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The Future Telco-Connected Home

The importance of greater open standards to enable service providers to protect their position in the connected home

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Summary

The connected home has become an essential part of the broadband network and is vital to the delivery of a high-quality end-to-end experience. For many years broadband service providers viewed the connected home largely as a cost driver and, therefore, focused their strategies on developing cheaper hardware and driving greater operation efficiency. The Broadband Forum's TR-069 standard was a key development in this strategy, because it enabled automatic configuration and remote management of broadband customer premises equipment (CPE), paving the way for self-installation of CPE and autoconfiguration of services.

However, the connected home is now a far more advanced environment than it was in the early days of broadband. Over just the five years to 2020, the number of installed connected devices has doubled to 13.4 billion, and this figure will increase again by a further 70% over the next five. And it is not just the sheer number of devices that is increasing but also the applications that they are running, including ultra-HD video, cloud gaming, telehealth, and home working, all of which require a highly reliable, quality network to perform to the required standard. Managing this network is, therefore, of paramount importance, and if done well it can bring the service provider significant brand differentiation and new revenue opportunities.

Industry standards and open frameworks are vital to this success, because they remove technical barriers and better equip broadband service providers to compete with global tech and consumer electronics companies. Based on its interviews with leading broadband service providers, Omdia concludes that the three most important areas for continued standards work are

- The continued drive to eradicate fragmentation
- Development of open platforms to drive third-party developer scale
- Data standards to maintain customer trust

The Broadband Forum's User Services Platform (USP) is one standard that will help service providers manage this more complicated connected-home environment. Developed to help deploy, implement, and manage all aspects of the home network including consumer Internet of Things (IoT), the standard creates a data model, architecture, and communications protocol to enable devices from many vendors to connect to the Wi-Fi home gateway, which can then be managed by the broadband service provider, opening up new business model opportunities as a consequence.

This report is a follow-up to a report produced in 2015 in association with the Broadband Forum entitled *Efficient and Automated Smart Home Rollout*. The analysis in this report is based on a quantitative service provider survey of more than 100 representatives across 19 countries, in-depth qualitative interviews with key executives from 11 service providers in Latin America, North America, Europe, and China, and existing Omdia research and data in the broadband, connected, and smart home domains.

Key points and recommendations

- **A new focus on connected-home investment.** Providing a high-quality broadband experience is essential for service provider differentiation, and this is not possible without adequate investment in the home network. Therefore, this should now be a top priority for service providers.

- **Ensuring a wall-to-wall advanced Wi-Fi experience.** The COVID-19 pandemic has only highlighted the importance of broadband and a good home Wi-Fi solution. Wi-Fi solutions, therefore, must now be optimized to provide the best-quality connection possible to all corners of the home. However, this is not just about throwing more hardware at the problem: in some cases this only makes the situation worse. Service providers must take a comprehensive view of the connected-home predicament and look to invest in both hardware and software platforms that will deliver the right solution to each individual customer.

- **Balance operational efficiency and new service development to optimize the customer experience.** There are two sides to modern smart Wi-Fi platforms: one is around driving service and operational efficiency; the other is about developing and enabling new applications and services. However, this is not an either/or situation. All service providers, regardless of their market position, should look to do both, because it is only through driving service optimization and new service features that they can optimize the customer experience. The key question is how this should all be monetized, and service providers should develop an overall roadmap with a clear monetization strategy in mind.

- **VAS prioritization remains focused on safety and security.** In terms of new value-added-services, the priority today remains on applications that bring added safety and security to the customer. Especially considering the pandemic, during which many more people are working and being educated from home, this prioritization makes perfect sense. However, service providers should also have a longer-term roadmap that means that their service portfolio will continue to evolve, unveiling new revenue opportunities over time.

- **Telcos' attitude to smart home has changed, but for the better.** Since Omdia carried out its last service provider connected-home survey in 2015, there has been a distinct shift in not only strategy toward the connected-home gateway but also smart home strategy. Five years ago, there was a greater focus on and optimism around developing service provider own-branded smart home solutions. Since then there has been a real shift toward more smart home enablement, working with third-party developers, with the connected-home gateway a key element of that strategy.

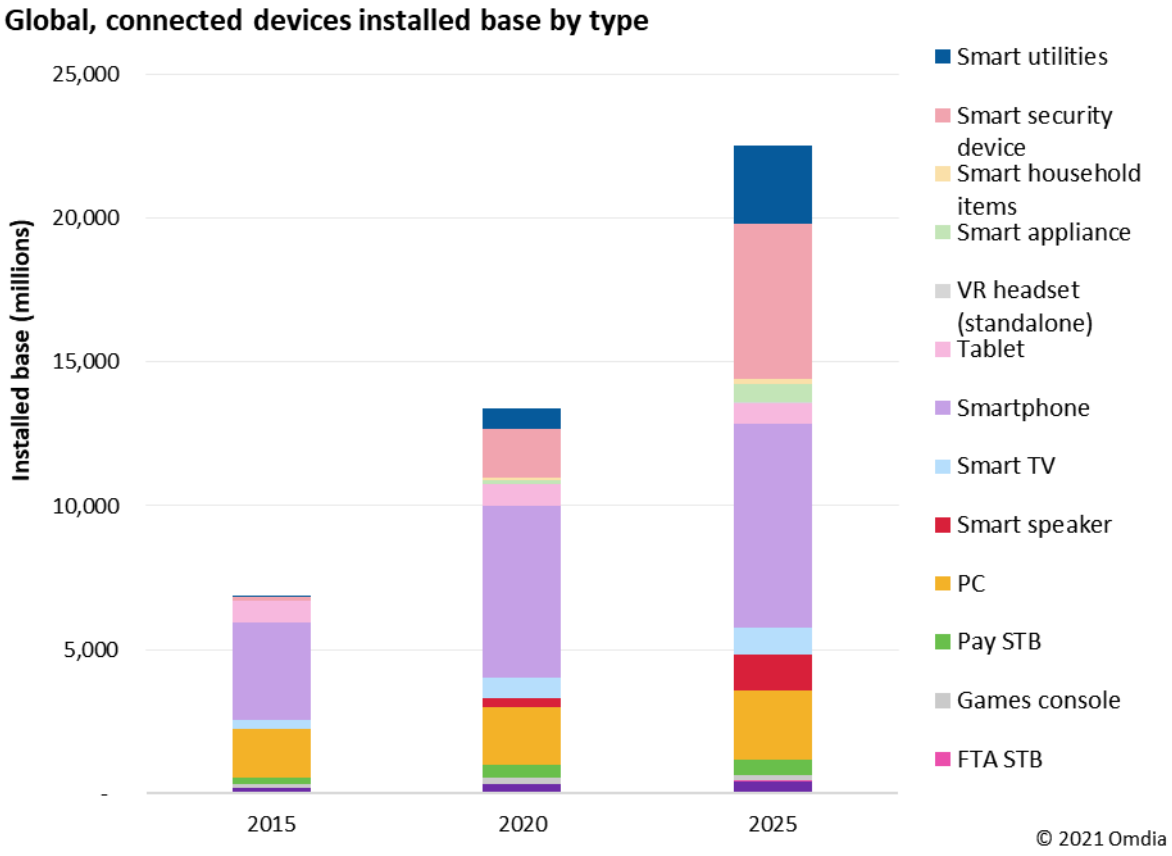
- **Help drive open standards to a better-connected world.** Without greater standardization, service providers will continue to be restricted by industry fragmentation that will limit both their ability to gain scale and the pace of innovation and thus their ability to compete with global tech and consumer electronics companies. All service providers and equipment vendors should, therefore, invest time and money in driving new open standards that will help ensure broadband service providers maintain their place at the core of the future connected home.

The future connected home

The rapid growth in connected devices

The number of connected devices in ordinary households is expanding rapidly, nearly doubling between 2015 and 2020. Personal devices such as smartphones and tablets are already commonplace, and growth in their installed base will slow over the next five years. However, the overall growth in connected devices will continue with a five-year CAGR of 11%, pushed by connected entertainment devices such as smart TVs and speakers and by smart home devices such as smart home appliances, smart speakers, and smart lighting (see **Figure 1**).

Figure 1: Entertainment and smart home devices drive new growth in the installed base



Source: Omdia

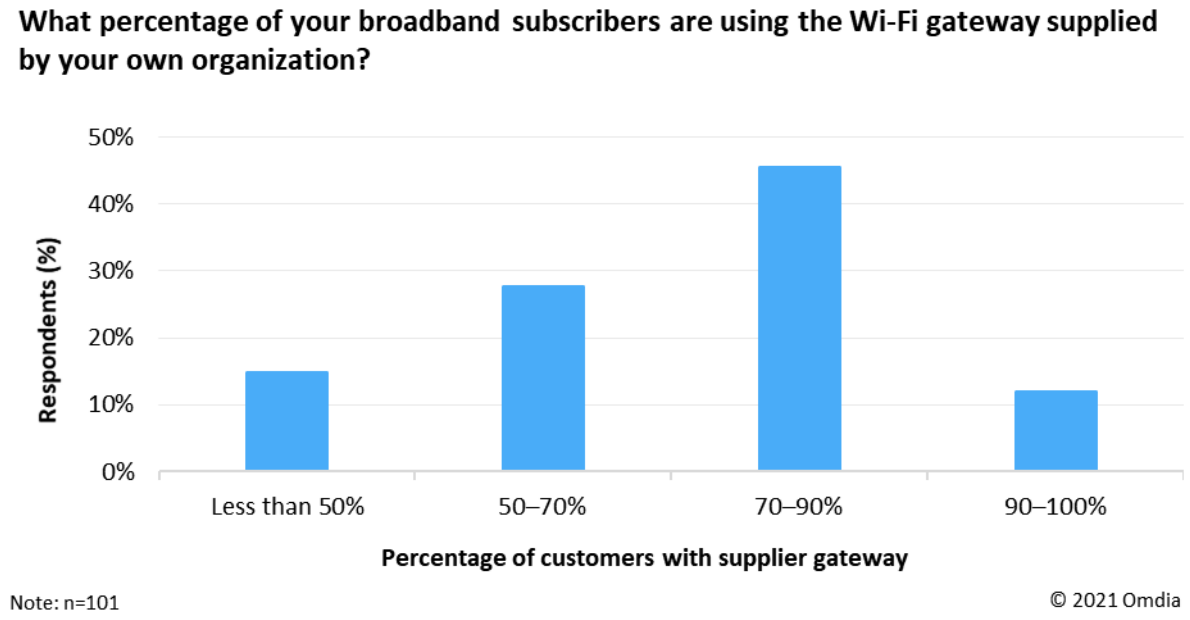
Omdia's consumer insights survey data indicates that the average number of connected device types in broadband-developed countries is already over 11. However, this downplays the real situation, because the figure does not reflect the fact that households may have multiple examples of each device type, that is, multiple smartphones, tablets, or smart TVs. This will increasingly be the case as we transition to smart homes, where households could have dozens of connected appliances or smart lighting devices, for example. Households with 50 or more connected objects will, therefore, become common in the near future.

