Broadband Innovation meets SD-WAN: New opportunities for distributed enterprises

Looking to shake things up? There are a few good ways to do it – make something better or make it cheaper. Want to disrupt? Do both.
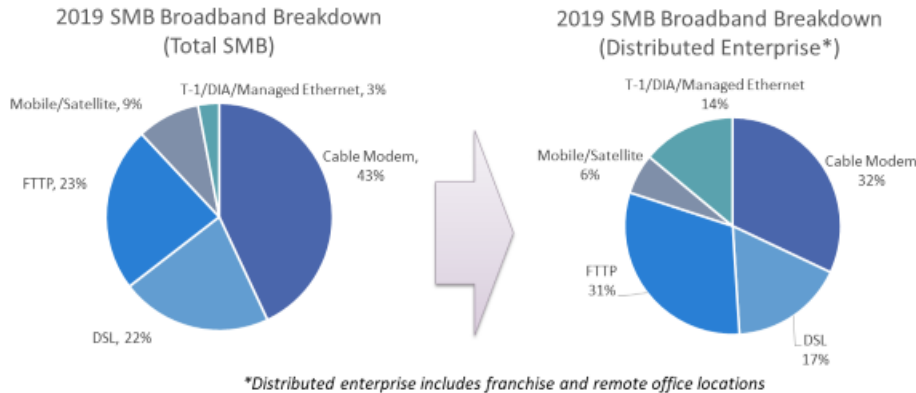
This report shares data and insights from Independence Research LLC's *2019 SMB Connectivity & WiFi Survey* conducted in April 2019 polling 500 SMB IT decision-makers and influencers*.* We use this data as a backdrop to analyze the disruption occurring in the U.S. distributed enterprise market. *This analysis focuses on the combination of broadband access evolution and the power of SD-WAN innovation to open new technology options for distributed enterprise customers.*

According to the *U.S. Small Business Administration*, there are a little over 30 million businesses in the U.S. This group is a complicated mix of companies of all sizes, from the smallest home-based sole proprietorships to much larger corporations with dozens of locations. Sitting somewhere in-between these small firms and large enterprises is what is described as the "distributed enterprise." Distributed enterprises are places of business that have multiple employee locations which require access to the internet and the ability to electronically connect to each other. Branch offices and franchise locations make up the bulk of the category. Most distributed enterprises have two or three locations, but some have dozens dotting the country. From an employee size perspective, distributed enterprise locations are much like the average SMB – however, their technology needs and associated spending are often a reflection of the larger mid-market or enterprise segments.

For service providers, the predominant distributed enterprise market strategy has been a "top down" approach, where the national or regional headquarters of a large business strikes a deal with a service provider for enterprise data, IT and/or voice services. Nationally distributed remote office connectivity is often part of the deal, and to service the account, the service provider must often cobble together a nationwide mosaic of broadband access options from different partners and wholesalers to deliver connectivity. These connections are usually a mix of fiber, cable modem, dedicated internet access (DIA), managed T-1 or DSL. According to Verizon, this strategy is working well, and a hybrid mix of MPLS and SD-WAN is currently winning in the marketplace today and will continue to be the preferred enterprise solution for some time to come. See below for our view of SMB broadband penetration by primary access technology comparing the overall SMB market to the distributed enterprise market:

SMB Broadband Breakdown
Primary internet technology penetration into SMB Business Locations

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2019 SMB Broadband Breakdown (Total SMB)

- T-1/DIA/Managed Ethernet, 3%
- Mobile/Satellite, 9%
- FTTP, 23%
- Cable Modem, 43%
- DSL, 22%

2019 SMB Broadband Breakdown (Distributed Enterprise*)

- T-1/DIA/Managed Ethernet 14%
- Mobile/Satellite 6%
- Cable Modem 32%
- FTTP 31%
- DSL 17%

*Distributed enterprise includes franchise and remote office locations

Source: Independence Research 2019

Another approach…

In a departure from the "top down' model, the most serious alternative approach to address the nationwide distributed enterprise challenge began in 2016 when the enterprise units of Comcast and Time Warner Cable (now Charter) led an initiative establishing national networking agreements between themselves and a few of the smaller cable providers (reportedly Altice, Cox and Mediacom). This partnership creates an operationally friendly cable modem network environment that we estimate can reach somewhere in the range of 70% to 80% of U.S. small business locations. The relationship helps alleviate the complexity of having to manage multiple service providers using a variety of access technologies when a larger multi-office business requires connectivity for its locations scattered across the country.

