Software-defined DDI

Fully realize the value of SD-WAN for remote locations and branch offices
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Executive Summary

Enterprises are embarking on digital transformation to improve business outcomes. This includes updating their network infrastructure at remote locations and branch offices. Cloud and software-defined technologies are proving crucial to this transformation. The adoption of SD-WAN by enterprises is driving demand for simpler, more efficient connectivity between branch locations and applications, such as Microsoft Office 365, placed in the cloud. Remote connectivity to these applications depends on fast and reliable core network services—DNS, DHCP and IP address management, collectively known as DDI. Legacy DDI management solutions, however, are too complex and rigid for the demands of cloud-based application delivery. In order for organizations to fully realize the benefits of digital transformation at remote sites requires the something new—software-defined DDI. By virtualizing and containerizing core network services, software-defined DDI (SD-DDI) simplifies and optimizes the network experience by extending the efficiencies of software-defined networking (SDN) and SD-WAN for branch office users connecting to cloud applications.

Market Trends

Migrate to Cloud, React Quickly, Transact Anywhere

Enterprises increasingly want their employees and customers to have the capability to transact business anywhere in a secure and reliable manner. To enable this transition, businesses are turning to the cloud for rapid development and delivery of new features and applications.

Figure 1: Transact business anywhere

According to an IDG survey, speed and flexibility are top concerns for organizations investing in cloud technologies (Fig. 2). Traditional enterprise networks are designed to provide users with access to applications and data hosted centrally in company-run data centers. As enterprise adoption and reliance on cloud-based SaaS apps continue to grow, and as employees work from more

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1 IDG Cloud Computing Survey 2018
geographically dispersed locations, the old methods of backhauling traffic to a central location for inspection adds time and leads to poor end-user experiences.

**Transformation Challenges Extend across Business Verticals**

**Finance**
Banks and financial institutions want to modernize their branches, minimize downtime and provide always-on access to an ever-increasing number of cloud-based banking, lending and investment applications.

**Retail**
Retail stores are increasingly seeing their customers using in-store online browsing. Comparison shoppers expect a consistent online experience no matter where they connect and how they make purchases.

**Franchises**
Expanding retail and dining brands need quick onboarding of new franchises into their core infrastructure. Today, lack of visibility into the network performance of remote locations makes consolidation of franchises a laborious task.

**Healthcare**
Violating HIPPA and other privacy statutes is expensive. Healthcare facilities need rapid, uninterrupted access to patient records while following strict compliance guidelines. As the healthcare system becomes more integrated among hospitals, health clinics and contracted rehabilitation centers, the ability to quickly and flexibly add new sites to the core network in a secure and reliable manner is paramount.

**Education**
K-12 schools, colleges and universities are constantly undertaking multi-site digital initiatives. They need to provide a consistent experience for students and faculty in all campus locations. For example, streaming video service must be available without a glitch at all sites.

**Manufacturing and Enterprise Services**
Manufacturing organizations and enterprise services firms (e.g., technology consultants) are moving to cloud-based applications. Frequently, small teams are involved in remote locations, and local survivability of cloud access is crucial for their success. Simply put, customers are increasingly seeking to affect specific business outcomes with their network, regardless of location.

**Remote and Branch Office Inefficiencies**

**Backhaul latency**
Enterprise WANs were originally designed to backhaul traffic to the headquarters data center. They were not meant to support branch-to-cloud application traffic. WANs connecting data centers and remote entities using MPLS backhaul links and leased lines are not able to keep pace with the dynamic requirements of today’s cloud-based applications. Backhaul architecture routes traffic back through the
enterprise network core in hairpin fashion, introducing significant latency and jitter along the way.

**Inefficient device-centric provisioning**

In legacy DDI deployments, provisioning typically occurs manually, one remote site at a time—making it error prone, time consuming and difficult to ensure policy compliance, performance and availability. Such environments don’t promote business agility; they hinder it.

**Lack of visibility**

The inability to see devices, applications and DDI data across all network deployments has a negative impact on many fronts. Understanding application latency to improve application performance is now a responsibility of the networking team. Without strong DDI visibility tools, enterprises will be unable to figure out why an application is underperforming.

