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**WHITE
PAPER**

The Future of Managed SD-WAN Services

*A Heavy Reading Market Leader Survey summary report produced for
Accedian, Amdocs, and VMware*

ACCEDIAN  **amdocs** **vmware**[®]

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INTRODUCTION*

Heavy Reading has been conducting surveys focused on software-defined WANs (SD-WANs) and SD-WAN services for more than five years. Past surveys have revealed concerns about the cannibalization of high value carrier services such as MPLS and the most cost-effective and efficient way to deploy, manage, and secure SD-WAN services. Today, Heavy Reading is seeing enterprises turning away from DIY SD-WAN implementations and looking to managed services.

Heavy Reading's current **SD-WAN Managed Service Survey** looks at how SPs are building and managing their SD-WAN service—how they are monetizing the service, where they are encountering challenges, and where they see an opportunity for differentiation. It also looks at how the hyperscalers are affecting the market as either partners or competitors to the service providers (SPs).

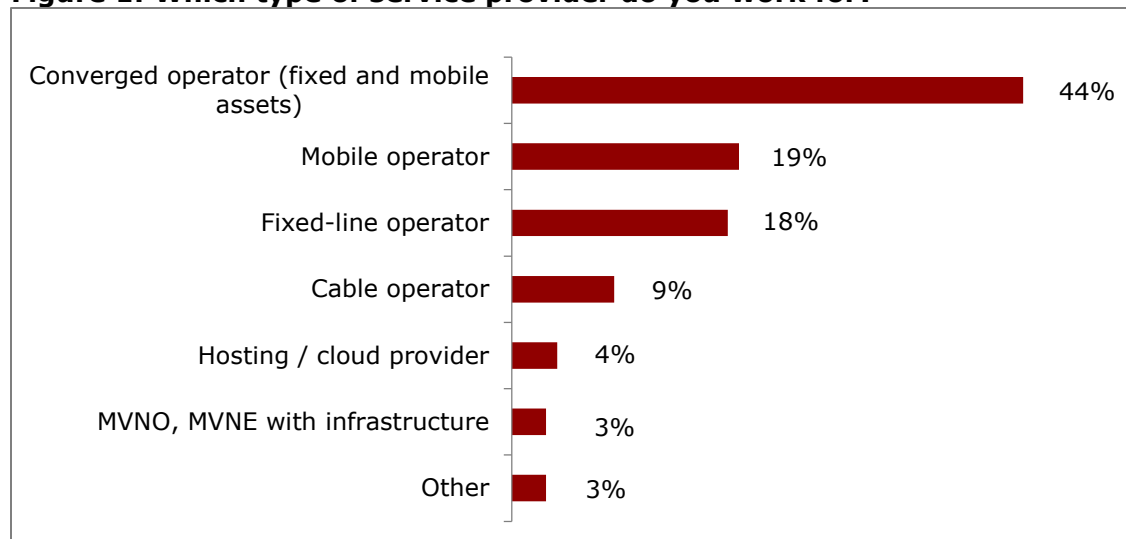
It is evident from the responses to this survey that SPs have deployed robust, scalable SD-WAN services. However, many challenges remain regarding how to manage the services as they grow to encompass multiple domains, clouds, and vendor solutions.

Note*: this is an edited version of the full survey report. For the full survey report, please contact us at [accedian.com/contact](https://www.accedian.com/contact).

DEMOGRAPHICS

Mobile and converged operators made up the bulk of Heavy Reading's survey respondent pool, accounting for almost two-thirds of overall responses of overall responses. An additional 27% came from the fixed-line and cable operator community. The remaining 10% hailed from hosting and cloud providers (4%), mobile virtual network operators (MVNOs)/mobile virtual network enablers (MVNEs) with infrastructure (3%), and others (3%).

Figure 1: Which type of service provider do you work for?

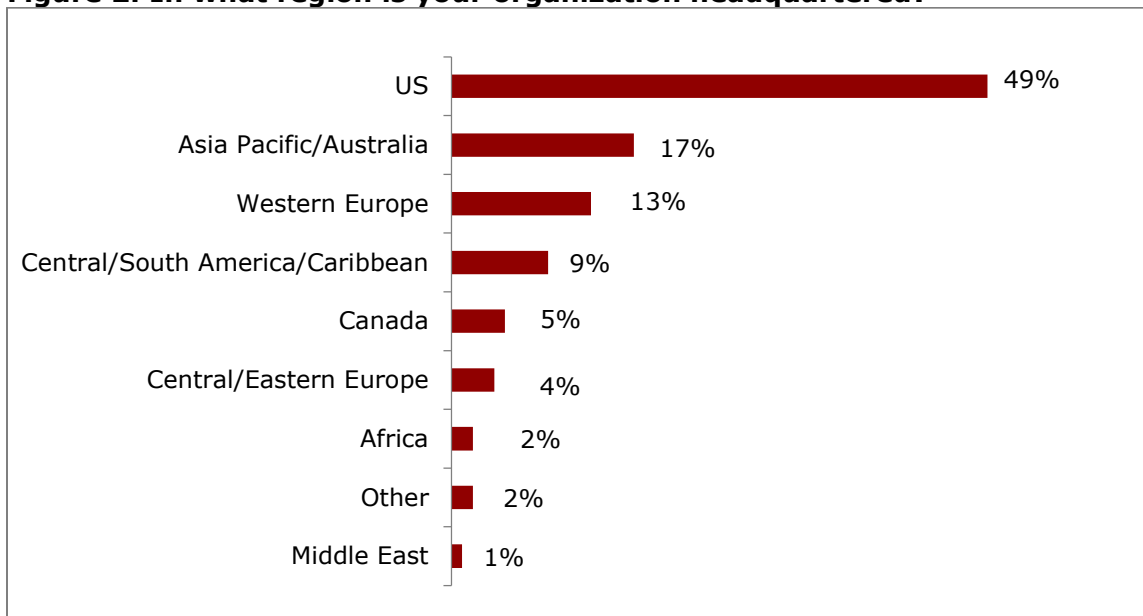


n=103

Source: Heavy Reading

The US accounted for just under half of the respondents, as shown in **Figure 2**. The Asia Pacific/Australia region provided the second largest block, with close to one-fifth of overall responses. Canada and Central/South America/Caribbean rounded out the Americas region with an additional 14%. All of Europe, the Middle East, and Africa together accounted for a fifth of respondents (20%).