The changing role of the broadband service provider

The home network has become a vital cog in the supply chain of high-quality broadband services and applications. It is critical that broadband service providers now see this as an area of active investment and service differentiation; this has not always been the case in the past.

Historically, the telecommunications network, and therefore the service provider's responsibility, terminated at the edge of the customer's premises, not at the device, with the home LAN seen as the customer's responsibility. With the advent of broadband, however, it became increasingly popular to supply the broadband CPE as standard as part of the overall service. As shown in **Figure 2**, approximately 60% of respondents to Omdia's 2020 Service Provider Connected Home survey stated that 70% or more of residential broadband CPE was now supplied by the service provider.

Figure 2: The majority of consumers now use gateways provided by the service provider



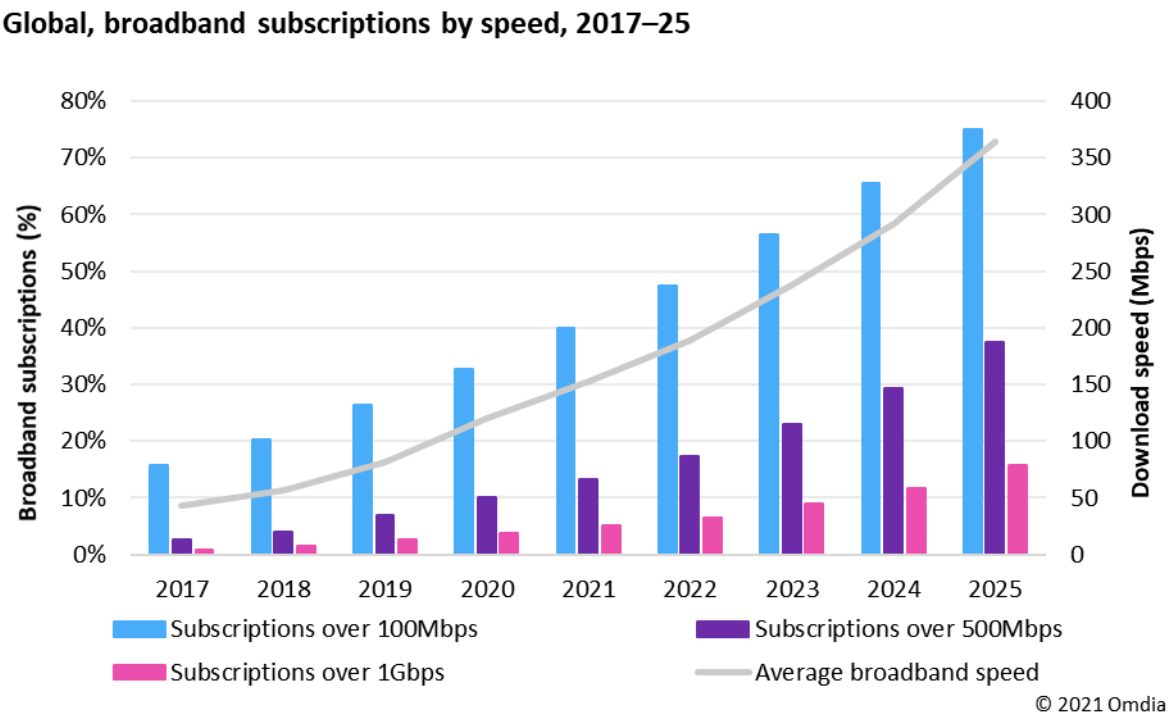
Source: Omdia's Service Provider Connected Home survey, November 2020

The majority of modern-day consumers, therefore, no longer view the home network as their responsibility; they measure their broadband experience by the performance of the applications on the end device, rather than simply the speed of the connection to the home. Not being able to match this quality expectation is a significant driver of customer churn for service providers. Providing a high quality of experience is, therefore, essential to a broadband service provider's business success, and this must include over the home network.

Investment in the home network has lagged that in the rest of the network

Broadband customers have seen a continuous investment in access networks, which has led to an exponential increase in broadband speeds and, therefore, overall quality of the broadband service. **Figure 3** shows that 75% of all broadband subscriptions globally will be on tariffs with speeds of over 100Mbps by 2025, and 16% will be on speeds of 1Gbps or more, with an average global download speed of over 350Mbps.

Figure 3: Broadband speed will increase exponentially over the next five years



Source: Omdia, Consumer Broadband Forecasts, 2020–25

Until recently, however, investment in the home network did not follow that in other parts of the network, with it largely being viewed as a cost burden to the business rather than an area of active investment. This has led to a sharp growth in consumer dissatisfaction with home networks: according to leading broadband service providers, Wi-Fi-related calls are now responsible for up to

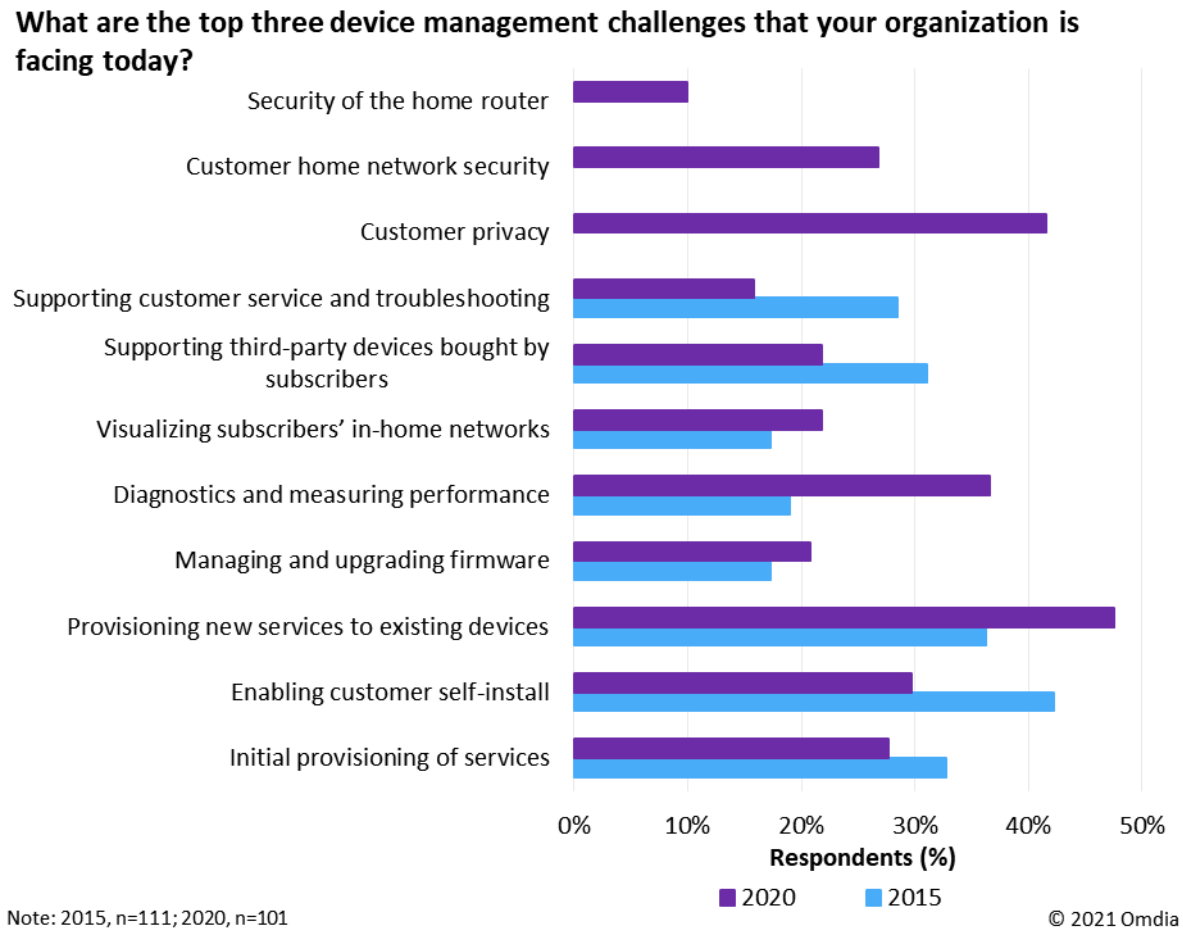
60% of all customer service calls. As a result, home Wi-Fi issues are now seen by service providers as one of the current biggest drivers of customer churn.

A new focus on connected-home investment

Attitudes toward broadband CPE have therefore changed, and broadband service providers around the world now perceive the connected home as a key area of investment. Viewing the connected home as an area for service differentiation rather than a cost burden has already led to a range of impressive success KPIs. Omdia interviews indicate that service providers have seen Net Promotor Scores increase 10–40 points, a reduction in service calls of 30–60%, a reduction in engineering visits of up to 30%, and an increase in customers on premium broadband tiers of up to 45%, all from greater investment in home Wi-Fi.

However, this is not just about offering new hardware routers. To achieve such results, service providers must take a fully comprehensive view of the connected home, identifying and solving all customer issues within it in a simple and efficient way. **Figure 4** shows that since the last Service Provider Connected Home survey in 2015, service providers' focus when it comes to CPE management has shifted from largely service provisioning and self-installation (i.e., increasing their own efficiency) to service diagnostics and performance measuring, provisioning of new service features and applications to existing CPE and devices, and other, newer areas such as customer privacy and data security (i.e., improving the customer experience).

