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Revenue at the Edge: Wi-Fi Managed Services and the Subscriber Experience

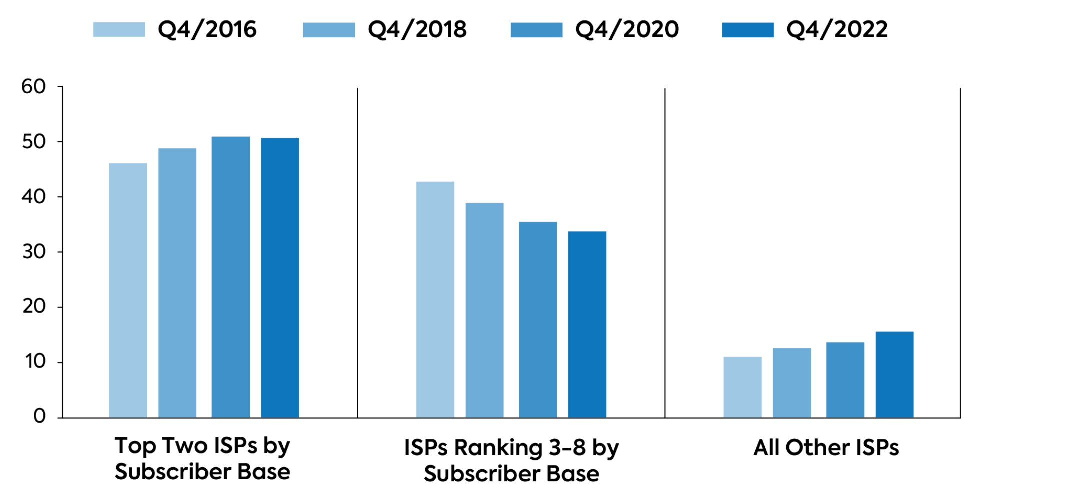
DEVELOPED FOR: Calix

Broadband Market Transformation: The Need for New Offerings

The market for broadband and home internet is shifting. Accelerating fiber and fixed wireless rollouts across the United States are challenging incumbent players, with fiber and fixed wireless experiencing continued growth even as coaxial cable and DSL subscriptions stall or decline. Small and local broadband service providers (BSPs) have been experiencing record growth, primarily at the expense of Tier 2 providers. Many of these players are fiber-first companies, targeting greenfield environments.

One emerging player type is that of the local energy co-op, making use of its existing energy infrastructure and Industry 4.0 initiatives to inexpensively deploy fiber internet service to existing customers. Small and local BSPs are increasingly outcompeting the largest of incumbents in both cost and service quality, while T-Mobile and Verizon move to capture the lower end of the market with their fixed wireless products.

Market Share of Top Residential Internet Providers by Category



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The market environment for internet service providers (ISPs), including broadband service providers, is becoming more challenging. With ongoing economic pressures and the end of student loan deferment, new household formation is on the decline - especially in higher cost urban markets. Fewer households are able to afford home internet service, leading to slower broadband growth as more consumers consider mobile substitution. Making use of best practices for the acquisition and retention of customers is critical.

Declining pay TV adoption, an ongoing trend, is pointing to the need for new bundles and offerings to attract and retain home internet subscribers. Since Q1 2016, adoption of pay TV from traditional players such as BSPs and satellite companies has declined from 80% of US internet households to roughly half of these households. Many remaining pay TV households represent long-time subscribers who remain with services due to long-term contracts or inertia – and many small to mid-size BSPs report that take rates for pay TV range between 5-15% of new residential internet subscribers depending on geography and area demographics. This indicates that while pay TV remains important to a select group of customers – largely older consumers – pay TV adoption has much farther to fall.

Pay TV is no longer a top driver of retention or satisfaction for many Americans. Home phone adoption has likewise been on a downward trend, declining from 50% of US internet households in 2017 to a reported 36% in July 2022, because of high cellular phone adoption and continued growth in spam calls.

New Offerings Emerge

Broadband service providers are instead turning to new offerings and bundle types, including mobile services, home security and smart home services, and value-added services tied to core residential internet. BSPs are partnering with mobile virtual network operator (MVNOs), security and smart home platforms, managed services providers, and a variety of other innovative companies.