Figure 2: In what region is your organization headquartered?

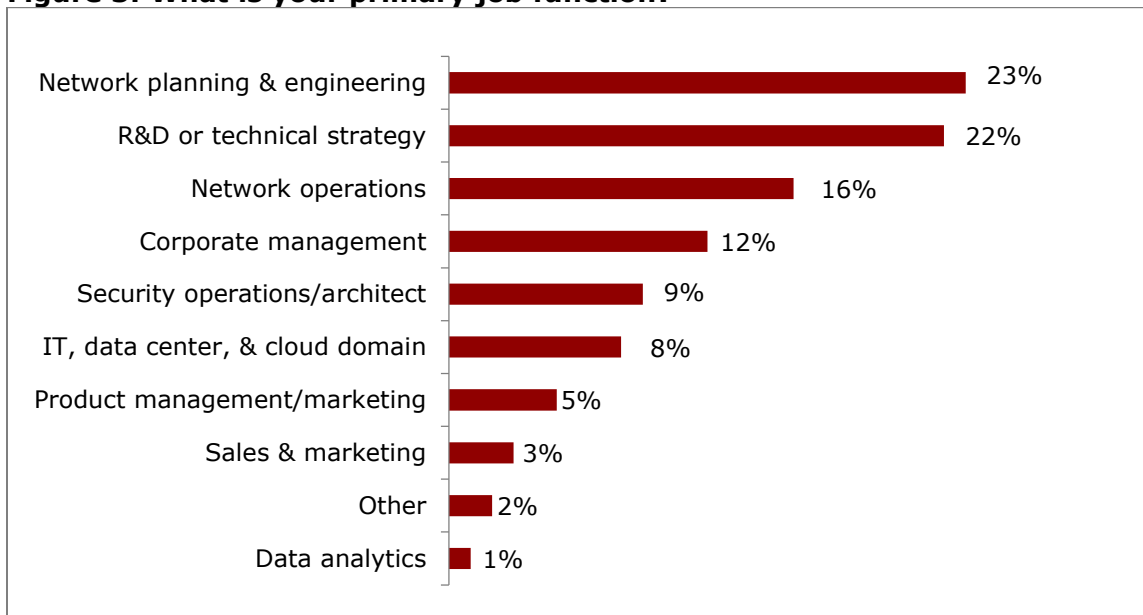


n=103

Source: Heavy Reading

As is the case with most Heavy Reading surveys, the majority of the respondents, 61%, were from technical networking roles: network planning and engineering, R&D, and network operations. One-fifth were from management, marketing, and finance. Security operations/architect made up just under 10% of respondents. The data center is more heavily represented in recent surveys; 8% of respondents were from IT in this survey. Data analytics and "other" made up the remaining 3% of respondents.

Figure 3: What is your primary job function?

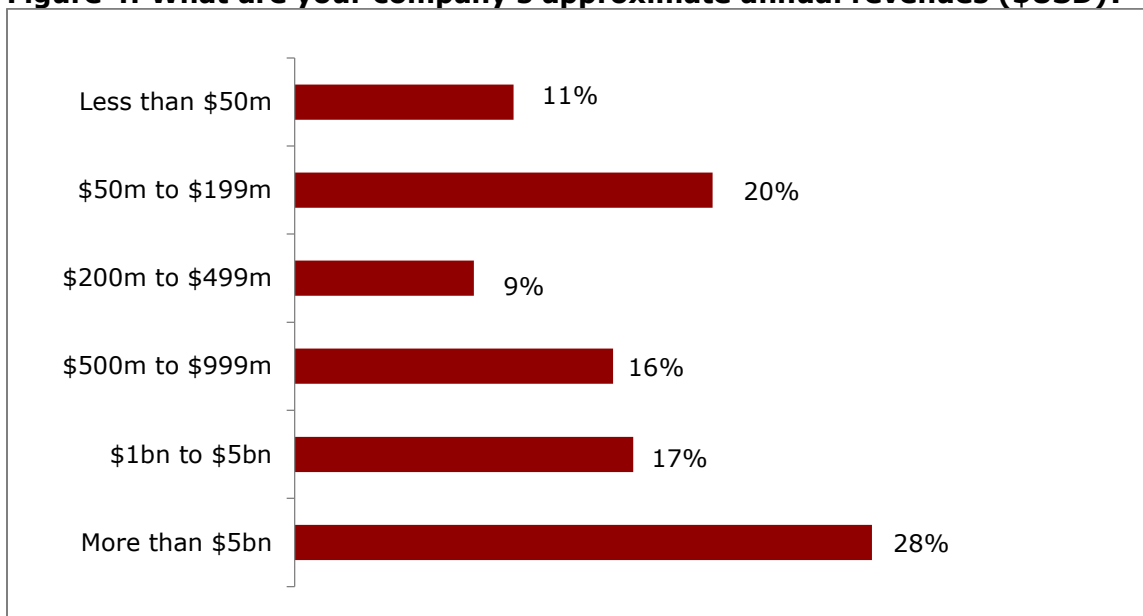


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Source: Heavy Reading

28% of respondents reported their companies have revenue of over \$5bn. Another third have revenue of between half a billion and \$5bn. The remaining 40% have revenue under half a billion. These smaller SPs include regional business units of larger carriers (e.g., Telefónica), dominant carriers of smaller countries, and over-the-top (OTT) vendors, hosting vendors, and MVNOs/MVNEs.