Figure 4: A greater focus on managing performance and new service features

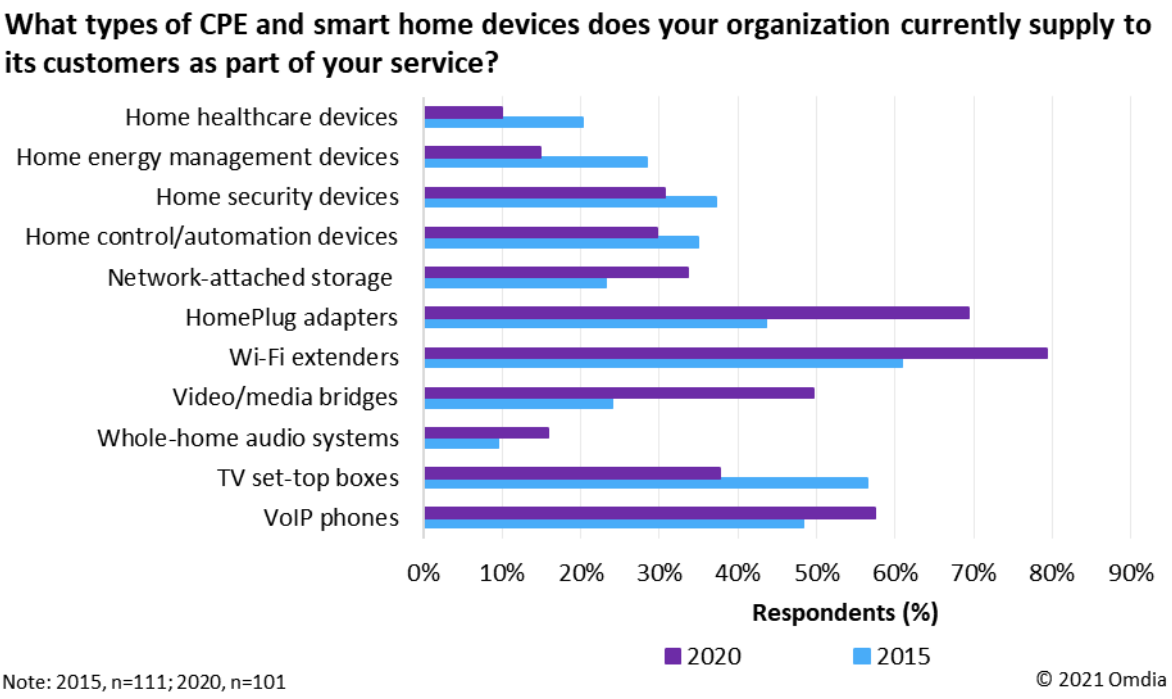


Source: Omdia's Service Provider Connected Home survey, November 2020

An increase in whole-home Wi-Fi

Wi-Fi range remains one of the most commonly cited Wi-Fi issues. With the increase in the number and type of connected devices, it has become imperative that Wi-Fi stretches to every corner of the home. The COVID-19 crisis has only heightened this requirement with all members of the household at home trying to work, continue with their education, or access entertainment, all at once. **Figure 5** illustrates the increase in service providers supplying additional home networking devices, especially Wi-Fi extenders.

Figure 5: Broadband service providers have doubled down on home network devices



Source: Omdia's Service Provider Connected Home survey, August 2015 and November 2020

A significant number (63%) of respondents to Omdia's 2020 Service Provider Connected Home survey believe that in the next three years, 20–50% of their customers will have multiple Wi-Fi access points in their home; 16% believed that more than 50% of customers will have installed them.

Fixed-mobile convergence is still up for debate

Mobile and fixed convergence has been talked about for many years, but there has been little in the way of industry developments beyond basic service bundling. However, with the arrival of both 5G and smart Wi-Fi there is a new opportunity to start delivering true converged services into the home.

Network convergence could provide value in high-5G but low-fiber countries

The biggest and most obvious opportunity is around network convergence, providing the same service level over both access networks, allowing intelligence in the core network to choose the best path to ensure the quality of experience. Currently this decision is taken by the end user or by the end device, both of which will only be following a set and uninformed rule (e.g., when within range, connect to the home Wi-Fi network, regardless of whether that network can indeed provide the best experience). Putting more intelligence within the core network will enable the networks and devices to communicate and make more informed decisions about which route to take.

Omdia's interviews suggest that service providers in countries where 5G coverage will quickly outpace fiber-to-the-home (FTTH) deployment show the biggest interest in this type of network convergence, because the 5G connection in some situations could complement the fixed broadband offering, improving the overall customer experience. However, for fixed-only service providers or providers already operating in fiber-rich broadband countries, this type of convergence is seen to provide less value and is therefore a low priority.

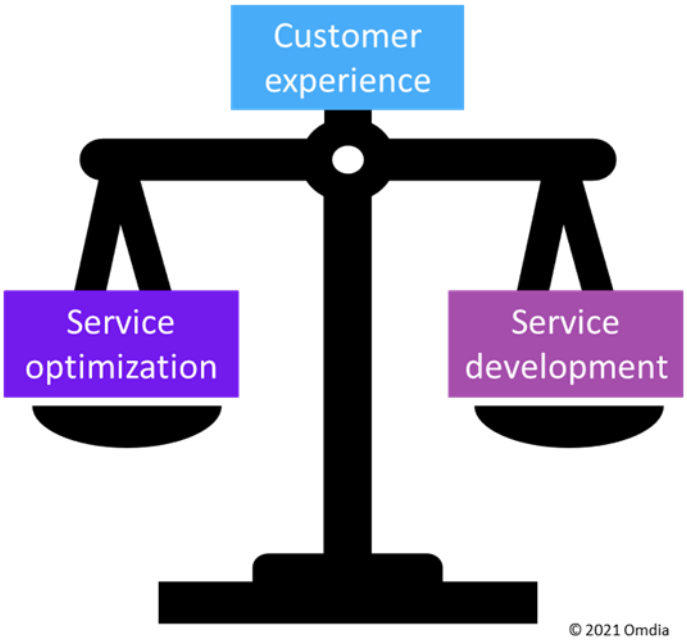
Network-agnostic services is where the value really lies

All service providers Omdia interviewed agreed that network-agnostic services are crucial to the customer experience. End users no longer see the world in terms of fixed or mobile; they simply expect all services and applications to work equally well, regardless of the network they are connected to. This goes for everything, including high-end media applications, security features, and basic functions such as being able to connect to and control other devices (e.g., a home printer). If any of these services or features stop working simply because the end device has switched from one network to the other, this will drive customer frustration and service dissatisfaction.

Managing the complexity of the connected home

It is clear from both Omdia's Service Provider Connected Home survey and in-depth executive briefings that getting a balance between managing costs, driving better customer experience, and developing new revenue opportunities is essential for ongoing business success for all types of broadband service provider.

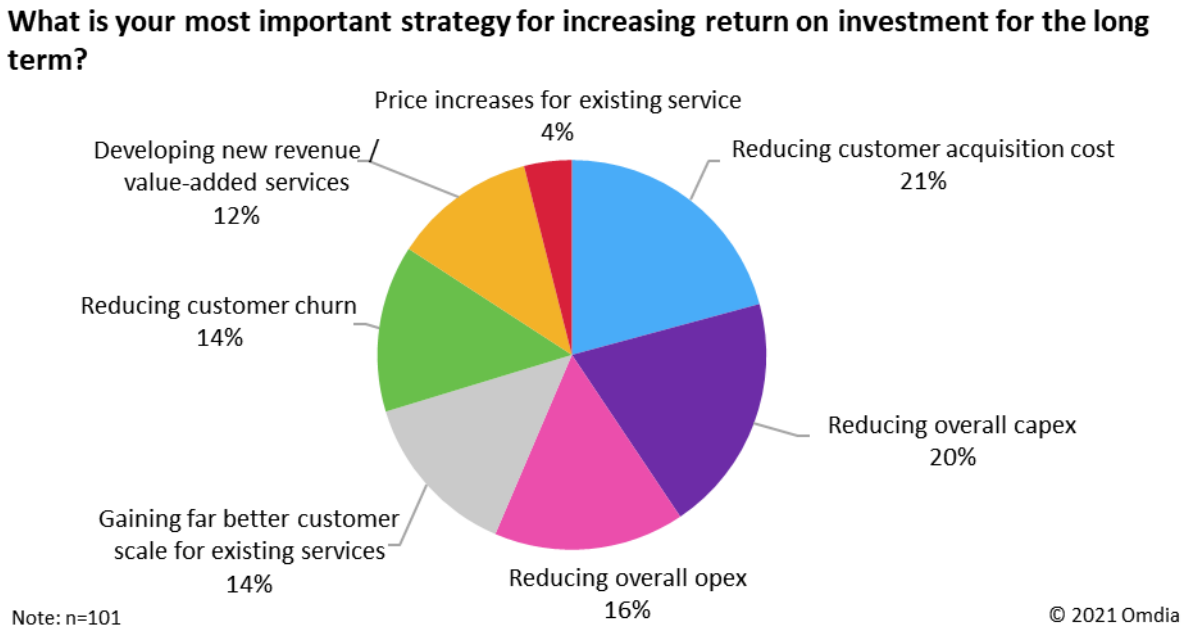
Figure 6: Balancing service optimization and development will grow the customer experience



Source: Omdia

Figure 7 shows that strategies focused on reducing costs and those aimed at increasing revenue were weighted approximately equally in Omdia's survey. One might expect that this focus will shift, leaning more toward service optimization/efficiency or more toward revenue growth, depending on the service provider's current market position. However, in Omdia's research we found that regardless of type of service provider, location, or maturity of the broadband market, this balance remains relatively constant; it is the drivers behind the strategies that change.

Figure 7: Cost and revenue growth strategies are rated as equally important when it comes to increasing ROI



Source: Omdia's Service Provider Connected Home survey, November 2020

Continuing to drive operational efficiencies remains essential for all service providers, whether their focus is on supplying only connectivity or a full suite of value-added services and applications. Reducing customer churn is possibly one of the most important factors, because churn costs are high and customer profitability is only maximized after a certain amount of time. Managing a customer's ongoing capex and opex, however, is also critical, especially as service providers need to continually invest to maintain broadband experience, while ARPUs remain relatively level.

