

Navigating the Hybrid Journey

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Steve had spent years growing, optimizing, and downright coddling his server farm. It was *almost* where he wanted it. A few more months and he'd have everything perfect. Then Steve got the orders that thousands of IT managers have gotten from their management over the last several years: migrate everything to the cloud.



No! Not when he was *so* close! What was Steve to do? Abandon his beloved servers?

Unfortunately, the direction from management was unequivocal. Cloud is where the company wanted, and *needed*, to be. And it was Steve's job to ensure it made a smooth transition.

Sound familiar?

A few years ago, the trend was for enterprises to fully embrace the cloud and migrate all of their assets and workloads from on-prem and colocation-based solutions into the hyper-scale cloud service providers (CSPs.) The promises of the cloud were just too amazing to pass up: super highly available, secure development and operations (DevOps) enabled infrastructure, and platforms that "just worked."

Since then, some of the sheen has worn off of that message, and many enterprises are now finding a balanced solution between all public and all private. It turns out Steve had a good point: there *are* applications that fit better into on-prem resources. There were things, however, the cloud could do better than Steve's server farm.

Thus, the hybrid cloud solution was born.

The Evolution of Networking

Networking, as it turns out, is not immune to the ebb and flow of public vs. private—and everything in between. The key difference is that the network is the enabling factor that allows the cloud to work at all. If it weren't for the network, these assets and workloads would just be stranded on a random computer somewhere in the world. Networks have gone through decades of evolution, from frame-relay to Internet Protocol Virtual Private Network (IP VPN) to Multiprotocol Label Switching (MPLS) and now to Software Defined Wide Area Network (SD-WAN) solutions, moving from private to public overlay and back again.

The problem with this is that a total shift to one extreme or the other rarely makes sense. Sure, there are corner cases where either a public or a private network is the obvious choice. High-frequency trading requires the ultra-low latency networks only a private network can provide, but it doesn't make much sense for small to medium-size businesses that need little more than Internet access and email to invest in private network infrastructure.

Thus, as with compute and storage more commonly adopting a hybrid approach, we believe networks will go that way as well. We envision a hybrid of public IP transit overlay network technologies, such as SD-WAN, combined with agile, high bandwidth, private transport networks. Each has its place in a modern enterprise IT infrastructure.

Public IP transit overlay networks like SD-WAN provide a cost-effective, easy-to-manage, first- and last-mile solution to reach thousands of branch locations, without

the headache of sourcing private line connectivity. The Internet, thanks to its almost total ubiquity, can be obtained nearly anywhere on the globe. In fact, if you are willing to use satellites, there is virtually no location on the planet that can't connect to the Internet. SD-WAN takes advantage of this reach and builds on it with simple, cost-effective, manageable security—through encryption and centralized control—to enable a fully meshed network topology.

This isn't to say that the Internet is a panacea for enterprise networking needs. The Internet is a scary place, after all. For starters, there is no service level agreement (SLA) for the global Internet. Sure, you may get an SLA from your local Internet service provider (ISP), or even on a Tier-1 carrier's backbone, but any assurance of reliable service is thrown out the window the instant you cross from one network to another or connect to a CSP. The Internet is a loose collection of networks connected by peering arrangements and agreements. There isn't a single oversight body that regulates things like peering oversubscription, congestion, de-peering, and so on. This is to say nothing of major service providers that effectively service the Internet as a whole, such as Amazon, Cloudflare, and others.

Each of these layers of complexity and best efforts can introduce failures. For example, invalid or incorrect entries can leak into the global Border Gateway Protocol (BGP) routing table; massive Distributed Denial of Service (DDoS) attacks take Domain Name System (DNS) servers offline; and de-peering creates massive choke points or blackholes, which lead to increased packet loss, latency, and jitter. When you get right down to it, it is pretty amazing the global Internet works as well as it does (see Figure 1).