Figure 4: What are your company's approximate annual revenues (\$USD)?



n=103

Source: Heavy Reading

CARRIER SD-WAN PHILOSOPHY

How are carriers planning to develop and monetize SD-WAN services? Will they expand the customer base and market footprint? Address additional demand from existing customers? Enable the SP to upsell new service and solutions into the SD-WAN base? All these revenue accrual strategies take a back seat to the dominant revenue protection and monetization goal: the carriers want to retain their existing connectivity business—MPLS—at risk of erosion from SD-WAN. While carriers agree that SD-WAN has, to a large extent, been additive to MPLS services and that MPLS will be around for the next decade, they also observe that new MPLS implementations are decreasing. Carriers are seeing the move toward hybrid networks and cloud access, where MPLS or leased lines are likely to be replaced at smaller sites with SD-WAN and broadband access. Network operators need to focus on innovating around SD-WAN, not on shoring up the MPLS fortress. Partners to the telcos have an opportunity to assist in this journey by helping the telcos develop new monetization strategies centered on services that are growing in terms of both numbers of customer and revenue, such as SD-WAN.

SD-WAN IN VERTICAL INDUSTRIES

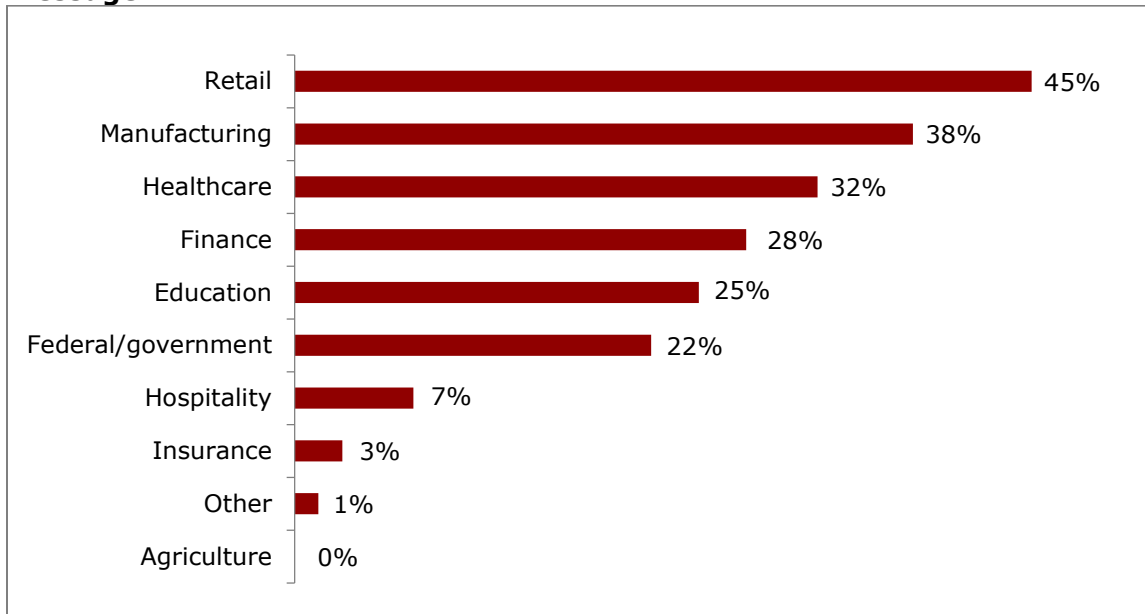
Over two-thirds, 68%, of Heavy Reading's survey respondents identified a vertical industry focus for their SD-WAN services. As seen in **Figure 5** below, retail leads in terms of vertical industry. SD-WAN is an ideal technology for connecting multiple storefronts, warehouses, and delivery hubs. Retailers also want to be able to provide customers with a multichannel experience—enabling them to easily connect with the retailer's online presence while the customer is in the store. This gives the customer access to the "endless aisle," allowing them to virtually browse items that are out of stock or not on display and have selected products shipped to their home.

Manufacturing is likewise full of use cases that leverage SD-WAN capabilities. Locations are often globally distributed, demanding a cost-effective, global solution with the flexibility to add/move/change sites quickly. Because it is software-defined and cloud-based, SD-WAN offers this flexibility. Even at critical production sites, SD-WAN can provide backup connectivity secondary to MPLS or leased lines.

Internet of Things (IoT) in the form of cameras, sensors, and meters is part of manufacturing today, with millions of new devices requiring connectivity every year. Again, the software-defined and cloud-based nature of SD-WAN keeps platform and network costs down as manufacturers bring more IoT devices online. Connectivity on the factory floor, in the warehouse, and throughout the supply chain is critical in the manufacturing space—and well suited to an SD-WAN service solution.

Healthcare is seeing a rise in the use of cloud applications, a shift that has been accelerated by the COVID-19 pandemic and increased demand for remote healthcare. Like retail and manufacturing, healthcare is characterized by the need to connect multiple disparate locations such as doctor's offices, hospitals, and pharmacies. With SD-WAN, healthcare IT can establish connectivity across this entire healthcare ecosystem.

Figure 5: Which verticals are you focusing on that have a clear/specific vertical message?