Broadband service providers overall are increasingly emphasizing the value of connectivity as their core service offering:

- improved customer premise equipment (CPE) and mesh networking products
- the increasing rollout of managed Wi-Fi and internet value-added services such as adaptive Wi-Fi and whole-home cybersecurity, among others
- improvements to their broadband service
- mobile bundling offers
- self-service mobile apps to enable subscribers to control home network functionality

BSPs that have launched home security and smart home

- GVTC Communications
- Horizon
- Home Telecom
- Comporium
- Intermountain Cable

Examples of traditional BSPs launching or partnering with MVNOs

- Comcast
- Charter Spectrum
- Altice
- WideOpenWest

Compared to the pre-pandemic world, the connectivity needs of many consumers have permanently changed. Remote work, remote schooling, and increased use of over-the-top (OTT) video and gaming services have increased the need for high-speed and reliable broadband service. Increased adoption of internet-connected devices – including computing and entertainment products, smart home devices, and smart health products – is increasing demands on home networks and residential CPE. Multi-member households in particular report higher needs, with increased 4K video consumption happening simultaneously on different endpoint devices throughout the household.

Impact of Remote Work

One of the largest trends impacting consumer need for high-speed, reliable internet is the advent of the remote worker market. From the beginning of the stay-at-home initiatives in Q1 2020, 37% of US internet households reported working remotely at least one day per week.

As of mid-2022, 36% of US internet households continue to work remotely on at least a hybrid basis.

Although pandemic pressures have waned, many consumers are more concerned with quality than price. There remains a large cohort of subscribers interested in attaining the highest value of service available. For these consumers, this includes high-speed and reliable home networks, fiber connections, Wi-Fi 6 or 6E gateways and routers, and value-added services that offer meaningful benefits.

Within the small and medium business (SMB) space, remote work has driven new concerns and opportunities. Many SMBs are embracing remote workforces, but face concerns around the security of employees' home networks, the security of company files, remote worker productivity, and employees' home internet bandwidth and overall home internet reliability.

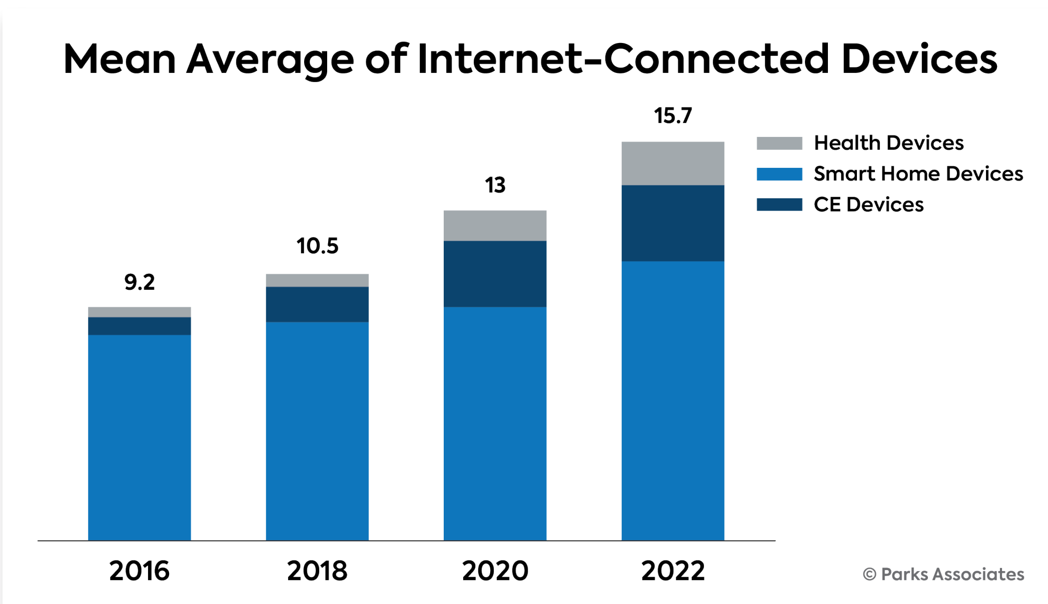
The United States alone has over 30 million SMBs, and these companies are oftentimes the target of cybercriminals.

