

Software-Defined Branch: A New Foundation for the WAN and Branch IT



Produced by



In cooperation with



MAY 2017



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SOFTWARE-DEFINED BRANCH: A New Foundation for the WAN and Branch IT

In 2011, Marc Andreessen famously said ‘Software is eating the world’ and that’s true in nearly all facets of enterprise IT. One area ripe for digestion is the WAN and branch office, which have seen little change in IT operations despite the software revolution occurring in the data center and the cloud. But the emergence of new digital and cloud transformation and the potential benefits they offer enterprises make it clear: The time has come for the hardware-defined branch to evolve to a Software-Defined (SD) Branch.

Today’s branch offices, and the WAN that connects them, are based on static, rigid IT architectures that purport to ease technology management burdens while providing mission-critical capabilities. Due to self-imposed constraints in processes and products, existing branch architectures present hurdles when deploying digital and cloud transformation projects. Consider the various steps in deploying a new branch appliance or server. The hardware must be acquired and shipped to the location. A technician must go to the branch to install it. Power, space, networking and

environmental support requirements like heating and cooling have to be in place. Once the appliance or server is deployed, it must be maintained and managed. In the event of hardware failure, recovery and contingency plans must be created and updated. Rigid, repeatable IT processes are built around this paradigm. They help ensure predictability for IT, but inhibit business agility.

SOFTWARE-DEFINED BRANCH (NOUN): A WAN AND BRANCH IT ARCHITECTURE THAT OFFERS VERSATILE BRANCH SERVICE DEPLOYMENT AND NETWORKING PROMOTING QUALITY OF EXPERIENCE, PRESERVING BUSINESS CONTINUITY, REDUCING IT MANAGEMENT, FLEXIBLE FUTURE PROOFING AND REDUCED OPERATIONAL COSTS.

This rigid WAN and branch office architecture model makes addressing application performance goals for local, data center or cloud-hosted applications difficult to achieve on a per-branch basis. In theory, every branch looks the same; in reality, local conditions including network connectivity options, branch size, and demands and workloads specific to each branch cause variations in application performance requirements.