n=69

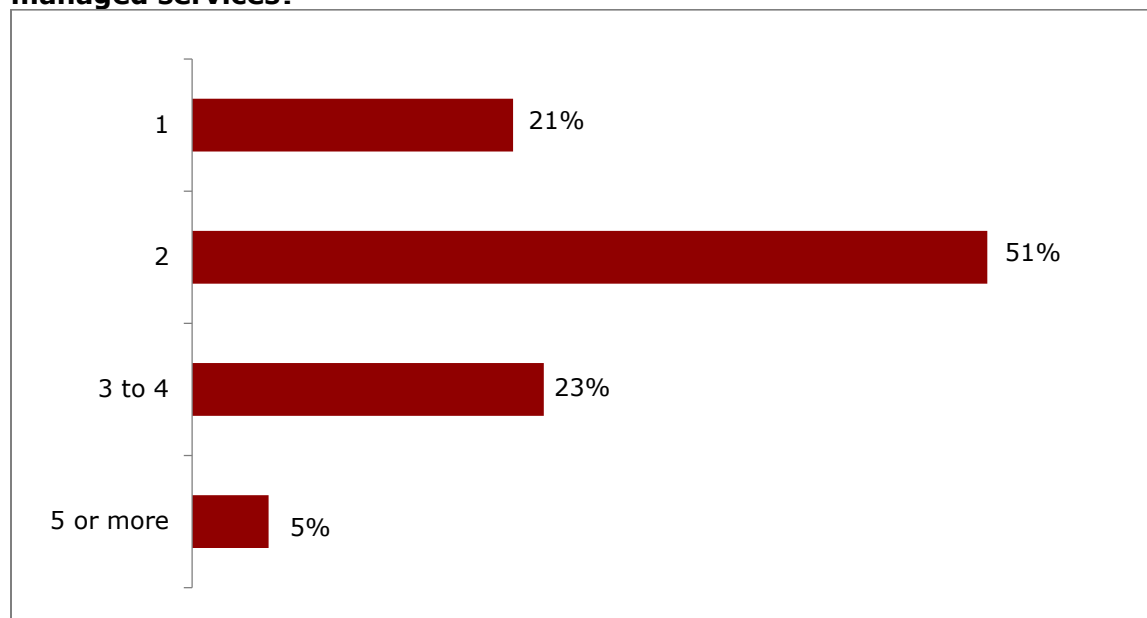
Source: Heavy Reading

SD-WAN GROWING PAINS

Almost three-quarters of Heavy Reading’s respondents are providing only one or two SD-WAN vendor solutions as managed services. This is indicative of the complexity that is introduced into the service by adding just one additional platform. It is also a testament to how diligently SPs have worked, despite acquisitions, mergers, customer demands, and geographical demands, to simplify the service offering and restrict the number of platforms to a manageable two.

Almost one-quarter of respondents use three to four solutions. The majority of these are large Tier 1 operators for which restricting the number of vendors to three or four solutions is, in itself, a victory. Looking *only* at responses from telcos with over \$5bn in revenue, three to four solutions is the top selection—garnering 45% of the \$5bn+ responses. Another 10% of these top SPs support five or more platforms, compared to only 3% for all other categories of revenue.

Figure 6: How many SD-WAN vendors' solutions do you use in your portfolio of managed services?



n=101

Source: Heavy Reading

CHALLENGES IN MANAGING PERFORMANCE

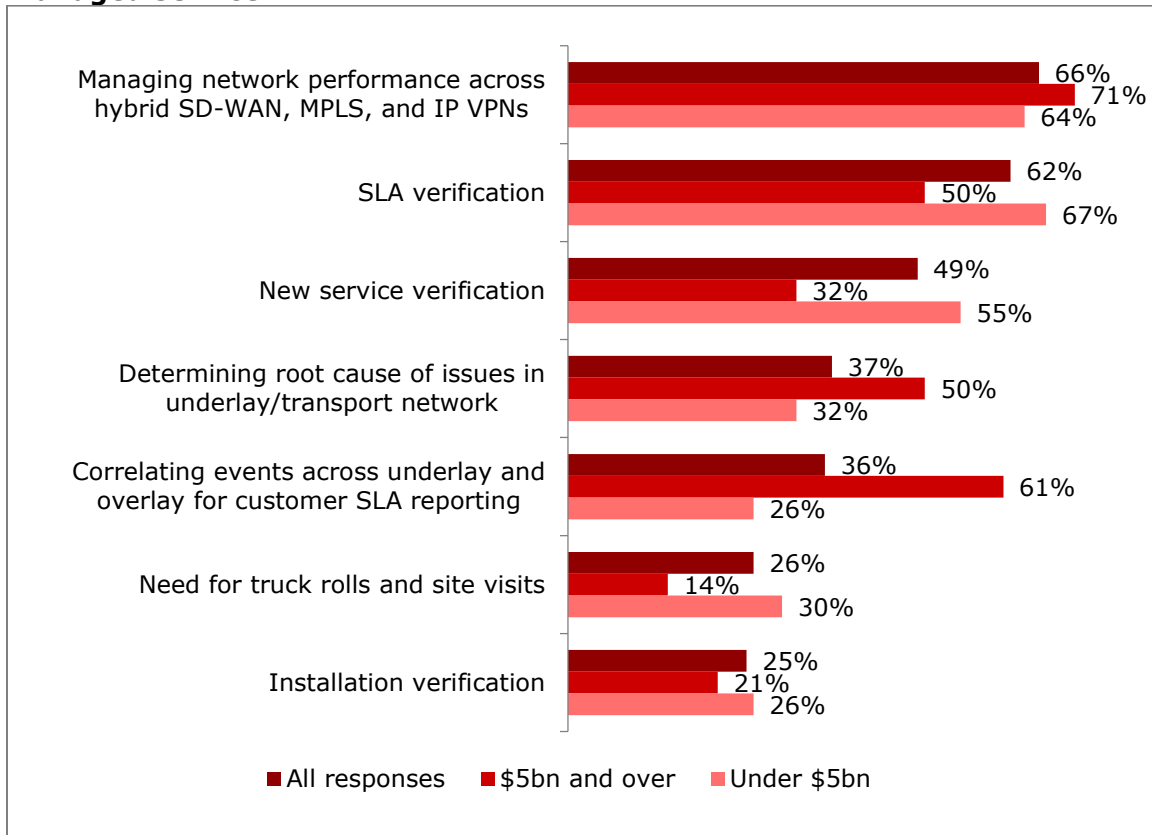
“Managing network performance across hybrid SD-WAN, MPLS, and IP VPNs” emerges as the most significant challenge. It has an even higher response rate, of 71%, if the pool is limited to SPs with over \$5bn in revenue.

The other challenge where the response from \$5bn+ SPs was greater than that of the total survey population was the multidomain management challenge—“correlating events across underlay and overlay for customer SLA reporting.” 61% of large carriers noted this as a concern compared to *only* 26% of those with revenue of under \$5bn. This response is related to the number two challenge identified—“SLA verification”—which requires the correlation of events across the overlay and underlay network. Multilayer root cause analysis is also connected with underlay/overlay SLA reporting, clarifying that the challenge lies not only with the SLA reporting side of the equation, but also with the multilayer root cause analysis side.