With no MPLS revenue to cannibalize, and a competitive, but lucrative national enterprise market to address, the initiative to move up-market is a natural for cable operators. Leveraging a strong position in distributed enterprise connectivity to gain a foothold in a multi-location enterprise by offering a cheaper, higher performance remote-office connection package based on cable modem is designed to open the door to higher-value enterprise-grade voice, data and IT services at the HQ. Comcast refers to this as their "wedge' strategy, which was mentioned in a previous Light Reading article. https://www.lightreading.com/cable/cable-business-services/comcast-business-positions-itself-beyond-fast/a/d-id/746368

This cable distributed enterprise partnership strategy sets the stage for a showdown between MSOs and large telcos like AT&T, Verizon or CenturyLink that are heavily geared towards enterprise and mid-market customers. Within their traditional ILEC regionally defined serving areas, AT&T, Verizon, CenturyLink, Windstream and their smaller telco peers operate in a geographically and technologically fragmented footprint. Both AT&T and Verizon, are expected to increase their focus on 5G as their most important mass-market broadband strategy – providing a national reach and giving them the option to go it alone. Without a partnership with these giants, it is unlikely the remaining ILECs could organize a viable telco-led national wireline strategy to counter the reach of the cable consortium.

Another major group to be potentially impacted by the cable partnership will be regionally focused IT & Telecom integrators, managed services providers (MSPs), and value-added-resellers (VARs). When serving standalone small and mid-market companies that have a limited national footprint, these providers are built for success. Managed service providers win on service innovation, specialization and strong customer support. However, these advantages become much more difficult at scale, and when pursuing distributed enterprise opportunities, they must turn to wholesale network providers for connectivity outside their fiber footprint.

It is worth noting that AT&T recognized the potential to turn these mid-market competitors into partners, and in consultation with a number of them, the *AT&T Partner Exchange* was created back in 2014, making it easier to work with AT&T as their wholesale partner. The initiative has been a successful one. Now called the *AT&T Alliance Channel*, we will be watching with interest to see how this organization counters the growing cable distributed enterprise threat.

Fixed wireless has been deployed by several of the leading providers. Verizon and AT&T both announced ambitious 4G/5G fixed wireless strategies to serve small business locations earlier this year. https://www.lightreading.com/mobile/5g/atandt-verizon-expand-fixed-wireless-(both-lte-and-5g)-to-small-biz-market/d/d-id/749722 In March 2019, Windstream announced a fixed wireless deployment that would address over 3 million potential new business customers. Beyond basic internet connectivity, fixed wireless connections can support Ethernet access, SD-WAN and other data services important to the distributed enterprise but will likely be deployed more often as a redundant back-up network connection.

Finally, with their nationwide satellite network, Hughes Network Systems is one of the few providers that can claim a truly national broadband reach. However, while satellite broadband has consistently improved, it still cannot match the latency and speed performance of fiber or cable modem. Hughes has been a quiet leader in the distributed enterprise space for years but will undoubtedly feel the competitive pressure once the cable partnership really gets going. The rollout of 5G will ultimately add to this pressure.