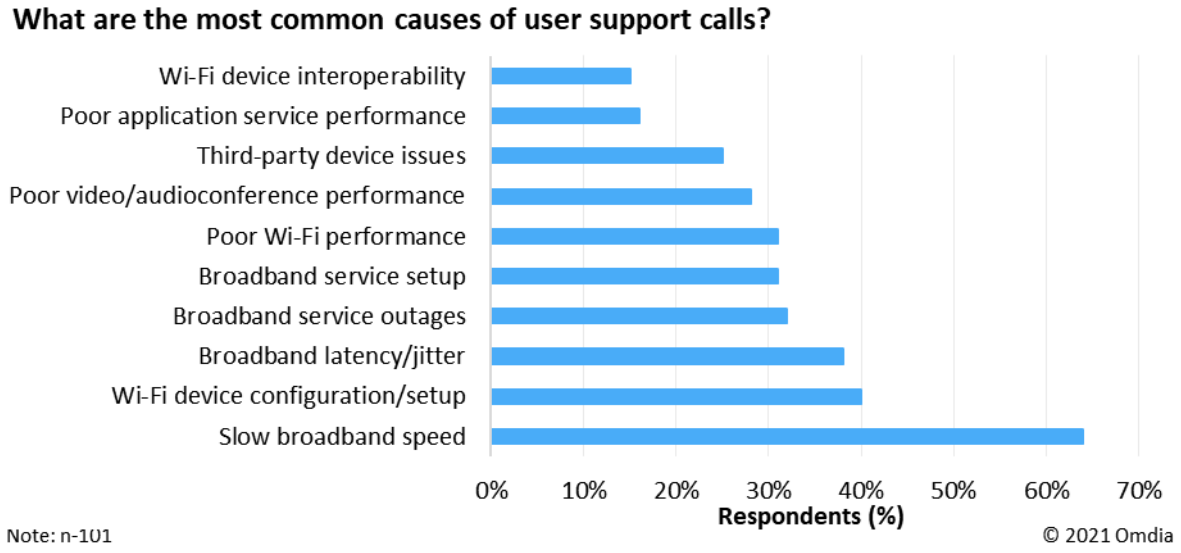
Managing the connected home is key to reducing operation costs

Because of the increased complexity of the connected home, according to service provider interviews, home Wi-Fi issues now account for up to 60% of all broadband customer service calls. **Figure 8** shows that, based on respondents to Omdia's survey, initial Wi-Fi setup is, by itself, a strong driver of service calls. However, after that comes calls focused on the broadband experience (e.g., slow broadband speeds and network jitter or latency). With the increasing investment in next-generation access networks, service providers are finding that in an increasing number of cases these issues are actually caused by the Wi-Fi element of the network rather than the access. The difficulty is that calls related to the home network are harder for service teams to handle, because unlike the access network, the home network is not managed.

Historically, customer service teams have had little visibility into the characteristics of each customer's home network. This means service calls related to the home network are costly and can lead to further operational expense through expensive engineer callouts or unnecessary CPE replacements. Most importantly, customer dissatisfaction with the home Wi-Fi experience is

becoming a growing driver of customer churn. The combination of increasing customer churn and rising operational costs creates the business case for greater home network management investment.

Figure 8: Next-generation access investment has pushed the broadband bottleneck into the home



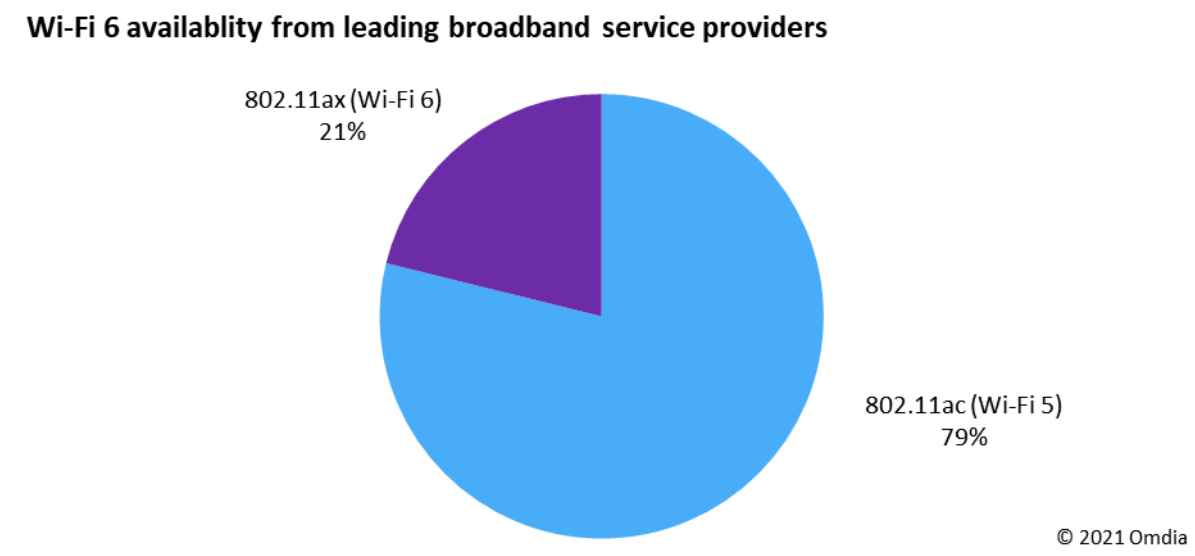
Source: Omdia's Service Provider Connected Home survey, November 2020

The ever-advancing Wi-Fi capability

Thanks to its low cost and simplicity, Wi-Fi remains the most dominant home networking technology and is likely to be so for the foreseeable future. Along with new hardware and software features, the home network capability continues to also be enhanced by the development of the Wi-Fi standard itself. Wi-Fi 6 is the latest generation to be released and is currently being deployed around the world. It is designed to totally change the way Wi-Fi works. In previous standards, the communication between access points and devices happened concurrently, one device at a time. With Wi-Fi 6, access points can transmit to multiple devices simultaneously using the inbuilt orthogonal frequency division multiple access (OFDMA) feature. This and many other capabilities give Wi-Fi 6 a huge advantage over the previous standards.

Although it was only released in 2019, 21% of the 52 broadband service providers whose Wi-Fi strategy Omdia currently tracks already offer a Wi-Fi 6 gateway to at least their premium broadband customers (see **Figure 9**). However, because of standard CPE lifecycles, mass rollout of the technology will still take time. In Omdia's Service Provider Connected Home survey, only 22% of respondents believed that more than 25% of their customer base would have Wi-Fi 6 capability within three years. The most popular (45%) answer was 11–25%. This latter estimate closely matches Omdia's own home gateway forecasts, which state that by 2023, 13% of home gateway shipments will be Wi-Fi 6, rising to 18% by 2024.

Figure 9: Wi-Fi 6 gateways are increasingly offered to premium broadband customers

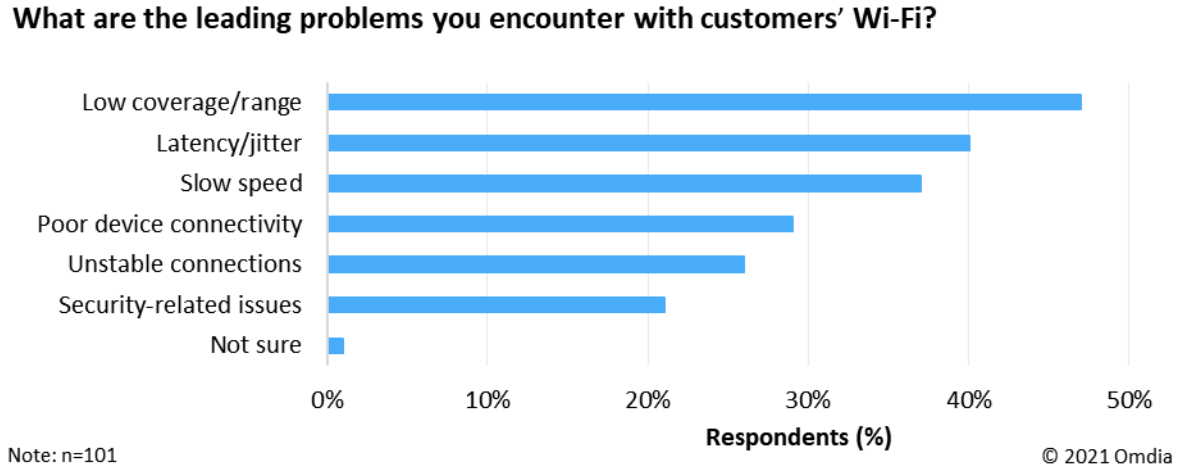


Source: Omdia's Service Provider Smart Wi-Fi Tracker and Benchmark

The rise of mesh

As discussed previously, range has always been an issue for Wi-Fi, especially in properties built with brick or stone walls, which Wi-Fi signals struggle to penetrate. In Omdia's Service Provider Connected Home survey, Wi-Fi range was still viewed as the number one Wi-Fi issue, followed by latency/jitter, slow speed, and finally, poor device connectivity (see **Figure 10**).