“New service verification” ranks third in Heavy Reading’s list, with just under half of respondents citing it as a concern. It is clear that automation has permeated the entire SD-WAN service lifecycle. Heavy Reading anticipates this is a challenge that SPs will overcome through automation within the next 12 months.

Truck rolls and site visits are always a concern with the SPs due to the cost and time they incur. However, they rank low on Heavy Reading’s list of challenges, along with installation verification. This is a testament to the degree of automation already available in the form of remote management and configuration in today’s software-based SD-WAN solutions.

Figure 7: What are your three biggest challenges to delivering SD-WAN as a managed service?



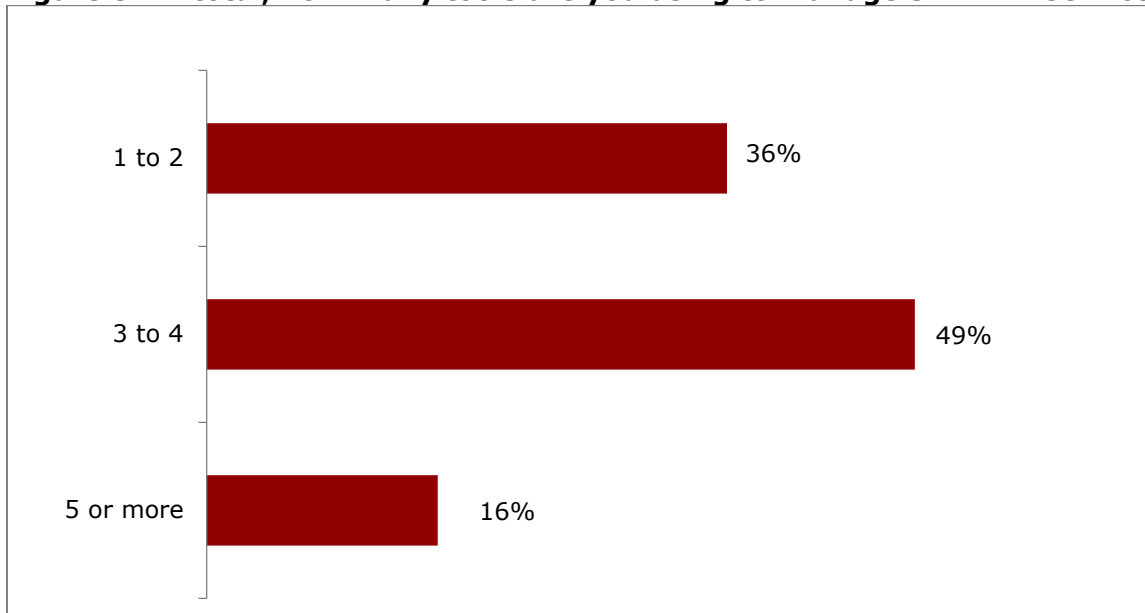
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Source: Heavy Reading

The main difficulty is managing a highly distributed service across multiple networks and cloud domains and integrating it into existing OSS/BSS systems. These, along with managing multiple SD-WAN platforms, are core challenges for the carriers every time they introduce a new service. How is SD-WAN any different and how are the SPs addressing these challenges? Heavy Reading identifies some of the technologies and strategies the SPs are bringing to bear on these challenges.

As seen in **Figure 8** below, more than 60% use at least three different management tools to manage SD-WAN services, with 16% using five or more tools. Just over a third, 36%, of SPs are able to restrict themselves to only one or two tools.

Figure 8: In total, how many tools are you using to manage SD-WAN services?



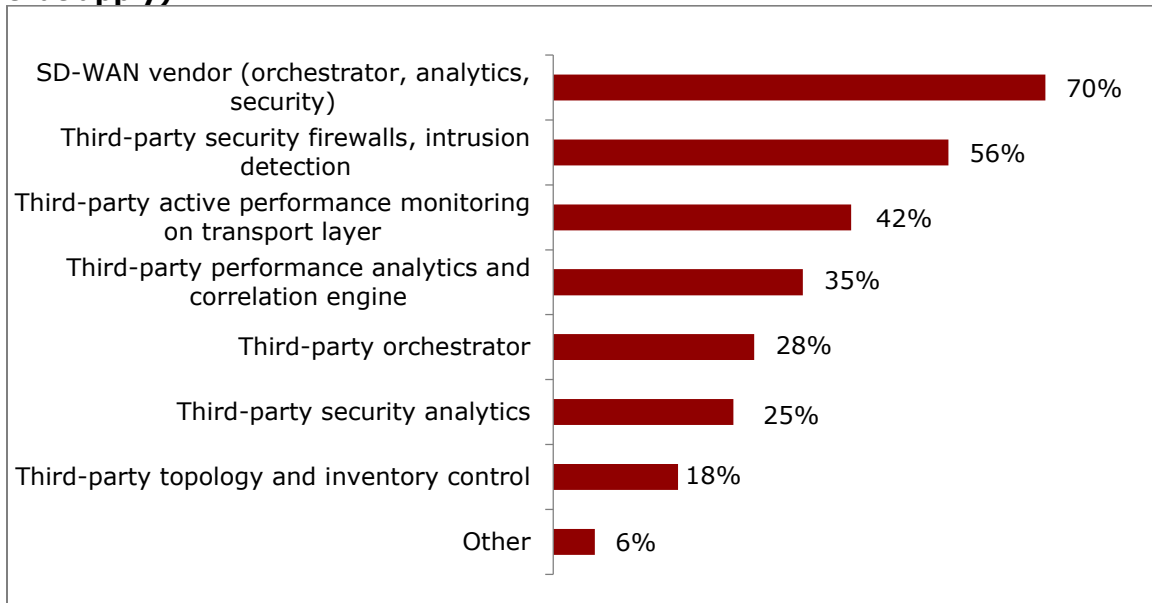
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Source: Heavy Reading

What are these tools and how satisfied are the SPs with them? 70% of respondents rely on management solutions from the SD-WAN vendors—bundled, pre-integrated solutions that include orchestration, analytics, and the security. However, they are also likely to implement some management functions à la carte; SPs are most likely bring in a third-party, best-of-breed solution for security firewalls and intrusion detection. A specific security solution is also often requested by the enterprise, a request that SPs are motivated to honor to maintain the customer relationship.