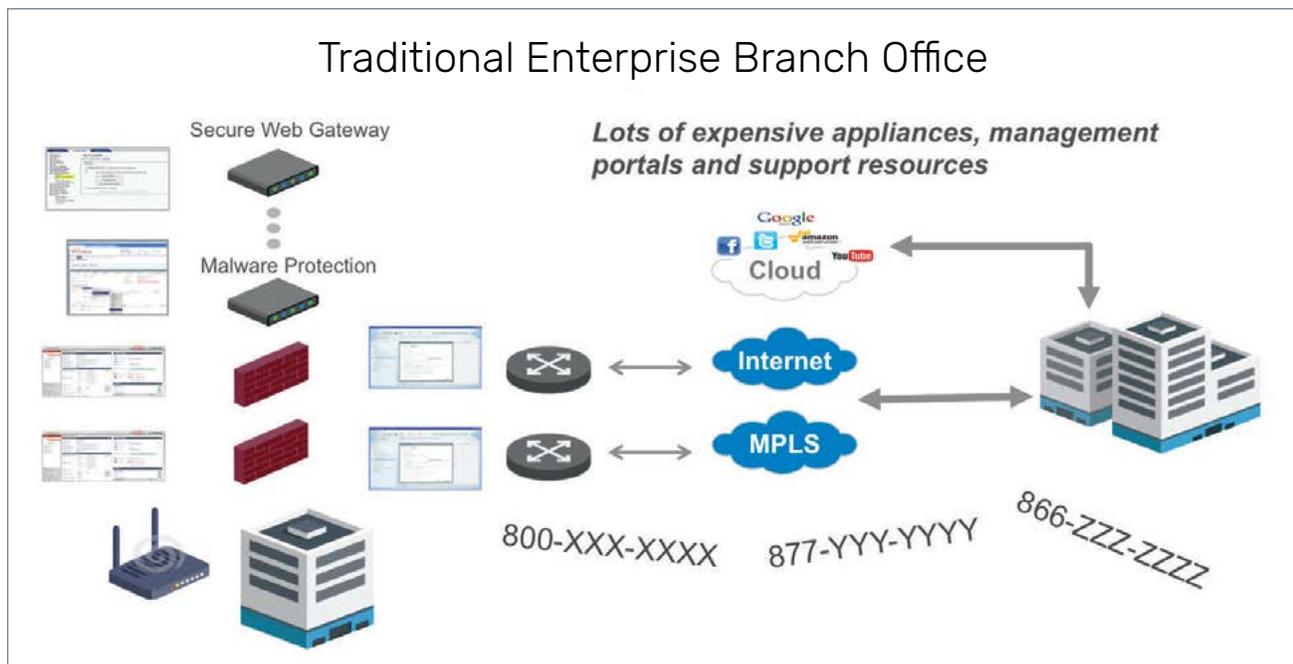


FIGURE 1: Voice, data, Internet, on-premises security and productivity software leads to an expensive, overly complex branch solution.

Enter the SD-Branch, which signals a fundamental shift away from static service and appliance architectures that lock organizations into rigid three to five year technology paths in favor of an agile architecture across IT disciplines. The result is an architecture versatile enough to match requirements such as application access and security in and across branch offices while improving application performance and business continuity objectives, and agile enough to alter as demands change. In addition, the SD-Branch enables updates and architectural changes as needed with reduced cost and complexity.

Shifting Applications

It's no secret that there is a fundamental shift in enterprise application architectures and deployments, moving away from rigid application silos and toward more versatile architectures and a greater reliance on cloud-based applications for CRM, ERP, collaboration, file-sharing and productivity software—including department-driven “shadow IT”—which places a greater demand for resilient Internet connectivity at the branch. SaaS applications offer flexible, versatile capabilities for businesses without the overhead needed to manage the infrastructure, reducing the hardware and software burden.

The net effect on new application deployments is unprecedented versatility in how the WAN and branch infrastructure can be deployed and maintained. In a SD-Branch, IT can add and move applications easily and non-disruptively among branch, data center and cloud as needed. While it's unlikely that applications would be moved on whim in the foreseeable future, the process to move an application becomes greatly simplified in a SD-Branch, thus enabling a more agile branch strategy.

Start at the Network

In support of agile application deployment strategies, the SD-Branch needs equally versatile and reliable networking and security capabilities. Despite various benefits, today's common WAN strategies fall short.

WAN services like private lines and provider VPNs have their place, but the cost and time necessary to acquire and manage them is outpacing their usefulness. Furthermore, depending on

the size of the organization, a single-source provider may further complicate the network and increase reliance on customer-managed routing architectures.

A hybrid WAN strategy—i.e., using two or more WAN providers stitched together via customer edge routing—is a tried-and-true method for branch interconnection, but the operational complexity and monthly recurring costs can be high, while simultaneously limiting performance and flexibility due to considerations like routing architecture development and maintenance, and QoS marking and prioritization.

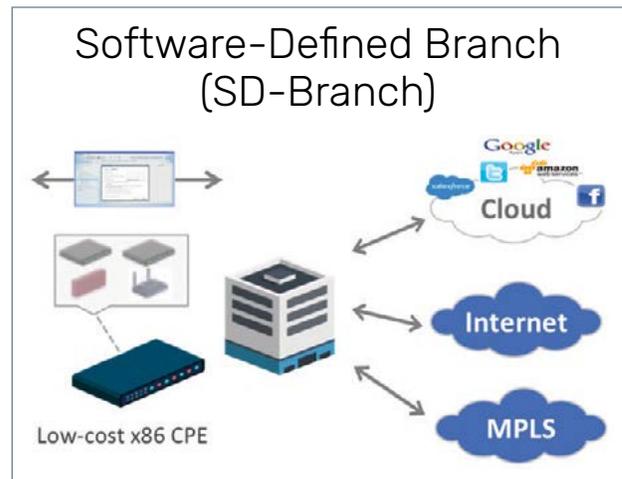


FIGURE 2: Reducing hardware and simplifying the architecture lowers operational and capital costs while maximizing flexibility at the branch.

Alternatively, business broadband can provide significantly more WAN capacity at orders of magnitude lower cost than other WAN technologies. That's because the capacities are in the tens or hundreds of Mbps and the services are ubiquitous, making new deployments faster than traditional WAN services. However, organizations cede other critical requirements when moving to business broadband, like end to end SLAs, the reliability of a provider WAN and data governance, which is critical in regulated environments.