Emerging Technology: Shaping Consumer Preferences

The COVID-19 pandemic helped drive increased consumer adoption of technologies and internet services. Growth in video viewership surged, the home office returned with the rise in remote workers, and consumers adopted a multitude of internet-connected and consumer electronics and smart home products. This increased demand on home networks drove large-scale consumer purchases of networking equipment and also triggered internet service providers to begin deploying next-generation networking products and services to their subscriber bases. Upload speeds became vitally important to many consumers, as did smooth Wi-Fi coverage throughout properties and advanced network control functionality.

Since 2016, the average number of connected devices has almost doubled – rising from 9 per household in 2016 to 16 per household in 2022.

These devices comprise a mix of smart health, smart home, and computing and entertainment products. Products are located in many areas of the home, with many smart home products such as IP cameras deployed to the edge of the network and smart TVs occupying multiple rooms of the household. The return of the home office likewise stressed home networks, with uplink speeds becoming a vital factor in many consumers' internet usage needs.



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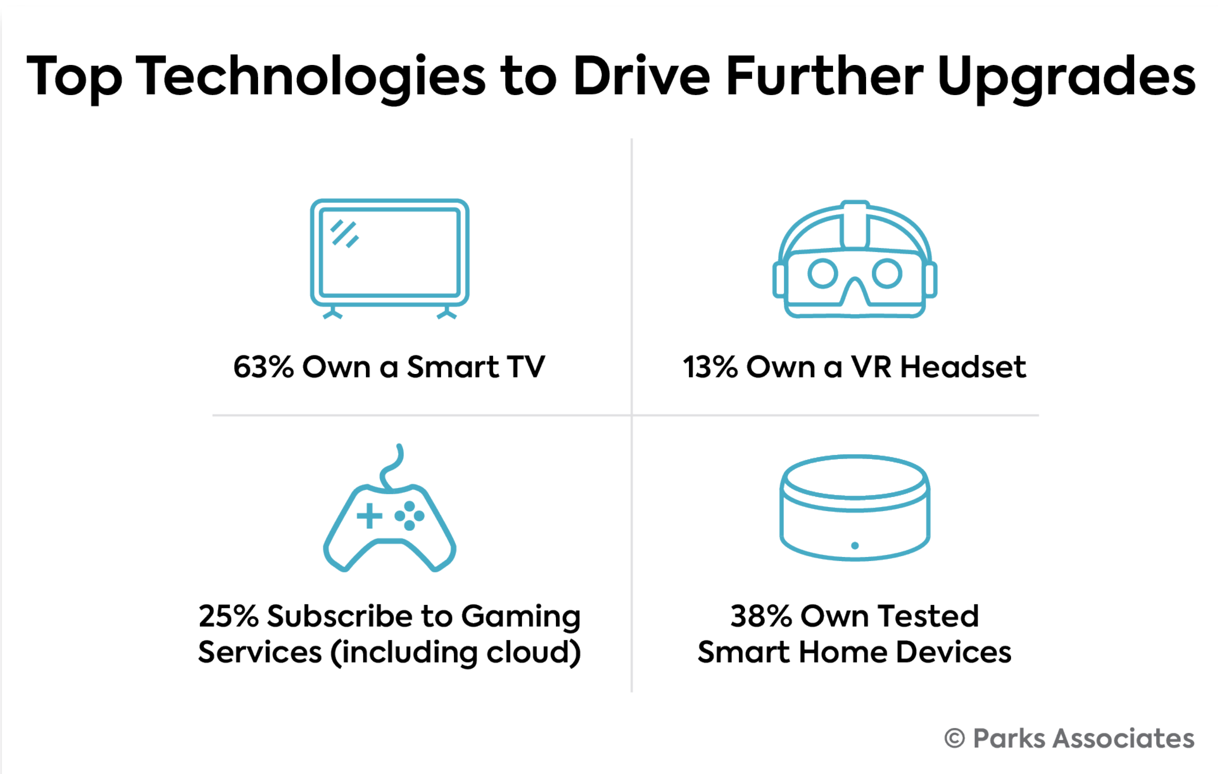
Increases in streaming volume, in device adoption, and the return of the home office resulted in consumers needing high-speed internet and sufficient coverage across their entire home. It drove a wave of CPE upgrades among consumers, triggering internet service providers to begin their own replacement cycles. However, during this time many BSPs experienced supply-chain disruptions, causing them to need to delay their plans. The quick rollout of Wi-Fi 6E on the heels of Wi-Fi 6 has likewise resulted in some delays on the part of BSPs, with many considering how best to approach their deployment strategies.