Broadband Evolution

There are well over a dozen technologies designed for internet connectivity with varying degrees of global deployment. Satellite, fixed wireless, T-1 and the various forms of DSL will continue to play a role, but Fiber, Cable Modem and 5G will compete to become the primary U.S. access technology over the next decade and serve as the foundation for potential disruption in the U.S. business market.
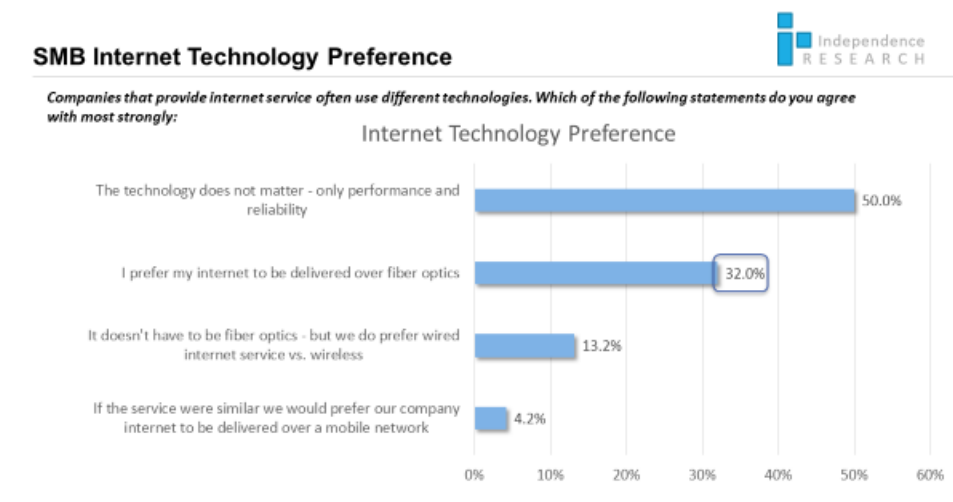
Fiber

Fiber is represented by several similar, but distinct technologies. The two fiber-based technologies that will have the most impact on the U.S. business market are passive optical networking (PON) offerings and managed Ethernet over Fiber services.

PON has evolved rapidly over the past fifteen years. Verizon FiOS was based on the BPON standard, which evolved to GPON, which is the standard that most of the mass market fiber is built on today and can deliver 2.4Gbps downstream and 1.2G upstream. Recently, the industry has entered a technology showdown between XGS-PON and NGPON2. There are engineering arguments on both sides, but the crux of the debate is cost vs. performance. XGS can achieve 10G symmetric and is cheaper to deploy in

the near-term, but NGPON2 can potentially hit 80G, thus promising to be more future proof. Currently, AT&T backs XGS, while Verizon is championing NGPON2 – so we may continue to see a mixed bag of PON technologies over the next decade (this includes EPON which the cable MSOs have adopted for MTU deployments). For the larger industry, a more standardized PON approach would be preferable, since volume deployments typically drive down manufacturing costs.

Ethernet delivered over optical fiber, or metro-ethernet is designed and priced for large businesses. However, the distributed enterprise is made up of remote offices and franchise locations that sometimes connect using these enterprise-grade networks. The following chart shows that while fiber is not the end-all for many businesses, it is a preference for a large group of survey respondents. (Please see findings based on Independence Research LLC, *U.S. SMB Connectivity & WiFi Survey*, April 2019)

SMB Internet Technology Preference

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Companies that provide internet service often use different technologies. Which of the following statements do you agree with most strongly:

Internet Technology Preference

Statement	Value
The technology does not matter - only performance and reliability	50.0%
I prefer my internet to be delivered over fiber optics	32.0%
It doesn't have to be fiber optics - but we do prefer wired internet service vs. wireless	13.2%
If the service were similar we would prefer our company internet to be delivered over a mobile network	4.2%

Source: Independence Research 2019

Cable Modem

Cable modem is the dominant mass market broadband technology in the U.S. The cable operators working through CableLabs have continued to make necessary investments in technological advancement and real-world deployments to fully leverage their coaxial cable footprints. As is typical in the access arena, cable modem was first conceived and delivered as a consumer service, but then made its way into the small business category. It is only in the past few years, with the birth of enterprise-oriented business groups at major MSOs like Comcast and Charter that cable modem is now on the radar of enterprise CTOs.