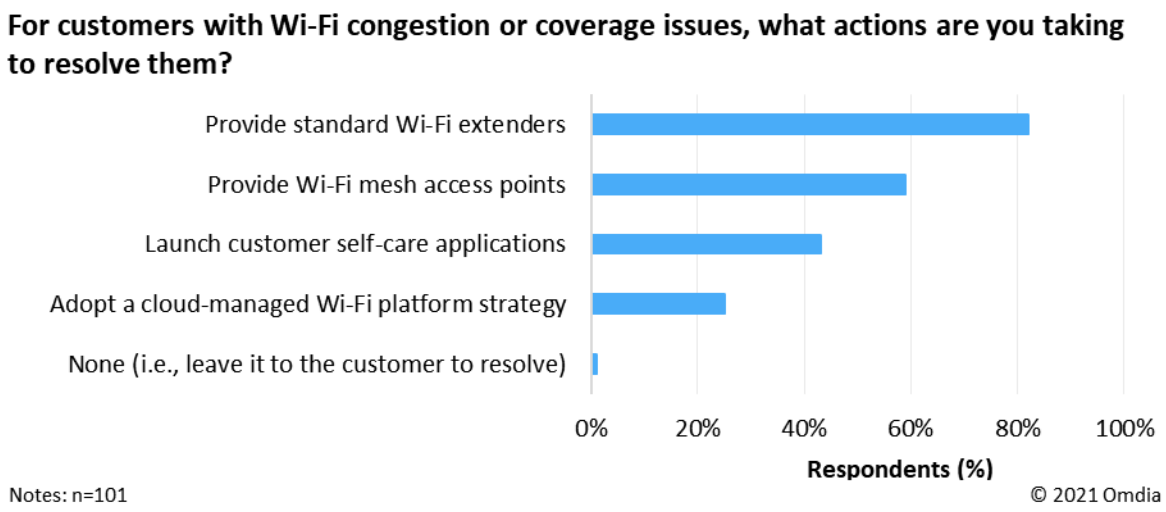
Figure 10: Wi-Fi range is still the number one issue for service providers



Source: Omdia's Service Provider Connected Home survey, November 2020

It is no surprise, therefore, that service providers' first instinct is to throw additional Wi-Fi access points at the Wi-Fi problem (see **Figure 11**). Additional Wi-Fi access points extend the reach of the Wi-Fi network and, with careful positioning, can eliminate any "dark spots" within the home. Mesh access points have the added advantage of being able to automatically reroute around any points of failure or link congestion.

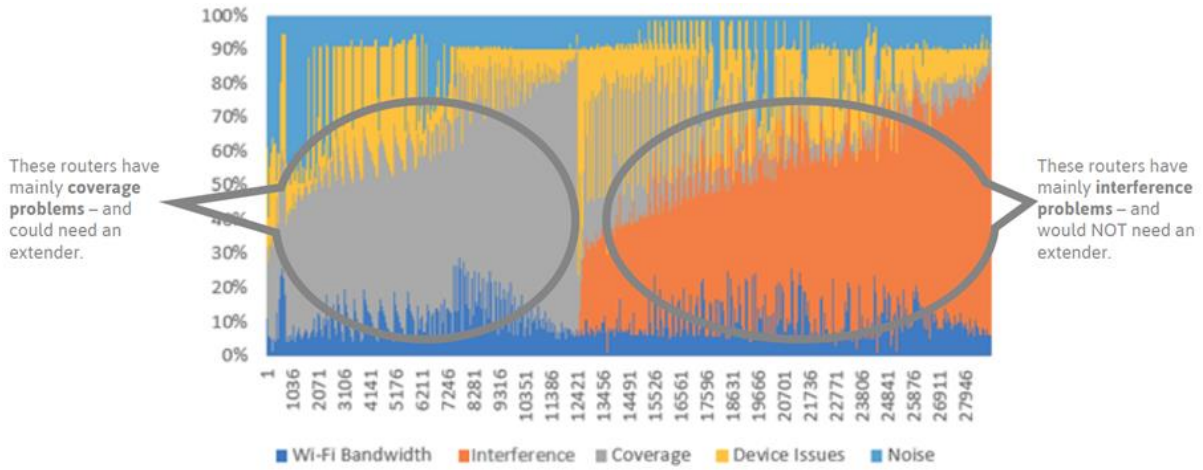
Figure 11: Wi-Fi extenders and mesh access points are the most common but not the ultimate solution to Wi-Fi issues



Source: Omdia's Service Provider Connected Home survey, November 2020

However, it is important that service providers view additional access points as just one of the tools in their arsenal to improve the Wi-Fi experience, not the ultimate cure. As illustrated by field data from Wi-Fi quality of experience (QoE) company Domos (**Figure 12**), not all Wi-Fi issues can be resolved by simply adding additional access points. In many cases households are suffering from congestion and/or device connectivity issues rather than a lack of range. In these circumstances not only would adding more Wi-Fi access points not help the individual customer's situation (and would thus be a wasted investment), but it could be making the wider situation worse for the service provider's customers, because an increase in access points throughout the network footprint can lead to greater overall interference for everyone.

Figure 12: Not all homes would benefit from Wi-Fi extenders



Source: Domos

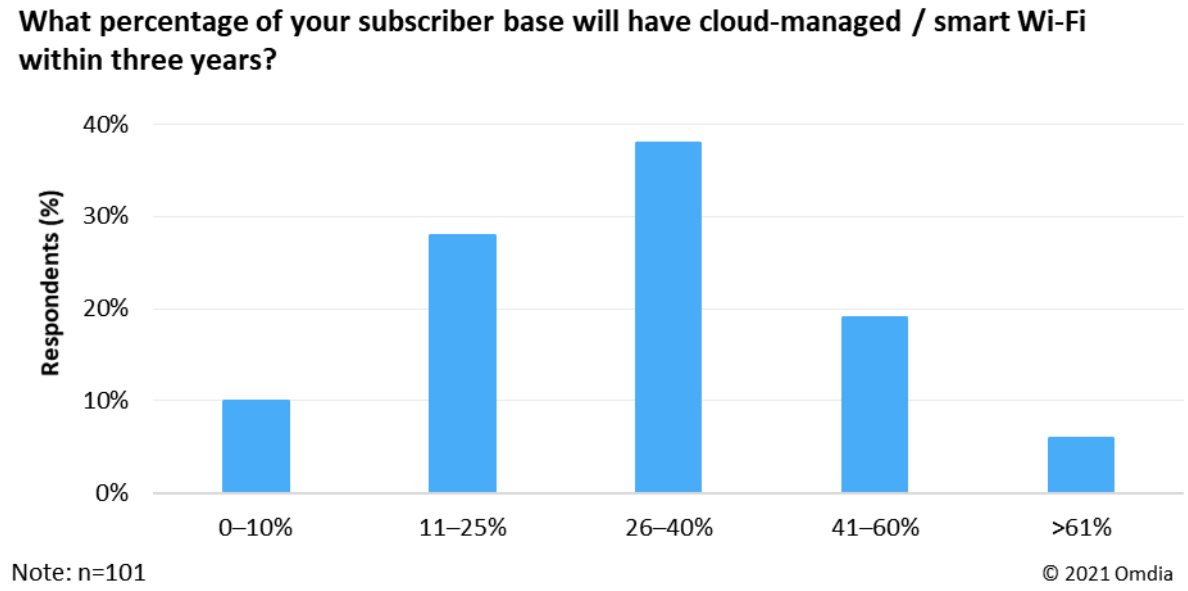
The rise of smart Wi-Fi

Smart Wi-Fi is a significant development in the connected-home industry. Smart Wi-Fi is a cloud-based software platform that, via the use of artificial intelligence (AI) data analytics, can significantly enhance the home broadband QoE. Data supplied by the smart Wi-Fi platform can be used both at the network level to help planning, marketing, and technical support teams and at the customer level to increase the customer experience through a range of advanced Wi-Fi features, namely

- Dynamic channel selection
- Dynamic band steering
- Dynamic client steering
- Dynamic power management
- Application prioritization

In theory, the smart Wi-Fi platform can be hardware agnostic and thus relatively quick to deploy across the service provider's footprint. In practice, however, deployment is more complex, and generally service providers prefer not to invest in legacy CPE devices. Deployment, therefore, normally goes hand in hand with new advanced gateways, which by their nature take longer to permeate the customer footprint. Having said this, 63% of respondents to Omdia's Service Provider Connected Home survey expect smart Wi-Fi's penetration in their networks to be 25% or above within three years (see **Figure 13**).

Figure 13: Service providers are expecting significant rollout of smart Wi-Fi over the next three years

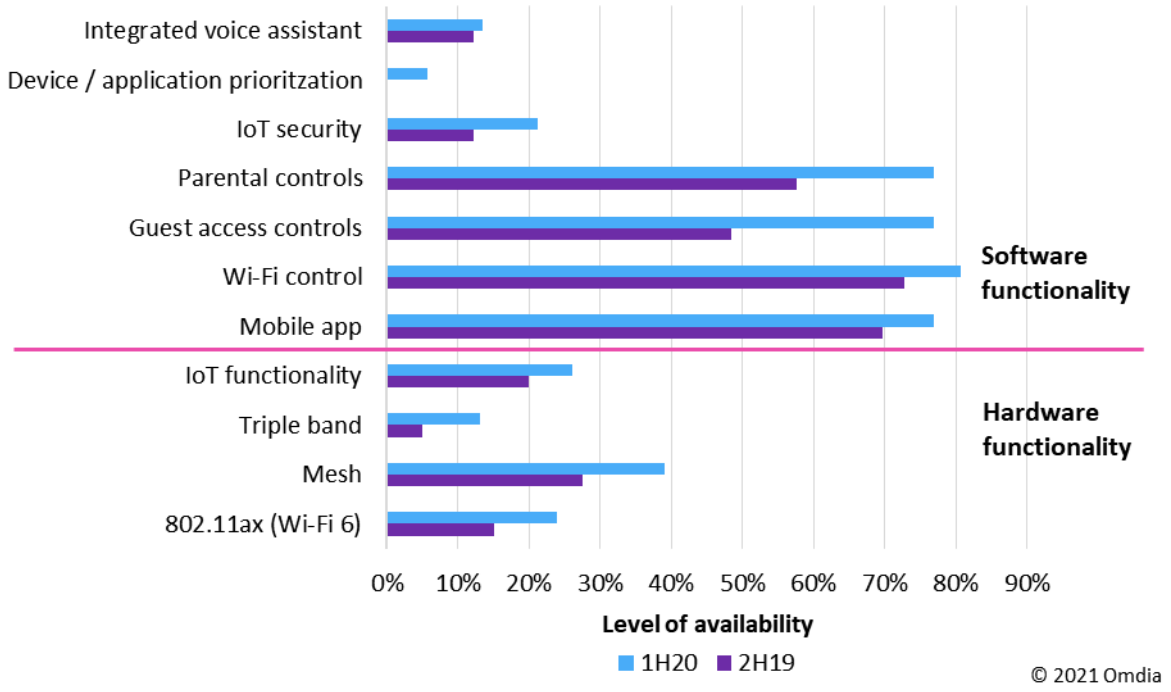


Source: Omdia's Service Provider Connected Home survey, November 2020

Developing new cloud services for future success

It is imperative that as well as developing an ultra-efficient Wi-Fi network and high broadband quality of service, service providers continue to innovate around new value-added broadband services and features. The broadband needs of the modern consumer extend beyond basic connectivity, and by meeting these needs, broadband services can increase their overall worth. Such needs can include advanced online protection (especially for customers with young families), online security and data protection, data storage, video and media applications, and new smart home use cases. Over the past 18 months, Omdia has monitored service providers' Wi-Fi offerings, and as highlighted in **Figure 14**, the range of advanced Wi-Fi features and new hardware developments have continued to grow in availability over this period.