“Active performance monitoring on transport layer” and “performance analytics and correlation engine” are the next tasks most likely to be sourced separately from a third party. This is critical to get visibility into physical network performance, as well as SD-WANs, and to correlate events for customer reporting and SLAs. These are followed by “third-party orchestrator”—where the SP may decide that features such as pre-integrated VNFs, VNF orchestration, partner authentication, or cloud collaboration provide enough additional benefit to warrant going with a separate third-party orchestrator. “Third-party security analytics” are used to help keep up with the size and volume of cyberattacks. They can combine a big data platform with advanced analytics, threat detection, monitoring, and incident response. “Third-party topology and inventory control” allows SPs to use information on network topology and configuration to isolate network elements, understand their effect in the network, and correlate alarms and troubleshoot issues.

Figure 9: What type of tools are you using to manage SD-WAN services? (Check all that apply)

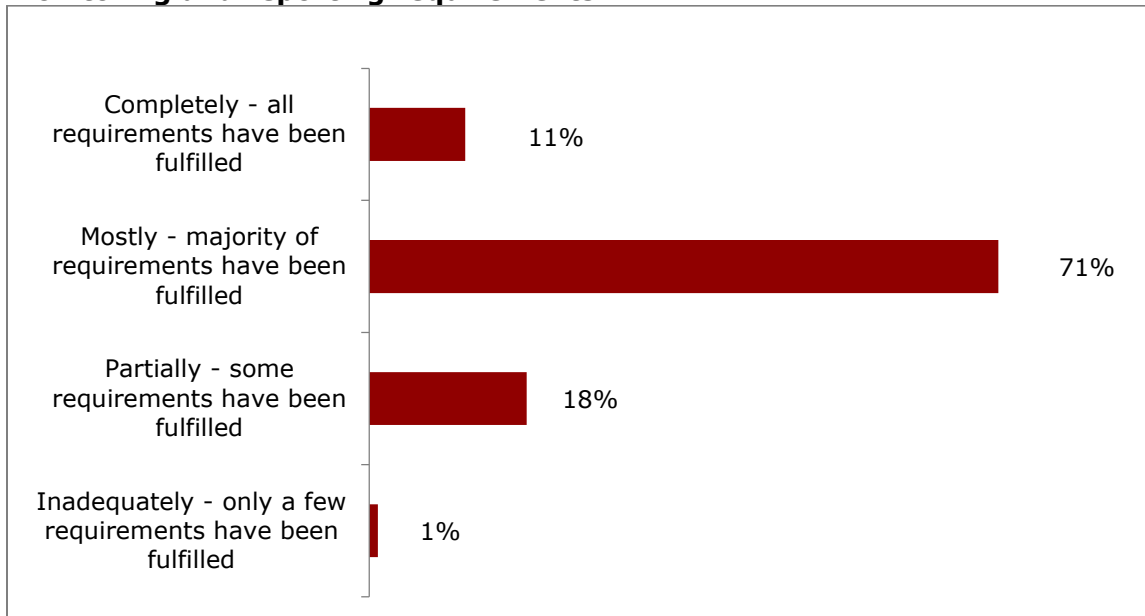


n=102

Source: Heavy Reading

Are the SD-WAN vendors meeting the SPs' performance, monitoring, and reporting requirements? As shown in **Figure 10** below, 11% of Heavy Reading's respondents say yes. The remainder of the respondents indicated their solutions are not delivering all the functionality needed. 71% of those surveyed responded that vendor delivered tools, by and large, satisfy their requirements. 18% are less content with the performance of their solutions; one carrier found its current solution to be inadequate. In what way is functionality lacking in these solutions? **Figure 11** breaks down the performance of these tools by management task.

Figure 10: How well do your current SD-WAN vendors meet your performance monitoring and reporting requirements?