The latest cable modem standard is DOCSIS 3.1 which can deliver lab speeds of 10G downstream and 1-2Gbps upstream. Major cable companies are mainly offering services in the 500 Mb to 1G range. In addition to speed advances, DOCSIS 3.1 tackled jitter and latency issues common with earlier versions of DOCSIS. This combination of Gigabit speed and better overall QoS combined with relatively low pricing makes it an attractive technology for remote office and mid-market customers. In addition, 3.1 also has a "full duplex" specification in the works that will solve one of cable modems most often cited disadvantages – the lack of a symmetric cable modem offering. *Discussed in this LightReading webinar* https://www.lightreading.com/webinar.asp?webinar_id=787&webinar_promo=1489 According to CableLabs, Full Duplex DOCSIS will be capable of delivering 10G/10G and be commercially available
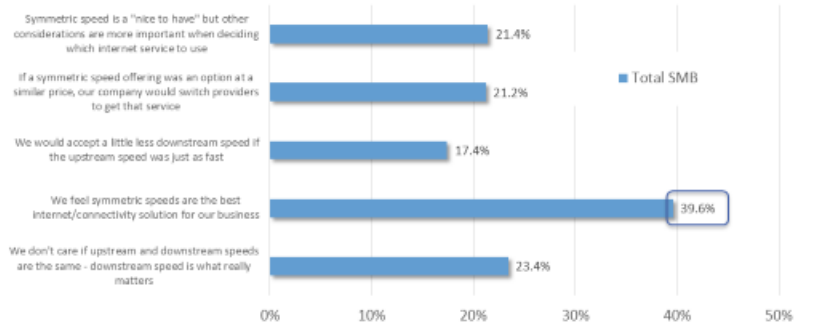
sometime in 2019. According to our research, asymmetric speed is not a significant concern for most businesses at the lower end of the business market – however, symmetry grows in importance the larger a company gets. (Please see findings based on Independence Research LLC, *U.S. SMB Connectivity & WiFi Survey*, April 2019)

SMB Symmetric Broadband Speed

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Depending on the technology used to deliver your company's internet service - some services offer the same speeds for both downstream (generally faster) and upstream (generally slower) What are your views on these symmetrical broadband speed services? (Check all that apply)

Symmetric Broadband Speed Preference

Response	Total SMB
Symmetric speed is a "nice to have" but other considerations are more important when deciding which internet service to use	21.4%
If a symmetric speed offering was an option at a similar price, our company would switch providers to get that service	21.2%
We would accept a little less downstream speed if the upstream speed was just as fast	17.4%
We feel symmetric speeds are the best internet/connectivity solution for our business	39.6%
We don't care if upstream and downstream speeds are the same - downstream speed is what really matters	23.4%

Source: Independence Research 2019

What about 5G?

Mobile 5G is a wild card in this analysis. 5G is likely to have a profound impact on the consumer broadband space, and we are forecasting a significant leap in mobile-only SMB broadband technology penetration based partially on anticipated 5G availability. However, mobile displacement of wireline broadband options will primarily impact the lower end of the small business market, that has more basic connectivity requirements.
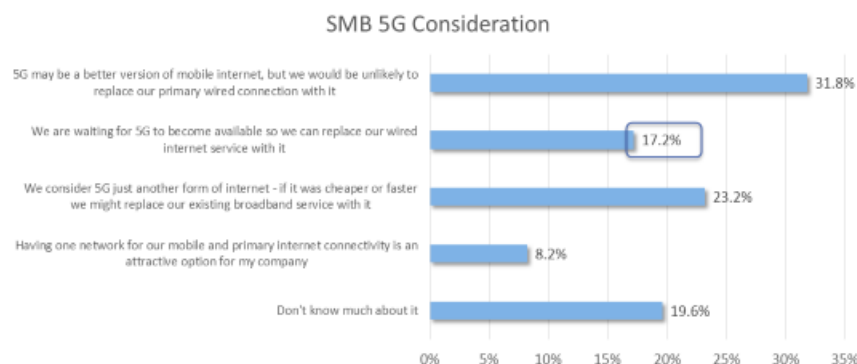
Where does that leave the mid-market and distributed enterprise? The 5G deployment timeline and performance levels for latency and connectivity speed is still in the early stages. The rule of thumb for speed is 20X faster than 4G – which according to April 2019 speed test results from Ookla, average around 30 to 35 Mbps for the top U.S. wireless providers. That puts future 5G "real-world" performance in the 600 to 700 Mbps range – well within the Internet speed requirements for most of todays SMBs.

As far as adoption in the U.S. mid-market and distributed enterprise, survey results are mixed. On the one hand, there remains a bias for wireline generally, and fiber specifically – however, on the other, our mid-market respondents indicate a willingness to replace wireline with 5G. (Please see findings based on Independence Research LLC, *U.S. SMB Connectivity & WiFi Survey*, April 2019)

SMB Attitudes towards 5G availability

5G is a new mobile internet technology that is getting an increasing amount of attention - which of the following statements comes closest to your company's thinking on 5G?