Lack of visibility at a local and global scale makes troubleshooting extremely cumbersome, capacity planning reactive instead of proactive and data collection for compliance and audit a painful manual process.

Finally, visibility is key to security management. The absence of clear global visibility makes managing security a complex endeavor.

**Software-defined Solutions for Remote and Branch Offices**

**SD-WAN**

Corporate data centers benefited immensely from virtualization, SDN and the cloud, but remote locations and branch offices were largely ignored until the introduction of SD-WAN. It has its roots in software-defined networking (SDN), which virtualized and decoupled network software services from the underlying hardware for data center networking. SD-WAN extends the benefits of SDN from corporate data centers to the branch office.

The adoption of SD-WAN by enterprises is driven by the desire to more efficiently connect branch locations and on-premises data centers with workloads placed in cloud service providers' data centers and SaaS services. As Figure 3 shows, it simplifies remote office/branch office (ROBO) networking and

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Cliff Grossner, senior research director at IHS Markit
optimizes end-user experience over the Internet and hybrid WAN. It also helps provide consistent and pervasive connectivity between end-users and their cloud-based applications.

SD-WAN products provide improved capability to handle changing network traffic patterns resulting from cloud computing and new application architectures.

**SD-WAN Benefits**

**Reduces Costs**
SD-WAN delivers a hybrid WAN (the use of corporate WAN and Internet broadband) with ease and elevates the ordinary Internet broadband in branch offices to enterprise-grade WAN. SD-WAN also reduces hardware costs by providing the option to deploy through commercial VM devices and VMs on existing x86-based routers.

**Simplifies Branch Networking**
The manually intensive process requires adding new branch offices to the enterprise lengthening deployment times. SD-WAN helps provision branch offices faster with automated zero-touch deployment, easy configuration and centralized troubleshooting tools. Configuration parameters are application and business centric, and even personnel who are not well versed in networking technologies can easily create, apply and change them. SD-WAN also allows the insertion of network services, such as security, in the branch, in the cloud or in data centers.

**Brings Agility to Branches**
Virtualization and APIs facilitate integration into various management and reporting systems. SD-WAN enables multiple links, devices and services to coexist and interoperate with incumbent solutions. SD-WAN products can detect more failover scenarios than traditional routers can. Thus, they can more easily accommodate additional links, such as multiple broadband links or cellular connections.

**Optimizes Application Performance**
SD-WAN optimizes application performance over hybrid or Internet links with direct, secure access to enterprise and cloud applications.

**Provides Global Visibility**
With SD-WAN, users get consolidated monitoring and visibility across multiple WAN links and service providers. Enhanced visibility, and better analytics and troubleshooting functionality improve mean time to repair metrics and lead to more proactive network operations.
Simplifying SD-WAN with Software-defined DDI

As enterprises increasingly implement SD-WAN to connect data centers and branch offices to enterprise applications in private and public clouds over the Internet, local presence of DDI in all locations becomes crucial. DDI manages network connections to the web for employee and customer devices in a secure and reliable manner, fulfilling the promise of SD-WAN: for remote and branch offices to easily and optimally connect with cloud services and applications.

Historically, branch offices either used local server or router implementations or backhauled DNS and DHCP traffic to their enterprise data center at headquarters for resolution (Fig. 4). Local server or local router implementations are cumbersome to manage per site, and backhauling is not optimal for reaching cloud-based applications. A solution combining local DDI services with cloud-based management ensures application performance and local survivability while centralizing policy control for the entire organization.

BloxOne™ DDI

BloxOne DDI is the industry’s first cloud-managed solution for DDI. Available in a physical and virtual form factor, it is easy to scale, provides global visibility and is available as a subscription-based consumption model. Cloud-based DDI management automates provisioning of remote sites, makes the latest features available automatically without downtime for upgrades and takes network services to the next level.

BloxOne DDI Benefits

Enhanced End-User Experience

BloxOne DDI directs user traffic from remote locations and branch offices to the nearest point of entry in the cloud for SaaS applications, eliminating the latency and performance issues of legacy DDI. Local DNS name resolution of endpoints helps to ensure that the closest entry points are being used to connect users.
Local Survivability
Local DNS resolution and DHCP services ensure that business operations can continue with minimal or no downtime if a disaster disrupts the WAN connection to headquarters.