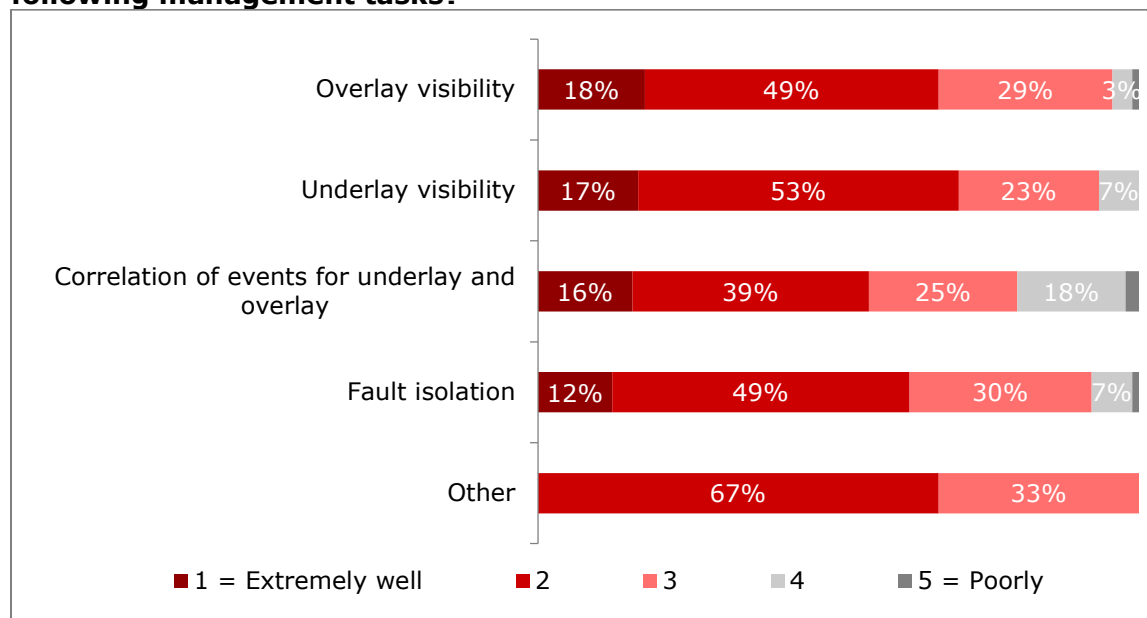


n=102

Source: Heavy Reading

Only 18% or fewer of survey respondents believe their SD-WAN vendors perform these management tasks “extremely well,” leaving a lot of room for improvement and opportunity for competitive differentiation from SD-WAN vendor partners. As anticipated by responses to earlier survey questions (see **Figure 7**), respondents are least satisfied with event correlation between the underlay and overlay network. Close to half of the respondents—45%—rated this task a mediocre 3 or worse. Overlay visibility and underlay visibility (separately) fared a little better, but both still had about a third of respondents rating the tasks as a 3 or lower. Fault isolation shows only 12% of respondents as “extremely satisfied” and close to 40% on the medium to poor side of the spectrum. This response also relates to the ability to correlate events on the underlay and overlay and then provide root cause analysis.

Figure 11: How well do the tools provided by your SD-WAN vendors perform in the following management tasks?



n=102

Source: Heavy Reading

THE ROLE OF AUTOMATION

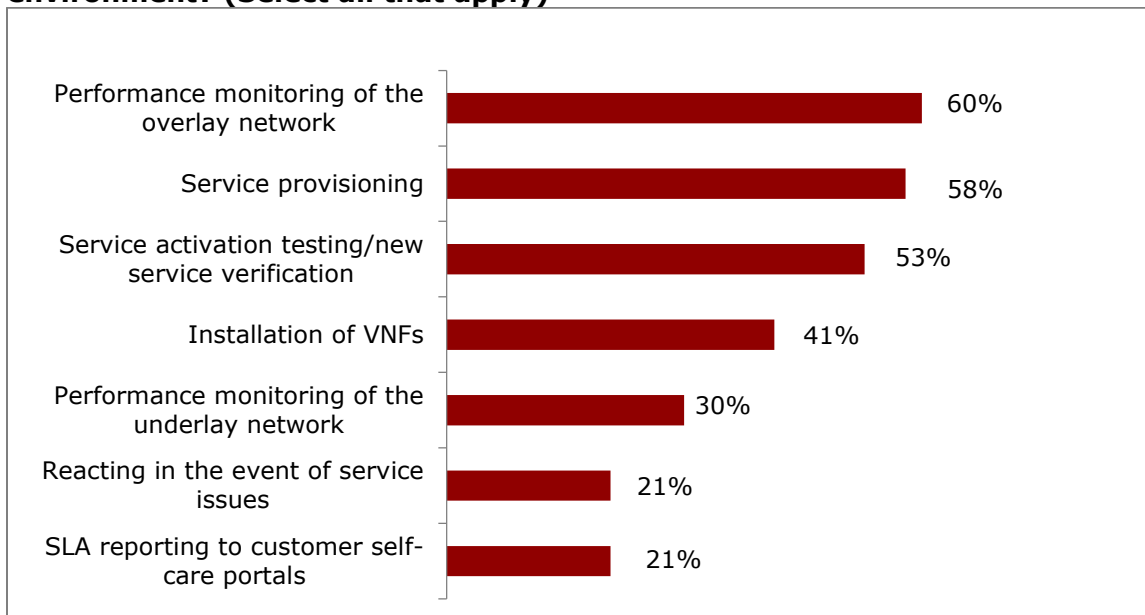
Overlay visibility ranked the highest in task performance in **Figure 11** above. This is not surprising because SD-WAN is an overlay network—the ability to see into the overlay is step one in offering an SD-WAN service. And since it is software-defined, automation is straightforward, particularly for a single vendor solution. Thus, it is not surprising that “performance monitoring of the overlay network” is the task most likely to be fully automated (see **Figure 12**). This correlation does not stand up when it comes to new service verification, however. Although new service verification is noted as a challenge in **Figure 7**, 53% of respondents indicated it is fully automated in their networks. **Figure 7** also indicates that truck rolls and site visits were not a major concern, likely due to the degree of automation reflected in **Figure 12** below for “service provisioning,” “service activation testing/new service verification,” and “installation of VNFs.” Looking only at SPs with revenue over \$5bn, service provisioning is automated by two-thirds of these large carriers compared to only 54% among the remainder of the survey base.

Compared to the overlay network, “performance monitoring of the underlay network” is only half as likely to be automated. This underscores the challenges the SPs are having with event correlation and performance monitoring of the combined overlay and underlay networks.

The final two tasks—“reacting in the event of service issues” and “SLA reporting to customer self-care portals”—show the least amount of automation. They also show the greatest difference in responses between the large telcos (over \$5bn) and the remainder of the survey base. In the case of automated response to service events, 38% of the large Tier 1 operators have implemented this capability compared to only 14% for the remainder of the survey base. SPs are still reluctant to remove network operations center personnel from the problem resolution chain, but the large Tier 1 operators acknowledge that the scale and highly distributed nature of today’s networks make automation a necessity to manage and grow the network.

SLA reporting is automated by only 18% of the smaller SPs while 27% of the large Tier 1 operators have automated the task. The ability to offer automated SLA reporting is (again) tied to the carriers ability to correlate underlay and overlay events, which is sorely lacking, as discussed earlier in this report.