SMB 5G Consideration

- 5G may be a better version of mobile internet, but we would be unlikely to replace our primary wired connection with it — 31.8%
- We are waiting for 5G to become available so we can replace our wired internet service with it — 17.2%
- We consider 5G just another form of internet - if it was cheaper or faster we might replace our existing broadband service with it — 23.2%
- Having one network for our mobile and primary internet connectivity is an attractive option for my company — 8.2%
- Don't know much about it — 19.6%

Source: Independence Research 2019

Independence Research believes that despite early mid-market interest in the technology, fiber and coax-based wireline services will continue to be the preferred broadband infrastructure choice for the distributed enterprise over the next five years. 5G adoption beyond smaller standalone SMB locations will depend on ubiquitous availability, and whether reliability and performance are delivered as advertised. However, if the vision of 5G is fully realized, including very low latency and gig-plus speeds, it will place enterprise MPLS/mobile providers like AT&T and Verizon in a very strong position to counter the MSO distributed enterprise strategy.

Enter SD-WAN

Today's U.S. broadband landscape is basically divided between two classes of network: mass-market and enterprise. Mass market broadband networks, which primarily serve consumers and small businesses, were originally deployed as consumer-grade broadband services – which basically means they are asymmetric, unmanaged and shared at some point in the access network. The vast majority of DSL, cable modem and PON all share these features. On the other side are the enterprise-extension technologies such as managed Ethernet, T-1, T-3, or DIA. These two general connectivity categories co-existed with relatively little overlap… until recently.

Before SD-WAN entered the picture, the options for remote office locations were limited. The choices were to subscribe to a relatively expensive, yet secure and reliable connection like a T-1 or fractional T-3 or a managed Ethernet service if available, in order to extend a corporate network. The other choice was to use a "best effort" internet service like a cable modem or DSL connection – combined with a remote access service that enabled the remote office to access data and applications from the headquarters and potentially the use of virtual private networking (VPN) to transfer data more securely from office to office.

Mass market wireline broadband access technology has gotten faster leaving traditional remote office and enterprise connections like T-1 or dedicated internet access (DIA) behind from a speed performance perspective. Reliability and security are still concerning, but almost all small businesses, and the majority of mid-market businesses use PON, cable modem or DSL as their primary internet connection.
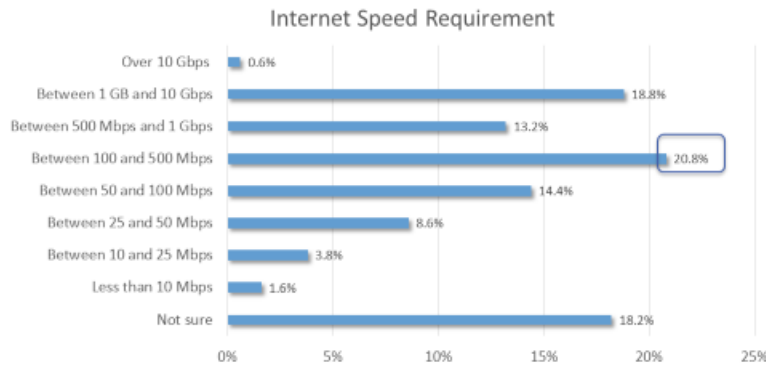
For most business locations, the speeds these technologies deliver are well within the required speed range SMBs and distributed enterprise business decision-makers are seeking: (Please see findings based on Independence Research LLC, *U.S. SMB Connectivity & WiFi Survey*, April 2019)

SD-WAN – the bridge between enterprise and access

Faster, more reliable broadband, combined with the maturity of software defined networking have resulted in an opportunity to disrupt – and that is exactly what SD-WAN has been doing in the distributed enterprise marketplace. The marriage of broadband and SD-WAN works so well, because in addition to benefits like dynamic routing or cloud-based provisioning, one of the fundamentals of SD-WAN is that it can work with all broadband access technologies including 5G and satellite.