Even using lower cost business broadband, IT networking has to build and maintain a secure, routed infrastructure at the branch offices to fully support multiple Internet connections. While routing protocols like BGP are well understood, supporting WAN routing adds complexity to the branch architecture complicating new branch



installation and modification of existing branches, doesn't provide fast enough fail-over to ensure seamless application performance and doesn't adequately ensure full utilization of WAN links.

The common result of all these legacy WAN strategies is a capital and operational cost-intensive branch strategy that isn't well suited to support the dynamic and diverse nature of applications both today and in the future.

What is needed for an agile SD-Branch is an automated, policy-driven architecture founded on a multi-function architecture that can respond to changes in the network environment with minimal IT interaction.

SOFTWARE-DEFINED WAN (SD-WAN): A Good Starting Point

SD-WAN is a WAN overlay technology that interconnects an organization's locations at the branch, data center, central site and cloud services. Its goals are to provide policy driven, automated and resilient connectivity, and ensuring service-level expectations are met across different applications, whether hosted by the enterprise or in a cloud or SaaS service. SD-WAN also consolidates numerous functions often deployed as individual branch appliances such as branch routing, firewall, VPN and link load balancing onto a single platform with a comprehensive policy determining how traffic is to be handled. The technology relies on customer-led policies that define the business priorities applied to application traffic as well as necessary access controls. The SD-WAN utilizes knowledge

of the real-time conditions of two or more WAN links and optimizes traffic forwarding based on the current policy and best WAN link at a given moment.

SD-WAN policies are not typically the same sort of rigidly defined instructions enterprise IT is used to implementing. Rather, the policies state the desired outcome and trusts the SD-WAN to determine how to achieve that outcome. SD-WAN provides better application performance in the branch by using automation to adapt to changing network conditions as they occur. The adaptability allows an organization to move some or all of its branch application traffic to business broadband, at reduced cost, while maintaining, or often improving, application performance including applications hosted in IaaS, PaaS or SaaS clouds.

Another benefit of SD-WAN is faster deployment of new locations. That's because business broadband can be deployed faster than traditional WAN services, and the reduced infrastructure in the branch (if just SD-WAN is used) is simpler to install and can be centrally reconfigured as needed. The SD-WAN can be easily customized with new applications or configurations as the organization's business demands change without having to deploy new hardware appliances.

However, SD-WAN only addresses part of the overall requirements at a branch – the connectivity. What's missing in most solutions is to make the entire branch contextual of its applications, users and location, and integrate that with multi-level security (NG firewall, web proxy, AV, IPS/IDS, malware protection, etc.).

TAKING THE BENEFITS OF SOFTWARE-DEFINED FURTHER: SD-Branch

The goal for IT and business leaders is to have a WAN and branch network that can optimally and cost effectively support application access during normal and degraded scenarios, as well as adapt to new requirements, improve branch agility and provide full security as workloads continue to evolve off-premises.

A SD-Branch can reduce capital and operational costs by consolidating siloed branch hardware and software—including virtualized instances of network appliances like firewalls and web proxies—onto a multi-service software platform running on low-cost x86 hardware. Deploying services to the branch—stand-alone or as part of a service chain—can be driven centrally and service-chained, reducing the need to send technicians on site or perform extensive troubleshooting.

Enablement of seamless and secure access to cloud-based applications is a critical feature of the. Organizations historically chose to tunnel all branch traffic back to a hub or data center site to centralize security services for both business and non-business traffic. Enterprises' increased use of cloud-based applications like CRM and office productivity and the ability to service chain security functions allows employees to securely access trusted cloud-hosted applications—improving application responsiveness while general Internet traffic from guest Wi-Fi, etc., can be handled differently. The security capabilities in a SD-Branch means enterprises can better balance security controls and application access with precision.