Figure 14: Smart Wi-Fi features are becoming increasingly sophisticated



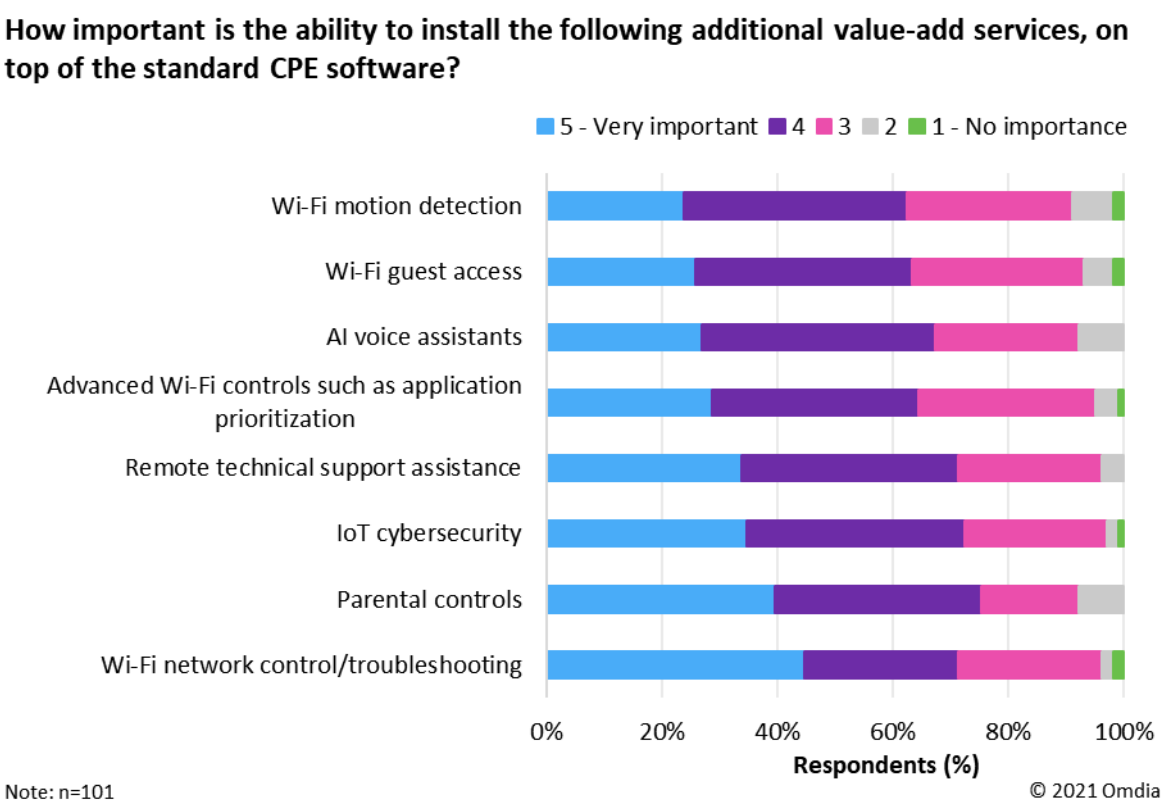
Source: Omdia's Service Provider Smart Wi-Fi Tracker and Benchmark

The push for continued new service development is twofold:

- Continue to improve overall customer experience and brand differentiation, thereby helping to reduce customer churn.
- Drive broadband ARPU through enticing customers to move up the broadband stack and/or introducing new premium value-added services.

Service provider interviews suggest both aspects remain pivotal, although some can be more concerned with churn reduction or revenue growth depending on their current market situation. Moving forward, parental controls and IoT cybersecurity continue to be perceived as the most important value-added services to add to Wi-Fi control (**Figure 15**). However, remote technical support and application prioritization techniques are viewed as potentially the next features that will be popularized, and as shown by **Figure 14** above, Omdia has already seen the first launches of application prioritization and is also aware of developments around advanced technical support features.

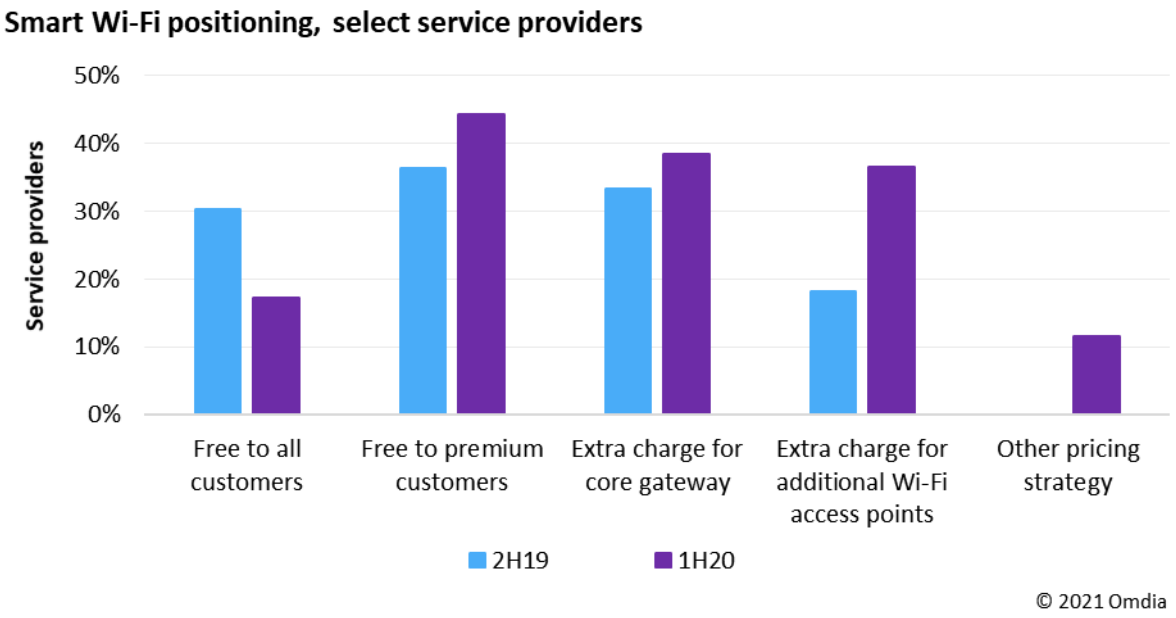
Figure 15: Broadband value-added service prioritization



Source: Omdia's Service Provider Connected Home survey, November 2020

In terms of monetizing broadband value-added services, the current most popular strategy today is to entice customers to move further up the broadband stack through a combination of higher broadband speeds, more advanced Wi-Fi hardware, and better software features (see **Figure 16**). In January 2020, Comcast removed the premium fee, initially $5.99 per month, for its IoT cybersecurity service to bolster this exact strategy. However, in future, Omdia expects that service providers will move into the next phase of their monetization strategy and gradually introduce premium features with additional fees.

Figure 16: Broadband service provider home Wi-Fi monetization strategies



Source: Omdia's Service Provider Connected Home survey, November 2020

Service virtualization

Where the intelligence of the connected home resides has been debated for many years. On the one hand, with the goal of reducing CPE capital costs, there has been a growing call for putting greater and greater intelligence into the cloud, simplifying devices in the process, and therefore reducing costs. There are also other advantages to this initiative, such as being able to support big data analytics and cloud services including online data backup.

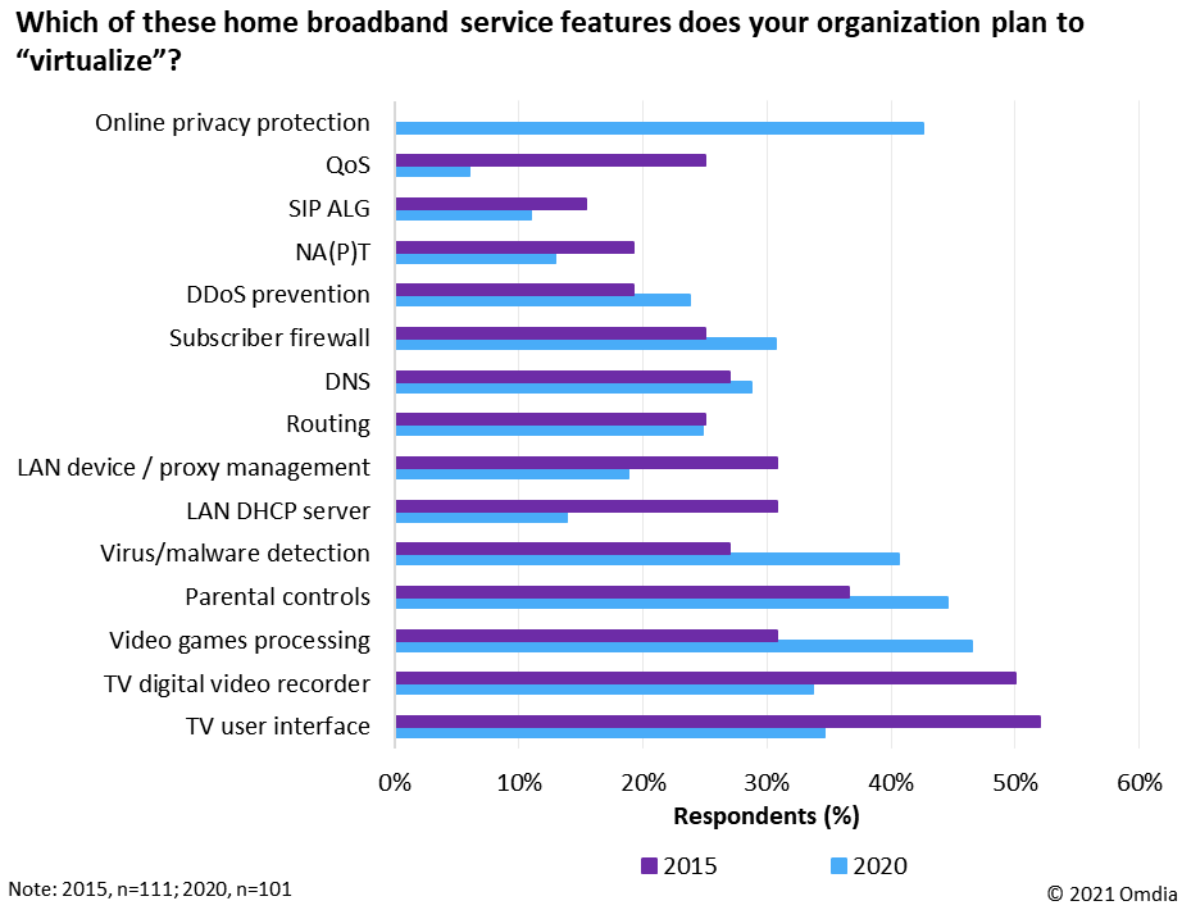
However, placing more intelligence in the cloud increases cloud server costs, where economies of scale—a fundamental requirement of most broadband service business models, especially around IoT—can often be hard to achieve. There is an argument, therefore, to keep more of the intelligence in the home network, which as well as reducing service costs keeps customers' data securely located in their own home network while also reducing network latency, which is vital for some applications.