Enterprise-Grade Reliability
BloxOne DDI provides next level DDI services that are scalable to thousands of sites and enterprise-grade high availability. Two BloxOne DDIs at a remote location share information and responsibilities so that if for any reason one goes down, the other takes over DDI services for that site.

Flexible Packaging
The option of physical or virtual form factors makes packaging flexible. Additionally, since consumption is subscription based and cloud managed, new features are available to customers automatically without downtime.

Cloud-managed Automation
Being cloud managed, BloxOne DDI is highly automated and brings agility to DDI services. Its zero-touch provisioning automates the addition of remote sites and branch offices to a DDI implementation, and eliminates the need for manual, per-site deployment. In addition, policy control is centrally managed, eliminating error-prone manual methods. Templates are available for easy management. Finally, global visibility is available through automated data collection, vastly simplifying compliance and audit reporting. Figure 6 summarizes the many benefits of BloxOne DDI.

SD-DDI Business Use Cases

Affordable Global Connectivity for Remote Sites and Branch Offices
- Subscription pricing
- Virtual form factor
- White box options

Improved Resiliency and Availability for Remote Sites and Branch Offices
- Per-site local presence with cloud-based management

Figure 6: BloxOne DDI Benefits
• Local survivability

Simplified Branch Connectivity, Global Visibility and Reduced Complexity
• Automated provisioning at remote sites at scale
• Central policy control
• Automated cloud managed upgrades
• Automated data collection for global visibility, compliance and audits

SD-DDI Technology Use Cases

Automated DHCP Services
In conventional DDI implementations, DHCP services are managed at remote locations and branch offices using a local server or router. This leads to a device-centric approach to management. Each site is managed individually. Today, provisioning, feature upgrades, monitoring and management, and policy control all need to be handled locally per site. At scale, this manual method is both cumbersome and error prone.

As Figure 7 illustrates, a cloud-managed solution with a virtual form factor eliminates these issues. Per site instrumentation and global visibility are cloud managed and integrated into the solution, making troubleshooting much easier.

Figure 7: Use case: cloud-managed automation for DHCP services

DNS Services Optimized for Cloud-Based Applications
DNS backhaul was originally designed to serve applications hosted in the headquarters data center and does not work for cloud-based applications. When using DNS backhaul, the end-user is not guaranteed connectivity to the local point of presence (PoP) for cloud-based applications. The headquarters data center DNS service could resolve to a remote PoP closer to headquarters than the branch office, resulting in slow application response for end-users at the branch office. In addition, remote sites depend on the link to the headquarters data center for DNS resolution. If that link is down, business can be interrupted.
BloxOne DDI provides a local presence in a virtual or physical form factor, vastly improving the end-user experience when connecting to such cloud-based applications as Microsoft Office 365. End-users can be assured that they are being served by their local PoP rather than some remote PoP as a result of DNS backhaul. (See Figure 8.) Additionally, the solution is locally survivable and does not depend on the WAN link to their headquarters data center.

Figure 8: Use case: DNS services optimized for cloud-based applications

**Simplified DDI Management**

Remote sites and branch offices often use local server implementations, such as Microsoft or BIND for DDI (see Figure 9). Managing sites individually makes policy control cumbersome and error prone. Using a cloud-managed solution offers large-scale automation for provisioning, configuration, policy control and data collection—vastly improving visibility as well as audit and compliance processes.

Figure 9: Use case: cloud-managed DDI

**Conclusion**

Businesses that are undergoing digital transformation and transitioning to cloud-based services are increasingly choosing software-defined solutions. Virtual form factor, cloud-based management and large-scale automation form the crux of software-defined solutions. BloxOne DDI is the industry’s first software-defined DDI solution. It enables remote sites and branch offices to optimize local access to cloud-based applications, improves deployment flexibility through virtualized form factor options, offers local survivability and automates large-scale provisioning, configuration and policy control through cloud-based management.
REFERENCES