A concept underpinning any successful SD-Branch is contextually aware policy enforcement. This is where combined requirements for things like the user and their role, the application performance requirements, security requirements and current network conditions are applied to make forwarding decisions on network connections. A contextually aware policy implements application performance and access controls in a dynamic environment, based on business requirements. Key implementation stakeholders like managers, networking staff and security administrators must develop a comprehensive set of goals that satisfy

business and governance requirements (see Figure 3). Those goals are then used as the basis for enforcing policy, which is enforced in the branch as required. The contextual awareness helps to abstract common, static qualifiers like IP addresses so that a flexible policy can be implemented that achieves the desired business goals.

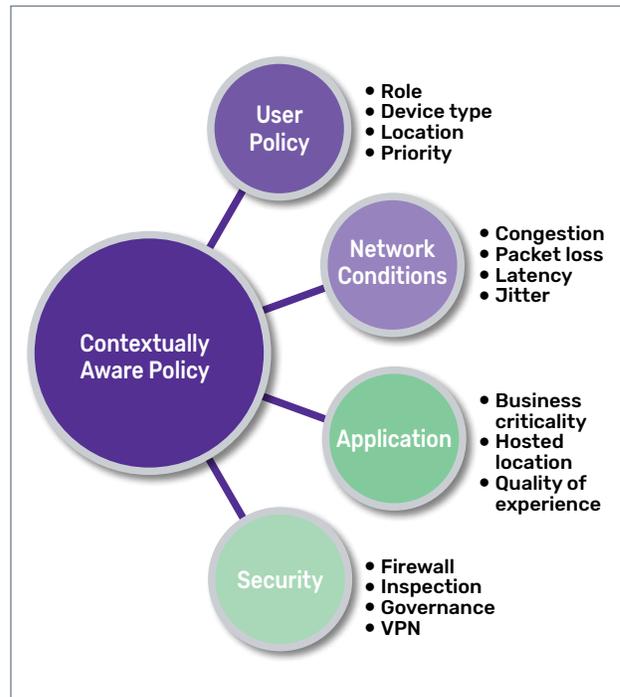


FIGURE 3: Example of elements used to define a policy.

A critical requirement at the branch is the ability to discover and classify application traffic in real time, regardless of IP address, even if the traffic is encrypted. Once the application is known, the appropriate policy for the user or role can be applied, and a forwarding decision can be enforced based on network conditions and requirements. For example, encrypted communications services like Skype for Business offers a number of capabilities like voice and video, IM, screen sharing and file sharing. Each of these applications may have different security policy requirements so the ability to detect in real time the sub-application and direct it to the appropriate security function like anti-virus is critical.

Trends in Software-Defined Networking (SDN), network function virtualization (NFV) and automation – coupled with growing real-world experience with these trends among

IT professionals, VARs and integrators – are advancing the SD-Branch from aspiration to reality. The shift in the data center from physical servers to virtual machines brought significant benefits to enterprise IT. Similarly, the shift from proprietary hardware-based branch networking and security to a SD-Branch with virtualized and integrated functions, coupled with low-cost x86 appliances, will bring major benefits to the next wave of digital transformation and enterprise IT.

EMBRACE THE SOFTWARE-DEFINED BRANCH

One of the first hurdles enterprise IT pros must clear is an aversion to automation. IT already uses automation broadly, but the result is so seamless and reliable that it barely gets noticed. VoIP offers a good illustration. Most enterprises using VoIP have automated the deployment and provisioning of new phones. Plug a handset into the network and the phone is discovered, the port and VLAN is provisioned, the SIP server is assigned, E-911 is set up and the phone is functional all without operator intervention. There is, of course, initial configuration, but once done, the actual service deployment is automated. Similarly, automated workflows are common among other applications and use cases.

Some organizations may misunderstand their roles in enabling this automation. To be clear, IT staff