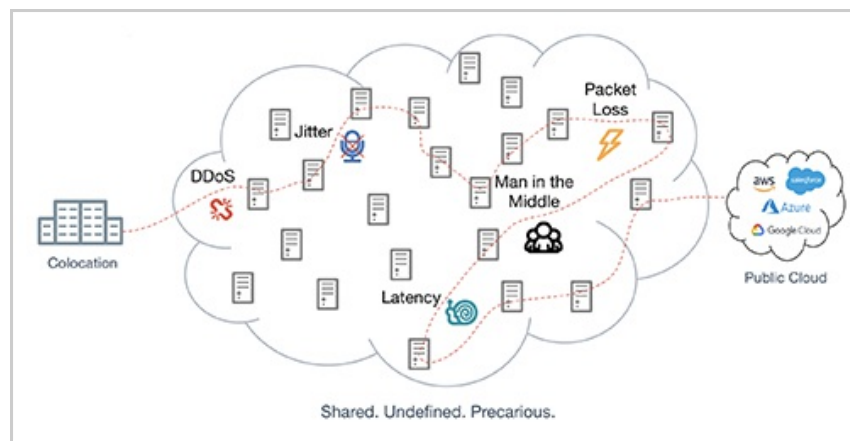


Figure 1 - The precarious nature of hybrid networks

These circumstances lead enterprises to desire private networking for mission-critical services. Private networks offer many advantages over public transit. For starters, private networks of almost all types include an end-to-end SLA. Performance characteristics of the network, such as packet loss, jitter and latency, are also much more predictable. Depending on the type of service being procured, savvy buyers can specify the precise routing of the circuit between the service locations and have a better chance at diversity from other services.

As with public transit infrastructure, however, traditional private networks have their own challenges and drawbacks. Private networks offered by legacy telecom operators typically come with hefty minimum contracts, expensive pricing, are extremely inflexible, and require very long provisioning times (more than 120 days can be common). Additionally, the customer is responsible for all of the planning, engineering, and integration with other providers and networks for redundancy and resiliency.

If we consider for a moment the pure aspect of service quality, one could envision a hybrid approach that takes advantage of the best of both public and private network infrastructure, coupling them together to build a better end-to-end solution. Imagine a solution that leverages the ubiquitous nature of Internet access combined with SD-WAN overlay for first- or last-mile solutions, terminating into a private network for the long middle mile, then connecting directly to the cloud or back to another SD-WAN-enabled first or last mile. If properly engineered, a hybrid model could deliver better performance and enable traffic to stay "on-net" with each carrier as much as possible,

with well-defined, highly SLA'd network integration points between them.

But examining service quality alone doesn't really paint the full picture. Much like other cloud "as-a-service" offerings, agility is a big part of the SD-WAN value proposition, which focuses on the capability to order, provision and scale on demand using software instead of manual processes and capex. So, how does our hybrid model fare, when considering agility and flexibility? It doesn't—at least, not when using a legacy telecom service.

Fortunately, the industry has begun to move beyond the legacy telecom world and into the age of software-defined interconnection. The modern software-defined interconnection platforms are at the forefront of network evolution, with an eye on simplification and ease of use for the customer. Companies such as PacketFabric have revolutionized the delivery of datacenter-to-datacenter or cloud connectivity through software. By creating simple-to-use web portals and application program interfaces (APIs), customers are able to order and provision services in minutes with just a few clicks. A traditional private network simply can't deliver the agility and control enterprises are realizing with modern software-defined private networks.

So let's return to our hybrid solution, combining Internet, SD-WAN, and a private middle mile, but this time utilizing a modern software-defined network as opposed to a legacy telecom solution. With this change, we can solve the agility problems that were previously left unresolved. The enterprise customer wanting to build a dynamic and flexible network leveraging its existing Internet services, along with SD-WAN for secure communication, can optimize the private middle mile in the same flexible, easy-to-consume way.

Where a hybrid solution with a private, software-defined middle mile component really shines, however, is when those branch locations using SD-WAN need to communicate with each other, as well as with the hyper-scale cloud companies and private cloud resources that may be on-prem or in colocation facilities.

Enjoying the Hybrid Journey

At PacketFabric, we're confident that a hybrid approach to network infrastructure—combining resources located on-premise, in multi-tenant data centers, like our old friend Steve's server farms—and cloud-based resources for compute, storage, and so on, will only become more popular. The reason the hybrid approach is important is that it gives the enterprise the flexibility to choose the most appropriate infrastructure to meet specific business objectives—whether financial, technical, compliance, or any other reason. There's no need to choose between all private or all public; with advancements in technology and the growing popularity of software-defined networking platforms, the modern enterprise can have the best of all worlds.

Imagine the security of infrastructure located on-premise, and the economical and reliable power at colocation facilities, plus the convenience and agility offered by the cloud, all connected together with a scalable, private network, easily controlled through software.

This is where the industry is heading. Even as networks continue to evolve, the needs of the enterprise will continue to grow in complexity. We'll see more and more networks adopting the hybrid approach, combining public network technologies with agile, high-bandwidth private networks.

Amid this change, one thing remains certain: Evolution is the name of the game in the journey of enterprise infrastructure, and no one single solution is going to be the cure-all. A scalable, secure, and on-demand network, however, is the foundation to the success in your enterprise hybrid IT journey.