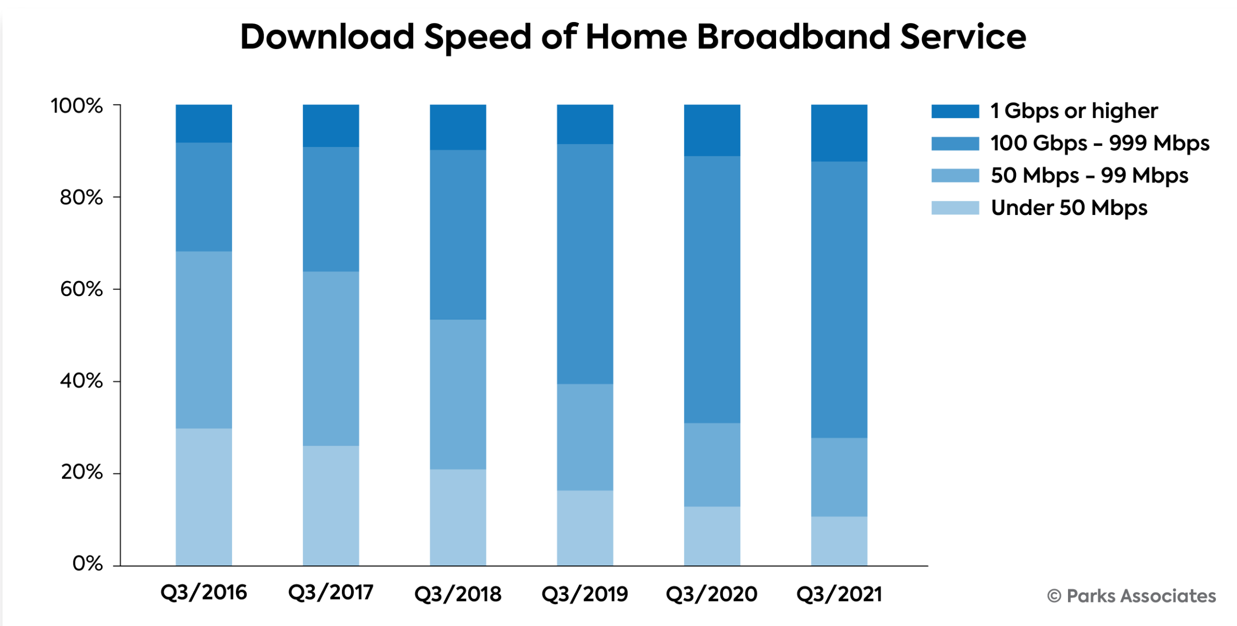
Consumers are increasingly adopting new technologies that may well act to drive further upgrades and increased service adoption in the coming years. **Smart TV adoption, particularly of smart 4K televisions, continued smart home device adoption, cloud gaming services, and continued virtual reality growth will strain home networks.** Consumers making use of these products and services will require high-quality CPE and services that maintain high-quality digital experiences. As the percentage of households overall performing these tasks increase, so will network requirements.



Expanding Beyond Core Connectivity: Value-Added Services

Between 2016 and 2021, consumer-reported home internet download speeds increased dramatically. While differentiation of internet service plans based on speeds remains an important aspect of companies pricing, promotion, and customer satisfaction strategies, there are few consumer use cases that truly require Gigabit connectivity. Router and gateways capabilities, as well as gateway-enabled services, are instead occupying an increasingly vital role in ensuring that internet subscribers remain satisfied and enjoy a quality experience.

- Nearly three out of every four US internet households report receiving download speeds in excess of 100Mbps, and over one in ten report having a Gigabit or faster connection.