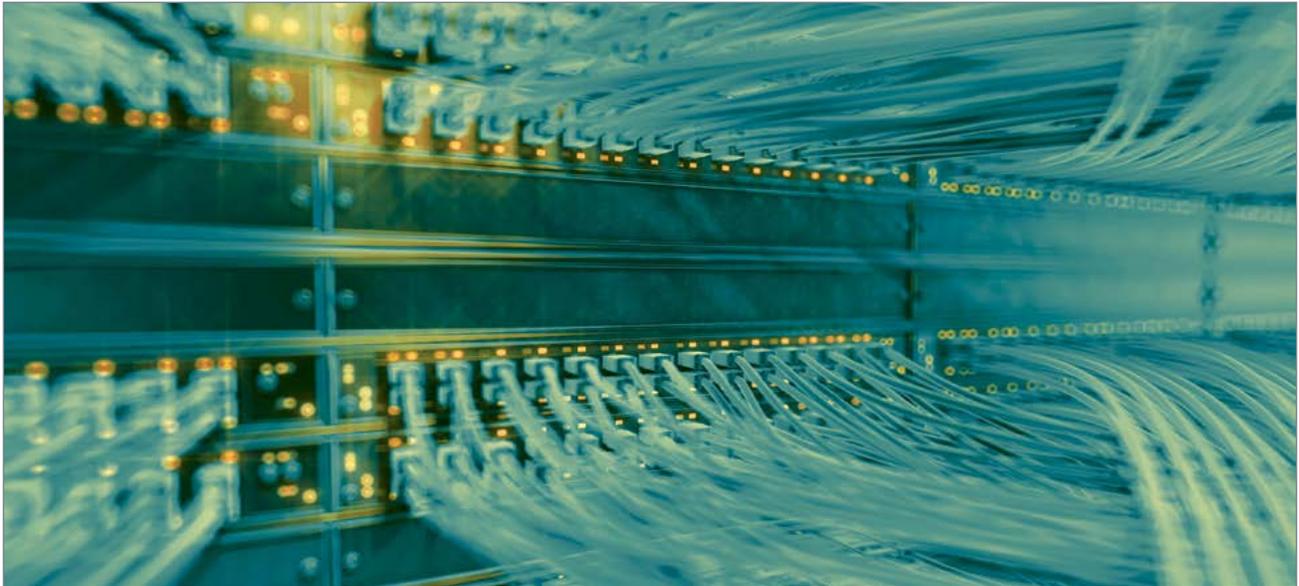
shouldn't be expected to write integration code or scripts to automate deployments; that level of integration should come from the products, value-added resellers, integrators or other contractors. The SD-Branch does mean leveraging application-level visibility and control, coupled with network automation tools like service chaining, to build workflows that stitch together the steps to manage high performance and secure policy-based networking.

The SD-Branch hinges on codifying business intent across multiple networking and security functions with configurations that are templated and automated, providing consistency and flexible, supporting branch network customization based on specific demands.

SOFTWARE-DEFINED BRANCH BUSINESS CASE

Claims of capital and operational costs savings vary by customer, but making the business case for the SD-Branch is straightforward and can be compelling. Making an accurate and defensible business case will not only help IT move forward with a SD-Branch, but also help clarify the requirements and goals in the strategy. Defining and tracking measureable goals will help keep the project on track and prepare IT for any changes in the future. Let's start with quantifiable costs:





WAN COSTS

Business broadband can deliver more capacity in more locations usually for far less than dedicated WAN connectivity such as T1/E1, carrier Ethernet or MPLS VPN. Additionally, business broadband can usually be delivered in days or weeks, compared to weeks or months for traditional WAN services. The cost savings of business broadband can reach hundreds of dollars per month for each connection, and when bonding dedicated WAN to reach similar business broadband capacities, the cost savings can reach thousands of dollars. Understandably, the capabilities of the services are different. Business broadband over the Internet becomes less reliable once the traffic leaves the broadband provider's network; it is subject to the whims of the Internet. Dedicated WAN technologies have committed base capacities and burst capacities backed by service level agreements between locations.

Compare

- The price of a logical capacity unit (like Mbps) between business broadband and dedicated WAN.
- The price to reach comparable capacity both in installation and monthly recurring costs (MRC).
- The costs for an SD-WAN with MPLS plus business broadband compared to a dedicated WAN service.

Watch for

- Business broadband lacks the same quality of service and service level agreements between locations that are available with dedicated WAN.
- Business broadband won't be able to help troubleshoot connectivity issues between locations.
- Organizations will need secure VPN tunneling between locations since the traffic will traverse the Internet, which may be an additional hardware and software cost in the branch.