The answer, therefore, will be a combination of both strategies, using the cloud functionality where there are distinct advantages (either to the service provider or customer, or to both), while also keeping some intelligence as well as customer data in the home network. Some service providers also believe in models where customers are provided with a greater choice of going more cloud or keeping data more local, trading off flexibility and features with data privacy.

Figure 17 compares the results of the 2015 and 2020 surveys when service providers' representatives were asked: "Which of these home broadband service features does your organization plan to 'virtualize' by resourcing and managing them within the network instead of

within the CPE or TV set-top box (STB)?". It is clear from the figure that there is a real mix of some applications declining in popularity for being virtualized, while others have increased.

Figure 17: Shifting virtualization plans



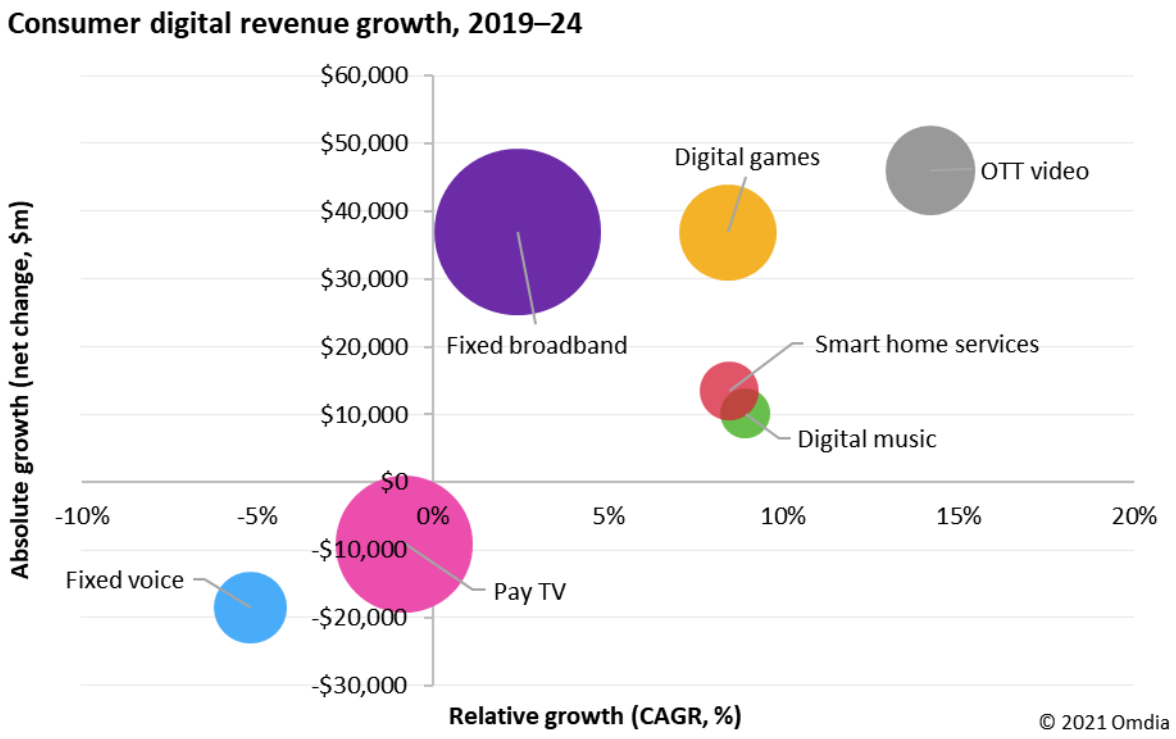
Source: Omdia's Service Provider Connected Home survey, November 2020

The role of telcos in smart home

Smart home is a rapidly growing market

Broadband access has been a big revenue success for fixed service providers, worth $326 billion globally by 2024. However, although it is still a large market, five-year CAGR is down to low-single-digit figures in most mature markets. Service providers have looked to other areas, specifically pay TV and over-the-top (OTT) video, to help drive further growth, and while such strategies have been relatively successful, pay TV is itself a declining market, and OTT video, though still showing good growth, is becoming increasingly competitive with players such as Netflix, Apple, and Amazon capturing large shares of the market.

Figure 18: Smart home services represent a new revenue growth area in the fixed space



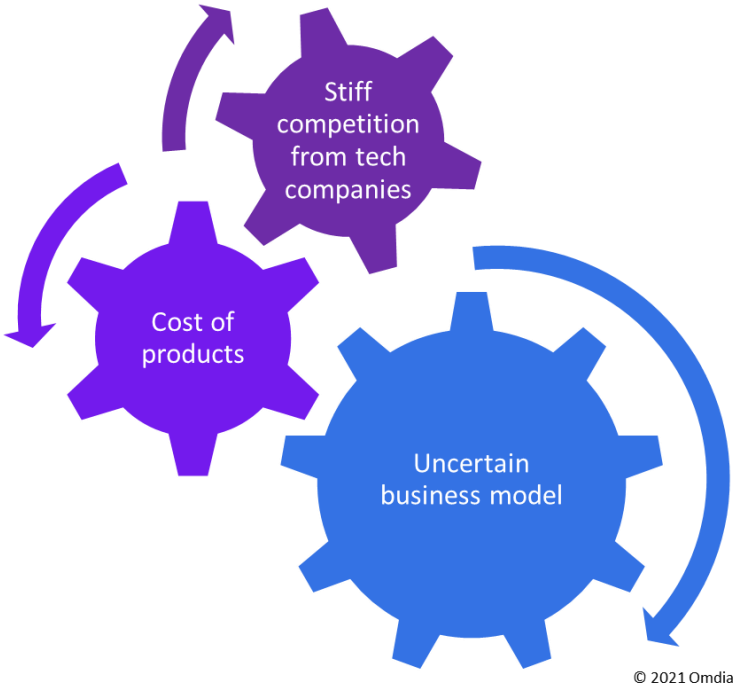
Source: Omdia's Consumer Digital Revenue Opportunity Model

Smart home services therefore represent a new growth opportunity that is likely to continue to grow even over the medium-to-long term as innovation around as yet unthought of use cases are developed.

Barriers to market for broadband service providers

The barriers to market for broadband service providers in the smart home space are numerous and complex but are focused largely around three central, linked key areas.

Figure 19: Core barriers to the smart home opportunity



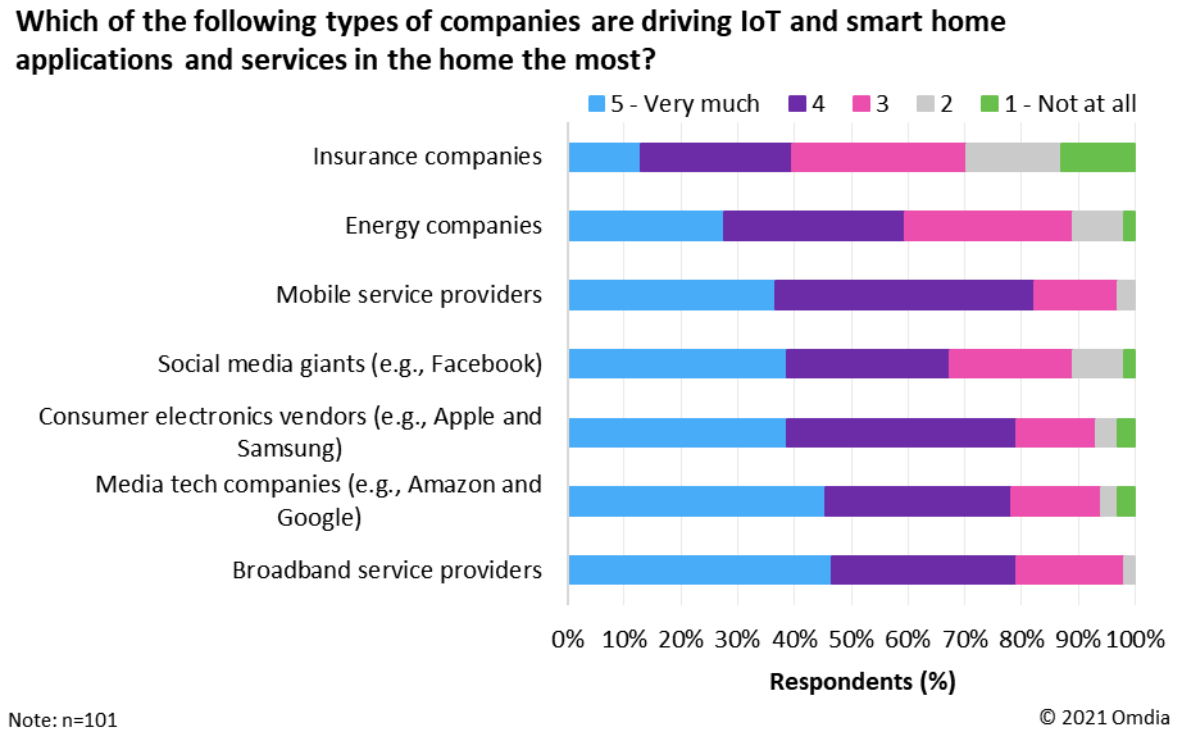
Source: Omdia

The cost of products and services is a central barrier to all smart home service business models. In Omdia's 2020 Service Provider Connected Home survey, 62% of respondents quoted it as being one of the barriers their customers had been most vocal about. Many commentators will state that not having well-enough defined use cases is the biggest barrier to smart home. However, use cases today focus around home security, safety, comfort, and health, all of which are fundamental consumer demands. For example, very few people would object to their home's being made safer or more secure. What many consumers are not willing to do, though, is pay the premium price associated with smart home solutions that provide perhaps only incremental improvements; that is, they believe the price outweighs any perceived benefit.