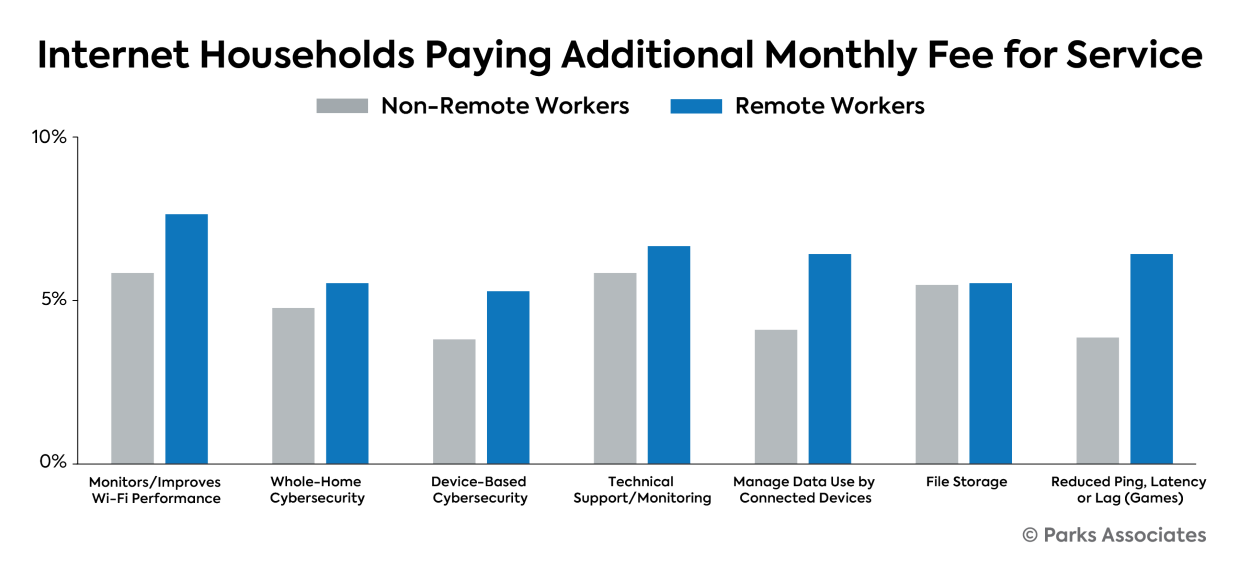


Many consumers do not differentiate between their Wi-Fi experience and their home internet service, seeing the quality of their Wi-Fi as the responsibility of their home internet service provider. Offering these consumers an improved router or gateway allows BSPs to increase customer satisfaction without needing to immediately upgrade network architecture. Correspondingly, mesh networking is becoming increasingly adopted by consumers, driven by the rollout of Wi-Fi 6 and Wi-Fi 6E products, as internet service providers react to the shifting market. The market transition to Wi-Fi 6 is happening at a rapid pace: as per the Wi-Fi Alliance, some 50% of Wi-Fi-enabled devices shipped in 2022 are expected to be Wi-Fi Certified 6 or higher.[1]

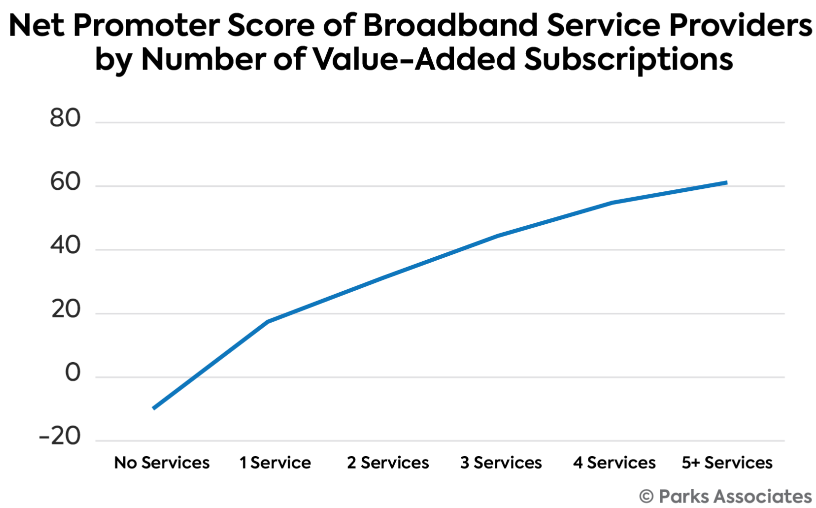
Routers and gateways are enabling new use cases to improve subscriber experiences, allowing BSPs to replace the traditional service bundle. Traditional bundling options, defined here as bundles including home internet service with other traditional services such as pay TV, home phone, and mobile phone, are falling in adoption. This is primarily due to the decrease in adoption of pay TV and home phone lines. While the prevalence of bundling mobile services with home internet is growing, this is not sufficient to fully offset pay-TV losses.