CUSTOMER PREMISES EQUIPMENT COSTS

The SD-Branch relies on consolidating branch networking and security functions via converting to virtualized services running on general purpose x86 appliances or servers—two for redundancy, but one may be sufficient—thereby reducing costs associated with acquiring multiple proprietary hardware devices, utilizing physical space in the branch, power and administrative time/truck rolls. If there are many appliances that can be replaced, the hardware reduction can be significant. However, as appliance vendors offer VM-based instances of their products, the capital cost savings from a software-only license individually may not be significant. The deployment and operational costs will still vary widely depending on the degree

of interoperability between the virtualized services and how many different vendors' products are retained or consolidated.

Compare

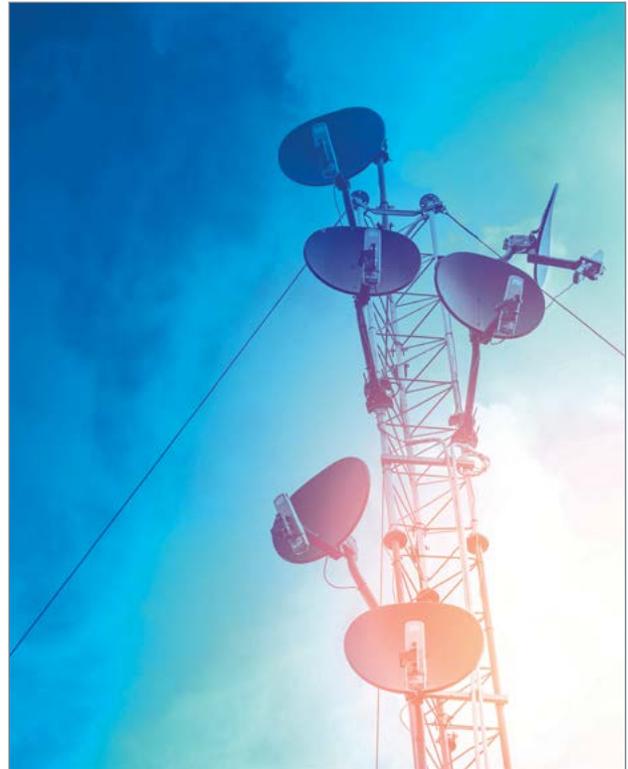
- The costs for multi-service software licenses plus the costs for x86 appliance/server in the branch with the costs for single-purpose hardware appliances and software supporting the required functions.
- The time required for deployment, troubleshooting and ongoing management, of multiple virtualized appliances or services vs. consolidating to fewer multi-function software instances.

Watch for

- The cost savings for hardware may or may not be significant (depending on plans to use virtual appliances or not).
- The hardware cost for redundancy in active/active or active/passive fail-over or clustering.
- The software cost for redundancy in active/active or active/passive fail-over or clustering.

Operational costs - such as increased efficiency through reduced management overhead, shorter time to deliver new services, shorter time to modify services, reduced troubleshooting time and improved employee productivity - are more difficult to measure because the processes aren't in place to do so. Hence estimating cost reductions means guessing the impact of new operations. However, some items to consider are:

- The total time to deploy and provision a new location, taking into account the current workflows for each branch service as well as the total time for a branch deployment including travel time if needed.
- The total time to modify a service in one or all locations on an ongoing basis, which can vary depending on the changes needed like adding new hardware or simply adding new services via a software update.
- The total time to react to IT problems in locations, such as hardware failure or WAN black or brown-out. This can include the time IT spends on resolving issues as well as the reduction in productivity at the branch.



Be sure to enlist the help of your business office early in the process of building the business case to better develop a sound and defensible business case when presenting to management for approval and to identify unforeseen business obstacles. Armed with this information, developing a return on investment as well as total cost of ownership comparisons along with well-articulated soft benefits will help make the case to move to a SD-Branch.

AGILE, EFFICIENT, COST EFFECTIVE: Pick Three

The SD-Branch can meet the agility, cost and security demands of today's organizations by removing the reliance on fixed function hardware with multi-service software alternatives that are just as performant and reliable as hardware appliances (if not more so). Software functions can reside at the branch, the cloud or the data center with no disruption to the user experience or productivity. The SD-Branch will require new IT workflows and a new approach to architecting the branch environment but the benefits of better agility, flexibility, lower cost and richer security is compelling.

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