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Volume 16, Issue 10

The Challenge of Connecting Beyond the Edge

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No matter what industry a business operates in, communications are crucial and make it possible for organizations to carry out their daily activities. When it comes to the communications infrastructure in place, the core networks of fiber, cable, and mobile can all provide reliable support for a business to depend on, in line with its requirements. However, when companies need to extend mission-critical applications beyond that core, they can face significant challenges.



Networks must provide high-quality, reliable connectivity with seamless operability around the clock, even as the data crosses the different transmission formats of fiber, satellite, 4G/LTE, and microwave. The problem is that IT network operators now need to integrate third-party cloud services into networks that weren't designed to support them. These ever-increasing demands test the limits of very-small-aperture terminals (VSAT)—the pillar technology for remote communications—which ties up IT staff time, limits the capabilities of end-users, and introduces unacceptable failures.

Optimized processes

The satellite industry is adapting to this challenge by deploying Software-Defined Wide Area Networking (SD-WAN), a proven technology in terrestrial communications that creates a secure virtualized Wide Area Network (WAN) from the capacity of all of the circuits available to it.

Every few milliseconds, it checks the capacity of all the circuits for reliability, bandwidth, latency, and other quality of service factors. Circuits that do not pass the test are labeled as unavailable during that period, and SD-WAN securely and automatically redirects traffic to the highest quality remaining links, including failover circuits, to deliver better performance for applications and reduced costs for IT and telecom operators.

Overcoming rising demands and design limitations

Until recently, the satellite industry relied on manufacturer-specific VSAT platforms to manage the delivery of bandwidth to its customers. While these platforms provide more flexibility and control than legacy, single channel per carrier (SCPC) circuits, they still have significant limitations for the demands of the future.

Most VSAT platforms are proprietary, so modems and hubs are not interoperable; switching or roaming between systems requires manual reconfiguration every time. They also have inherent throughput limitations, and when a customer's bandwidth requirements exceed these limits service providers must stack multiple modems together and load-balance using standard routing protocols. This makes management more complicated. Given that loads can change dynamically, customers can run into design limitations of individual hubs, resulting in them having to pay for more bandwidth to handle peak loads, regardless of the average usage.

One solution for a multitude of industries

VSAT modems generally only support satellite bandwidth. Leveraging disparate telecommunications technologies, such as wireless and terrestrial links, requires external routers and complex routing protocols that cannot respond quickly enough to dynamic changes across multiple circuits.

However, SD-WAN can overcome this challenge by virtualizing capacity and automatically managing the availability, bandwidth, and latency of networks, making it easy for customers to prioritize bandwidth allocation and content. For example, end users can choose to transmit video streaming over fiber networks and less latency-sensitive business communications via satellite.

It is also ideal for customers that are always on the move. When combined with systems that automate the physical switching between beams, bands, and antennas, SD-WAN delivers uninterrupted connectivity wherever customers roam.

From cruise and ferry to enterprises and even offshore, SD-WAN can be deployed across VSAT and hybrid networks to provide robust and reliable connectivity in line with both industry and customer-specific demands.

SD-WAN makes for smoother sailing

Cruise ships represent one of the most challenging VSAT applications in the industry. In addition to the complexities of serving a moving vessel, cruise ships consume a tremendous amount of bandwidth. Serving thousands onboard at any one time, cruise networks often require multiple transponders and modems per ship to meet customer requirements. However, as technology advances and passengers become accustomed to more bandwidth-hungry applications, new solutions must be put in place to meet the ever-increasing demands.

By aggregating multiple satellite links into a single virtual WAN connection, adaptive SD-WAN algorithms optimize and load-balance the underlying circuits, while offering a high-capacity virtual interface to the customer. In addition to overcoming throughput limitations, SD-WAN allows for the intelligent management and routing of different VSAT technologies and asymmetric satellite circuits for a seamless cruise customer experience. As vessels move around the world, the underlying circuits can easily be switched—including moving off VSAT entirely to 4G/LTE or broadband wireless when near shore—without interrupting the virtual WAN.

With basic installation and configuration, SD-WAN can reduce the costs associated with the operation and management of the platform, allowing cruise operators to operate more efficiently at a lower cost.

Hybrid solutions for more efficient business operations

Small and medium enterprises typically leverage a variety of connectivity solutions to minimize cost and maximize availability. Remote offices may have primary Multi-protocol Label Switching (MPLS) links with Internet Virtual Private Networks (VPNs) and/or satellite links for backup. Customers often look to distribute traffic across all available links to get the most out of the bandwidth. However, traditional routing protocols make decisions based on the link state and cost, making it nearly impossible to accurately load-balance traffic over different links.