Bundling services serves a variety of purposes for internet service providers. In addition to generating incremental revenue, **bundling helps increase customer satisfaction and reduce churn.** Many broadband service providers are moving to offer new bundled services building upon their core connectivity offerings. These services are being made available to subscribers as part of tiered service package offerings or available on an *a la carte* basis where customers pay an additional monthly fee.

Parks Associates research has found that remote workers are more likely to pay for additional services provided to their homes. This has held true for nearly every tested service, with the exception of file storage. Services that directly impact productivity show the largest pronounced differences in adoption between remote workers and other households.



Value-added services, sometimes referred to as managed services, are also having a sharp impact on customer satisfaction, as measured by **net promoter scores (NPS)**. NPS is a measure of customer willingness to recommend products and services, with totaled scores ranging from -100 to 100. The higher the score, the more likely the customer is to recommend the service, with negative scores indicating that most customers are unhappy. As seen in the graphic below, **the number of services adopted has a powerful correlation with higher NPS**.



Services that strongly impact NPS:

- data use management for router/gateway-connected devices
- enhanced parental control functionality
- managed Wi-Fi services
- whole-home cybersecurity

Many of these new services are being enabled through residential routers and gateways. These devices are serving as the platforms for new application distribution models, where services are pre-integrated in order to speed time-to-market. With these new services, BSPs can generate incremental revenues, reduce the need for calls to support, ensure fewer truck rolls, and acquire detailed analytics and insight into network performance and operations.

Leading Use Cases for Gateway-Based Services

Device Identification & Rulemaking	Devices are identified and rules around internet access, allowed content, and traffic prioritization are applied. Includes parental control functionality and preferential treatment for gaming or work at home.
Advanced Customer Support Tools	Provides insight into subscriber networks and real-time data on technical issues; can be leveraged into self-service tools.
Wi-Fi Optimization	Use of AI to optimize Wi-Fi coverage within residential networks. Includes band steering functionality to improve coverage and minimize dropouts. In deployments with multiple gateways, Wi-Fi optimization can be used to prevent interference from neighboring APs.
Gateway-Based IoT Security	Software identified devices connected to network, AI learns behavioral patterns and/or applies learned pattern to known devices. Abnormal behavior is identified and prohibited.
Gateway-Based Safe Browsing	Traffic from user-controlled devices (PCs, smartphones) is monitored and checked against known-bad lists. Connection to a known bad brings up a splash page warning the user.
Privacy Protection	Notifies users when data is being collected without their permission. Blocks data collection by unauthorized third parties.
Network Usage Insights	Collects information on home network usage patterns, including internet-connected devices. Models future network behavior.

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Best Practices and Considerations in Wi-Fi Managed Services and Emerging Tech Deployment

Wi-Fi managed services and emerging technology in general represent a new way of deploying customer services, conducting operations, and providing ongoing support. Internet service providers are likely to experience common challenges when approaching these technology types. Many of the top challenges that companies experience are common across all technology initiatives, and not necessarily specific to any one. To generate a return on investment in new technology, avoiding costly missteps, BSPs must adhere to best practices.

