jobs and instances between my data centers, into the cloud, and back?
- How do I monitor the performance of applications, databases, storage, servers, and networks?
- How do I avoid errors that can bring everything crashing down?
- How do I detect security breaches and cyberattacks, which can cripple the entire organization?

No single vendor will provide answers to all of these questions. The right choice of solutions will vary from enterprise to enterprise. So how do you meet your needs for today and also plan for the future?

Concerto in Four Movements

First, you should embrace an open approach wherever possible—open APIs, open source, open protocols. Open products, applications, and tools can easily interact and exchange information with each other and with the rest of the IT environment. Open ensures that you move at your own speed, not at the pace of a particular vendor's product releases, combining the products and solutions that best suit your requirements, without compatibility or interoperability issues.

Next, you need to consider automation and orchestration—the conductor must have visibility and control of the entire performance and be able to adjust every element. Just as managing the server and storage environment has already become highly automated, so too must networking in your data center. Why does it take so long to adapt your data center network to changes in your virtual environment, and why aren't network and security integrated into it? How much time does your networking staff spend making changes and troubleshooting? Not only does automation of these tasks free them up to do more useful projects, it also avoids the number one source of network downtime: operator error. So ask if the solutions can easily integrate automation tools such as Puppet, Chef, and Ansible, or standards-based command languages like NETCONF and YANG.

And while you're at it, you also want to make sure that security is top of mind. Because the data that you are storing and moving around your data center and cloud environments is valuable, very valuable, and cybercriminals will go to great lengths to get it. Today, the old paradigm of building a wall around the data center is, well, full of holes. Because threats can enter from anywhere—phishing attacks, infected USB sticks—and firewalls cannot be everywhere. But the network is everywhere. Your data center network elements should play an active role in detecting threats and eliminating them. Wouldn't you rather have a data center network where security is built in rather than added on?

Finally, consider the basic physical fabric of the network. To truly bring a musical score to life requires the finest instruments orchestrated in the optimum arrangement. The same is true in your data center. Selecting the right network elements and architecting them in the correct structure is paramount in enabling the networking software to fully meet your application needs, whether in your own data center facility or spread across multiple cloud environments.

For Juniper Networks, these points are not merely academic; they are what have driven our business since its creation in 1996. Because we recognized that your success depends on powerful applications and software, but in turn their success rests on a strong foundation of networking and security software and hardware. In today's hybrid cloud world, that foundation will be a multivendor and even multigeneration hardware underlay network, managed by a software-controlled overlay network—just as servers and storage are already. And it will integrate with the orchestration and control software that manages those parts of the environment.

Coda

You want to build more than a network. You want to create a safe, reliable, scalable, and fast digital environment for your business. To help you be successful, Juniper Networks believes in building open, high-performance networks that have security embedded in their foundations, and automation in their DNA.

To that end, our network controller software solutions use open protocols in order to get the most out of any hardware you may already have in place. Our data center switches and routers provide you with high-performance, high availability interconnectivity to ensure that your data flows smoothly,

swiftly, and securely. We offer interfaces and APIs for automation using standards-based tools and controllers from a wide variety of vendors. Our monitoring solutions can map your virtual environment to the physical one, whether for storage, servers, or networking. Above all, our network and software architects and consultants understand all of these challenges and have solved them for hundreds of customers like you.

Your business is unique. Your IT is, too. Ensure that it is built on a foundation that will provide the openness, flexibility, and agility you will need in the turbulent years to come. Build it with Juniper Networks.

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at Juniper Networks or connect with Juniper on Twitter and Facebook.

BUILD MORE THAN A NETWORK™.