Despite the advantages of SD-WAN, penetration of the technology is still just getting started in the SMB and branch office market. At this stage the main market participants are enterprise broadband service providers and pure-play IT integrators. In general terms, service providers are offering a managed service that businesses can outsource while maintaining a degree of customization, while VARs and integrators are working with internal IT departments to implement fully customized solutions. Many of the largest enterprises have the internal IT resources to integrate best of breed SD-WAN solutions themselves.
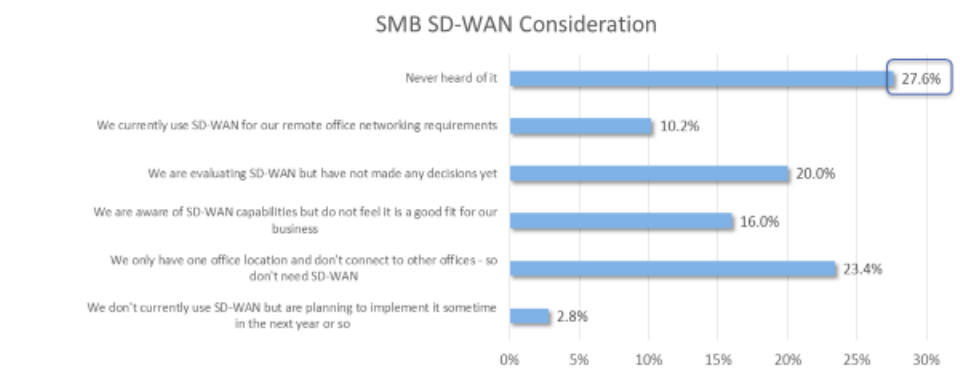
As with many technological transformations, the SD-WAN revolution will likely be held back not by technology limitations or cost considerations, but by industry inertia. Despite the hype among telecom industry watchers, 28% of survey respondents that have IT decision-making influence have never heard of it, and over 20% are still in the evaluation phase. (Please see findings based on Independence Research LLC, *U.S. SMB Connectivity & WiFi Survey*, April 2019). In the mid-market, the numbers are a bit better - just over 25% of mid-market respondents are still in the evaluation phase, and just 15% are unaware of the benefits.

SMB Attitudes towards SD-WAN

Some businesses are using software defined networking services for remote office connections (SD-WAN) What is your company's view of SD-WAN?

SMB SD-WAN Consideration

Never heard of it	27.6%
We currently use SD-WAN for our remote office networking requirements	10.2%
We are evaluating SD-WAN but have not made any decisions yet	20.0%
We are aware of SD-WAN capabilities but do not feel it is a good fit for our business	16.0%
We only have one office location and don't connect to other offices - so don't need SD-WAN	23.4%
We don't currently use SD-WAN but are planning to implement it sometime in the next year or so	2.8%

Source: Independence Research 2019

Analysis and Outlook

Today, the security and performance of the enterprise network is the starting point, and the rest of the network gets sorted out as an after-thought following this "top down" approach. However, looking at macro trends occurring throughout the entire market, it is clear the direction we are moving in is away from centralization and towards individual empowerment. Mobility has fundamentally altered the way we interact with technology, and the idea of a single, secure enterprise perimeter is rapidly becoming outdated. The gig-economy is just getting started - work is no longer a place you go - it is the endpoint where you connect. Each time an employee works from home or accesses company files on a mobile device, the focus shifts slightly from a centralized networking model to a distributed enterprise mindset. Each application migrated from the data center to the cloud, creates a greater need for a more resilient, secure WAN architecture.

To summarize, our research indicates there are several dynamics at work that support the move towards a more decentralized WAN networking environment: faster, readily available and more reliable broadband that meets or exceeds business speed requirements, innovation in both PON and DOCSIS to enable symmetric broadband offerings, an innovative cable partnership focused on the distributed enterprise, the security and performance benefits of SD-WAN, and the promised 5G revolution being pursued by two of the largest enterprise telecom providers.

Inertia is a powerful force, but at the end of the day, cheaper, simpler technologies tend to replace more complicated and expensive solutions. While it is still premature to predict the demise of MPLS, the combination of widely deployed, high quality broadband coupled with the flexibility of SD-WAN may soon be enough to move enterprise decision-makers to consider the entire enterprise - from headquarters to smaller remote offices - when selecting a network service provider.

For further insights on the SMB broadband and distributed enterprise markets, please contact the author at mdavis@independenceresearch.com. For an executive summary of our 2019 SMB Connectivity & WiFi Survey visit our website and register at www.independenceresearch.com.