By utilizing solutions based on SD-WAN technologies, intelligent algorithms continuously measure latency, throughput, and packet loss on each link, dynamically adjusting the flow of traffic. Since SD-WAN routing rules are application-aware, latency-sensitive applications such as voice and video conferencing can be specifically routed over low-latency MPLS connections. Additionally, traffic flows can even be replicated along a second path, delivering perfect-quality voice and video.

SD-WAN allows customers to route data and applications between headquarters and remote locations with reliable network performance and security. This means they can rely on a single provider for their connectivity needs, simplifying operations, optimizing traffic, and reducing costs (see Figure 1 on next page).

Like the enterprise market, commercial maritime vessels must also leverage multiple telecommunications technologies to balance cost and performance. Near shore, 4G/LTE offers a low-cost, low-latency solution for the crew to stay connected. However, as vessels sail out of the range of terrestrial towers, satellites must then become the primary path for connectivity.

SD-WAN solutions seamlessly blend satellite and wireless technologies, so customers no longer need to worry about the status of each link and which paths are preferred. SD-WAN continuously monitors the characteristics of each link and dynamically redirects traffic as required, allowing commercial maritime operators to focus on growing their business instead of worrying about their communications system.

A reliable virtual circuit for oil and gas applications

Reliable, high-performance connectivity is mission-critical for oil and gas platforms. With daily lease fees often exceeding hundreds of thousands of dollars, these platforms cannot afford any interruptions to their operations. SD-WAN allows the creation of highly reliable hybrid connectivity solutions that blend satellite, microwave, and 4G into a seamless, virtual circuit. This diversified approach mitigates outages related to interference, rain fade, crane blockage, and hardware failures.

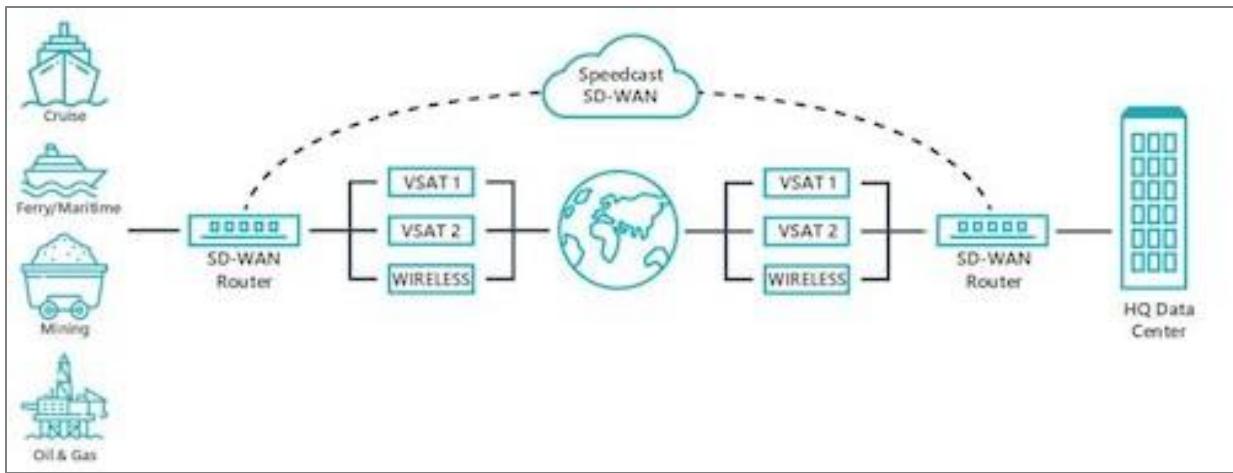


Figure 1: Routing Data
[\(click to enlarge\)](#)

In addition to seamlessly switching between the various technologies, SD-WAN can intelligently load-balance traffic among links to maximize throughput and minimize costs. With this hybrid virtual circuit, oil and gas operators can rely on robust and reliable connectivity with guaranteed minimal downtime.

Preparing for unprecedented future requirements

Companies in every industry are facing unparalleled pressure to accelerate their digital transformation without disrupting their operations. As networks and satellite communications continue to grow, smart network management will become ever more critical to ensure seamless business operations and processes. With dynamic link bandwidth aggregation to maximize throughput, guaranteed high uptime availability, unparalleled WAN visibility, and high end-user quality of experience, SD-WAN can provide a multitude of benefits to enterprises across a range of industry sectors.

SD-WAN makes it possible to mix and match different transmission networks—each with its strengths and weaknesses—into a single secure, high-performance, and cost-effective platform to provide the reliability, agility, and flexibility that today's companies need to master change and deliver results when connecting beyond the edge. SD-WAN's capabilities will only become more critical as customer demands and expectations increase.