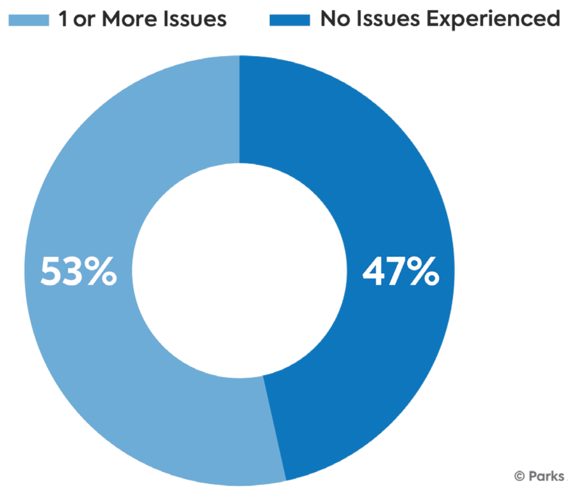
Identifying Top Priorities

Executives across industries emphasize that deploying new technology begins with planning and strategizing, ensuring that key considerations and goals are accurately identified and defined, stakeholders and support teams are aligned and on board, and processes and project requirements are clearly understood. BSPs must conduct research, both internally and externally. Internally, to identify their own specific needs and priorities, and externally, to identify trends and benchmark against competitors. This process may be a larger lift for smaller BSPs that lack needed internal expertise and resources. These BSPs will oftentimes seek guidance from external experts to help them to identify top needs, best practices, and steps to optimize people and processes.

One key example of the benefit of Wi-Fi managed services is that of precise insights and analytics into residential network behavior and network outages. Access to this data allows BSPs to precisely know and account for the types, locations, and network capabilities of internet-connected devices within the home and estimate and plan for network traffic patterns. In order for BSPs to fully make use of these insights, they must be equipped with cloud-based systems to track and manage their subscriber experiences. These systems incorporate analytics capabilities able to interpret and analyze subscriber data in a user-friendly way. Without such capabilities, BSPs risk being inundated with a firehose of data that they have little means of making sense of.

BSP support teams use these cloud-based support systems to deliver troubleshooting and maintenance for customers and even drive mobile app self-service solutions, allowing BSPs to reserve truck rolls for more severe issues requiring a field technician on the ground. **To properly capitalize on this advantage requires that BSPs align their support teams with customer success related services, making use of change management and business transformation best practices to ensure that employees and teams do not see new technology as a threat but rather an opportunity.**

Home Internet Service Issues Among Subscribers



Over half of home internet households report experiencing at least one issue with their home's internet service in the last 12 months.

These issues range between technical problems, network issues, customer service, and billing problems. These issues are a key cause of dissatisfaction among home internet households, with consumers who experience multiple issues throughout the year rapidly losing patience with their BSP. Poor customer service in particular is highly likely to cause dissatisfaction and result in lowered NPS. Remote technical support and self-service solutions are key in helping to prevent dissatisfaction among customers.

Improving Time-to-Market

Time-to-market while deploying new solutions has historically been a challenge for BSPs and for vendors. Managed services can enable a faster time-to-market, allowing BSPs to roll out white-labeled or co-branded solutions without needing to develop them in-house. These solutions are highly scalable and include vendor support, in particular customer success and enablement services that help guide BSPs through new product introductions and provide best practices for business transformation and growth. The timeline of deploying of these managed services has also been greatly reduced compared to years ago, when integrations took more than six months on average to complete. Since then, vendors have worked to streamline the deployment process through pre-integration strategies, completing much of the generic integration work ahead of time.

An additional consideration is deciding between an in-house router/gateway solution from a vendor or choosing an open integration approach capable of making use of existing router/gateway deployments. In-house solutions tend to offer more robust feature sets and capabilities than existing CPE deployments and are more easily integrated into technology stacks. The primary benefit of using existing CPE is cost-savings, through avoiding deploying new devices. With many BSPs having delayed their CPE upgrade cycle, benefits are tilted towards vendors offering in-house solutions. Before deciding on a solution, BSPs must evaluate the availability of vendor devices – the supply chain crisis is continuing to play a role in CPE availability. Compliance with industry standards is another key differentiator, ensuring compatibility with third-party products and systems.

Working with Vendors

To deploy new edge solutions, it is vital that BSPs select a suitable vendor. **Vendors must offer valuable solutions with proven ROI and a quick time to market, integrate well with BSP internal systems and processes, and provide mission critical long-term support and partnership.** Coordinating multiple vendors may be a challenge for BSPs, given the complexities involved in integration, solutions management, and coordination. It is easier to either have a single vendor capable of coordinating third-parties or to have a single vendor offering the full suite of desired services and products. This also plays an important role with regards to support, as having a single support partner dramatically simplifies support operations among growing operational and customer complexity.