Figure 12: Which tasks are currently fully automated/zero touch in your SD-WAN environment? (Select all that apply)



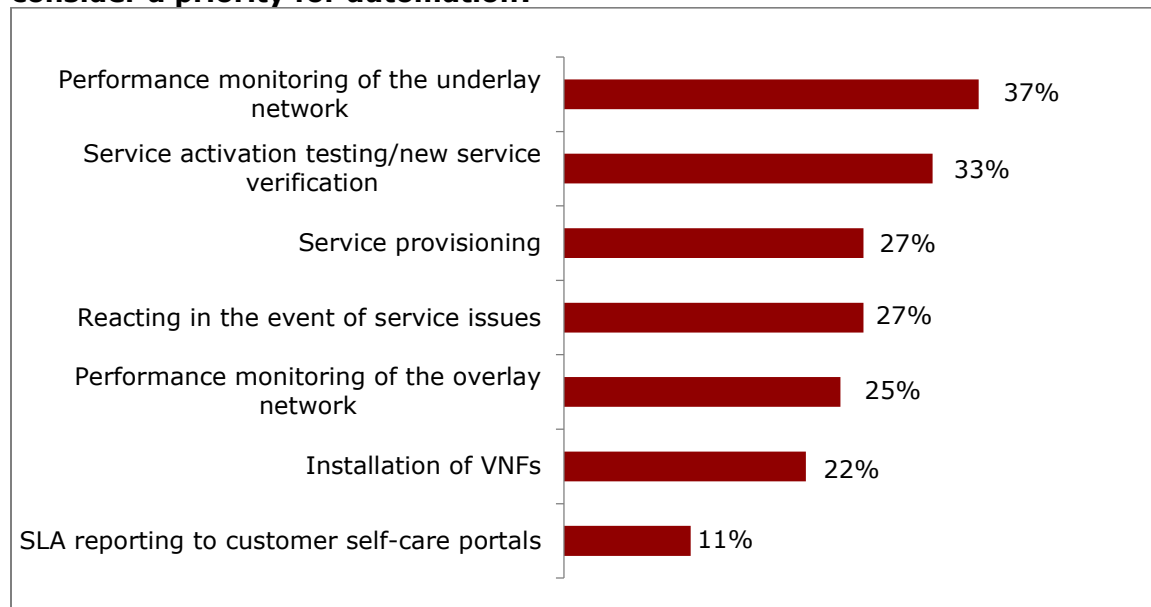
n=97

Source: Heavy Reading

“Reacting in the event of service issues” is getting some focus by the SPs, with 27% indicating that it is an automation priority moving forward. Not surprisingly, “performance monitoring of the underlay network”—the thorn in the side of many an SP—heads the list in terms of priorities. Automation of the overlay network is far down on the list since it is the task most likely to already be automated.

Service provisioning, verification, and activation—while they have been automated by over half of the survey base, as seen in **Figure 12**—are tasks that the remainder of the base identifies as a priority for automating (see **Figure 13**).

Figure 13: Out of those tasks that are not fully automated, which two do you consider a priority for automation?



n=97

Source: Heavy Reading

The automation of SLA reporting captured the lowest number of responses. Heavy Reading suggests that one of the reasons for this result is that the automation of SLA reporting is dependent on other tasks that must be automated first. Accurate SLA reporting cannot be achieved without performance monitoring of the underlay network—the number one priority. When this is achieved, the importance of SLA reporting will rise in priority. Heavy Reading sees this as an opportunity for differentiation. With the growth in cloud applications, edge computing, critical IoT services, and network slicing, the customer must be able to make informed decisions that take into account all layers of the network. Accurate, multilayer SLA reporting can set an SP apart from the rest of the crowd.

CONCLUSIONS

Network operators know that their current method of designing and deploying networks will not hold up to near-term demands, let alone future demands. There are multiple waves of change sweeping the network. The COVID-19 pandemic and the pressures it has placed on the network have brought into focus the fact that the world has moved beyond simply connecting people to one in which “always-on” access to digital services is seen as a basic need.

Heavy Reading’s survey results show that SPs believe SD-WAN will be a key tool to deliver on the demands of the network. However, many challenges and concerns remain:

- **Integrating management of the overlay and the underlay:** Throughout the survey, the difficulty of unified management, root cause analysis, and problem resolution of the combined overlay and underlay network emerged as a significant issue. It is one where the SPs could clearly benefit from an assist by their SD-WAN partner ecosystem.

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- **Moving security to the cloud:** The debate, if any, is over: the carrier respondents are behind SASE and are planning their SASE implementations today. Many questions remain, however, regarding how to translate what is essentially a framework into deployments in a production network.
 - **Accelerating automation:** Service provisioning, testing, and verification are at the top of the list for further automation—but automation is key to all aspects of deploying and managing an SD-WAN service. As one of the operators reflected recently, automation is more important than either security or agility because it is the first step in rolling out a secure and agile service.
 - **Removing complexity from the network:** Despite the massive amounts of integration work most SPs have done on their service offerings, they are still looking to limit the number of SD-WAN solutions, security solutions, and management tools they employ within the SD-WAN service. They will not succeed, but maybe they can get some help. One of the SP's main jobs in a managed service is to remove complexity from the enterprise and take that complexity on themselves. As the network expands, mergers and acquisitions are made, and customer choices are taken under consideration, it is difficult for an SP of any scale to limit the portfolio of products available to the customer. It is, however, possible to adhere to standards, follow Metro Ethernet Forum (MEF) service standard specifications, adopt CI/CD methodologies and tools, implement standard APIs, and partner with solution providers that do the same.
 - **Implementing advanced features on customer portals:** Heavy Reading lists this last, not because it is least important, but because it is dependent on the resolution of the challenges mentioned above, most notably integrating management of the overlay and the underlay and accelerating automation. Many customers buy multiple services from the same SP—MPLS, SD-WAN, and other services. The SPs offer single sign-on portals that provide visibility into all services purchased by the enterprise, including the SD-WAN overlay. However, the utility of these portals can be greatly enhanced if SPs offer enterprises the ability to move, add, or change sites automatically. It can also be enhanced if SPs provide SLA reporting that encompasses the underlay network, as well as the overlay, and enable active monitoring of the network, in addition to passive monitoring, to determine current service availability or response time. By doing so, they enable real-time troubleshooting and network optimization. These capabilities can transform the utility of a customer portal and be a significant differentiator for the SP.

SD-WAN products and services continue to evolve. The challenges emerging today are not as focused on how to deploy or manage SD-WAN. Rather, they are focused on how to deploy services faster and how to manage SD-WAN better. These are the key insights gleaned from Heavy Reading's survey results, even as they lead to new questions about the future evolution of SD-WAN services.