When selecting a vendor, BSPs must take care to ensure that their internal roadmap and their vendor's roadmap are aligned. Collaboration and partnership between a BSP and its vendor help to align these visions, resulting in vendors developing solutions that provide value to BSPs and in BSPs being able to deliver solutions that provide value to subscribers and ROI to the company. **With many BSPs looking to expand greenfield operations and move into unserved or underserved areas, the ability to scale to serve these new customers is another key factor for success.**

Differentiating the Experience

While revenue generation is a key consideration when looking for a solution to deploy, the overall internet service market is growing more competitive. To attract and retain subscribers, BSPs must be prepared to employ a variety of new solutions. An increasing percentage of BSPs are offering select managed Wi-Fi services to customers as part of their standard tiered offerings, to raise satisfaction and better differentiate themselves from competitors.

For BSPs employing this strategy, the use of a **cloud-based support solution** for network visibility and improved customer support is becoming increasingly critical. By leveraging their cloud-based support solution to automatically identify local network outages or other problems, BSPs can address factors impacting the service before it escalates to a support call from the user. End-to-end visibility into subscriber experiences allows customer service representatives and field technicians to understand the root causes of customer service issues within the home and network, from the WAN to the residential gateway, in-home Wi-Fi experience, internet-connected devices, and individual applications. Proactively identifying and resolving issues results in greater customer satisfaction and retention, while reducing the cost of operations.

Competitive Implications and Conclusions

Competition is rising in the residential broadband market. Fiber rollout is accelerating, and mobile-powered fixed wireless has become available across the United States. A series of new entrants are poised to take market share from the unprepared. At the same time, with increasing inflation, rising interest rates, and economic uncertainty, internet service providers cannot afford to misstep.

BSPs must be prepared to pivot their strategies to account for this changing market. Customers are seeking more connected lifestyle services with more reliable internet service and a need to connect an ever-increasing number of devices to their networks as part of their desired subscriber experience. BSPs are utilizing the network in many locations throughout the home and even outside of it, and they expect a seamless connected experience. Meeting these customer expectations requires a forward-looking approach to new technologies and managed services with support systems in place to ensure optimal network performance.

Both ongoing consumer trends and upcoming use cases point to the need to prepare for a more connected world delivered by managed Wi-Fi and value-add services. Connected devices and services are part of today's lifestyle, and effectively supporting both is critical to a BSP's success. BSPs looking to compete with Tier 1 providers must provide differentiated experiences through their service offerings and the quality of their customer's experience.

[1] Wi-Fi Alliance, Wi-Fi 6 and 6E Drive Global Market Opportunities. Source: https://www.wi-fi.org/news-events/newsroom/wi-fi-6-and-wi-fi-6e-drive-global-market-opportunities

About Parks Associates

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Parks Associates, a woman-founded and certified business, is an internationally recognized market research and consulting company specializing in emerging consumer technology products and services. Founded in 1986, Parks Associates creates research capital for companies ranging from Fortune 500 to small start-ups through market reports, primary studies, consumer research, custom research, workshops, executive conferences, and annual service subscriptions.

The company's expertise includes new media, digital entertainment and gaming, home networks, internet and television services, digital health, mobile applications and services, consumer apps, advanced advertising, consumer electronics, energy management, and home control systems and security.

About Calix

www.calix.com

Calix cloud and software platforms enable service providers of all types and sizes to innovate and transform. Our customers utilize the real-time data and insights from Calix platforms to simplify their businesses and deliver experiences that excite their subscribers. The resulting growth in subscriber acquisition, loyalty, and revenue creates more value for their businesses and communities. This is the Calix mission: To enable broadband service providers of all sizes to simplify, excite, and grow.

About the Author

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Kristen Hanich heads Parks Associates' consumer electronics and mobility research, with expertise in other verticals including connected cars, mobile networking, healthcare, wellness, and independent living. She leads a mix of custom and syndicated research projects throughout the year, with a focus on major players and emerging trends. Kristen specializes in bridging the gap between data-driven and narrative approaches to understanding the consumer markets via a mix of qualitative and quantitative research approaches.

Kristen has dual master's degrees in applied anthropology and public health from the Universities of North Texas in Denton and Fort Worth. She earned her BSc in health at the University of Texas at San Antonio and has a graduate certificate in Geographic Information Systems.

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