This in turn leads to uncertain business models for the service providers. Broadband service providers' standard business models are typically based on monthly recurring revenue. However, if only a niche segment of the population is willing to pay such fees for smart home services, then the service provider will either be left with a service that cannot gain scale, or it will need to completely change its business model to something that is far less reliant on direct monthly recurring fees (similar, for example, to consumer tech vendors), something service providers have struggled to do in the past. Indeed, 53% of survey respondents see uncertain revenue models as being the main barrier to their providing smart home services.

To make matters worse, service providers are coming under increasing pressure from tech and consumer electronics vendors. Such players are less reliant on recurring revenue and thus can create relatively cheap, standalone solutions that meet consumers' needs in a more cost-effective manner. Although survey respondents still believe that broadband service providers have a strong role to play in driving smart home, media tech companies such as Amazon and Google are now seen as equally strong players, with consumer electronics companies coming in a close third (see **Figure 20**).

Figure 20: Media tech companies will drive the smart home industry equally alongside broadband service providers



Source: Omdia's Service Provider Connected Home survey, November 2020

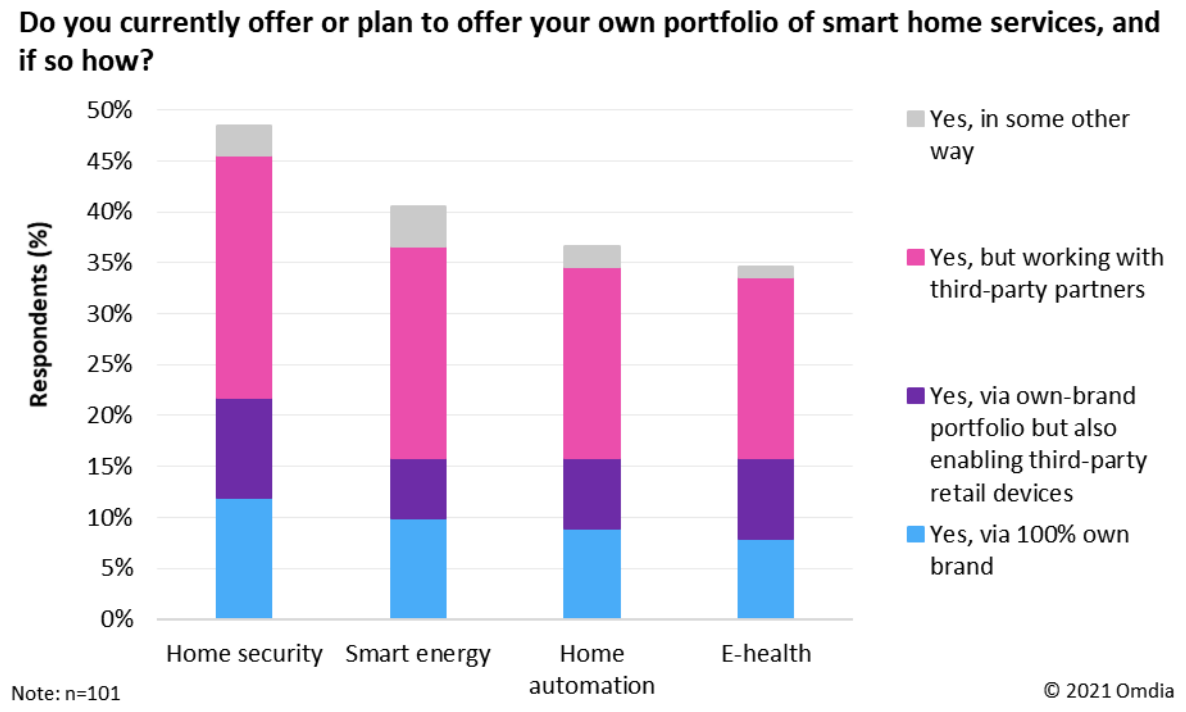
A change in telco smart home strategy

Since the 2015 Service Provider Connected Home survey, there has been a clear change of strategy when it comes to smart home. One driver for this change has been the shift in attitude by the service providers to investing in and differentiating around the connected home. A second driver has been the way the smart home is being monetized.

In Omdia's 2015 survey it was clear from the responses that there was still a distinct line between connected home, "service provider" smart home, and "third-party" smart home. At the time there was a greater focus, as well as optimism, from respondents around developing service provider own-branded smart home solutions: 60% of respondents said they would launch own-branded smart home services. At the same time, the service provider role in the connected home was largely focused only on providing basic connectivity.

As already discussed in the report, there has now been a distinct shift in strategy in both connected and smart home. Connected home is now seen as an area for active investment and brand differentiation, while there has been a noticeable decrease in the level of optimism around own-brand smart home solutions, with a greater focus on developing partnerships and/or enabling other smart home solutions from third-party suppliers (see **Figure 21**).

Figure 21: Third-party partnerships and solutions will play a much more prominent role



Source: Omdia's Service Provider Connected Home survey, November 2020

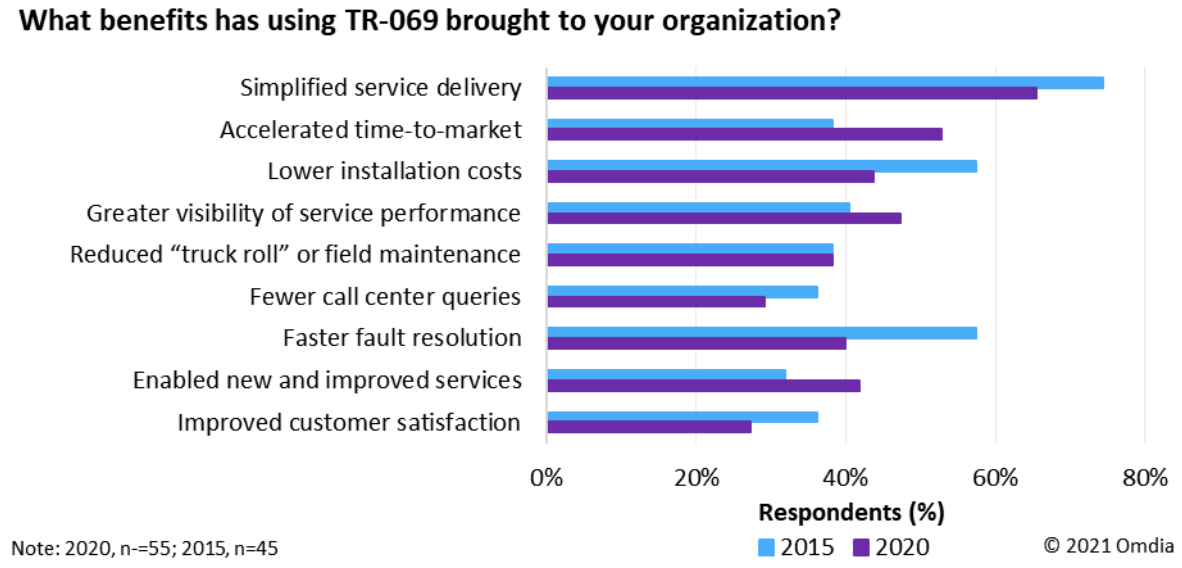
The need for greater standardization

TR-069 helped transform connected home 1.0

TR-069 (Technical Report 069), first published by the Broadband Forum in 2004, was a game changer for the broadband industry. The specification defined a common communications protocol between customer premises equipment (CPE) and an auto configuration server (ACS), enabling the automatic configuration and remote management of broadband CPE and paving the way for self-installation of CPE and autoconfiguration of services, thus vastly simplifying the broadband business case.

TR-069 laid down the foundations of how home broadband-enabled devices connect to the internet today and is used to serve more than 800 million broadband subscribers globally. Using TR-069 not only for self-installation of devices and provisioning new services but also for helping manage and maintain a good level of service brings a range of measurable business benefits. The respondents to Ovum's Service Provider Connected Home survey indicated that TR-069 had brought business benefits to their organizations in a number of key areas but especially around simplified service delivery and accelerated time to market (see **Figure 22**).

Figure 22: TR-069 has brought significant advantages to broadband service providers



Source: Omdia's Service Provider Connected Home Surveys

Future requirements to foster the future connected home

However, since the advent of TR-069, the role of the broadband service provider in the connected home has changed, bringing both new opportunities and new challenges. In order to successfully meet these challenges and take advantage of the new revenue opportunities that the future connected home will create, new open standards are now required to both remove technical barriers and enable the broadband service provider to successfully compete with global tech and consumer electronics companies.

Continued drive to eradicate fragmentation

One of the big issues that still plagues the broadband industry is CPE fragmentation, on both the hardware and the software side. As discussed in this report, Wi-Fi mesh has been a significant development for improving customer Wi-Fi experience by effectively and efficiently solving Wi-Fi's range issue. However, early systems were built on proprietary technology, meaning Wi-Fi mesh access points from one vendor could not communicate with those from another, locking service providers and households into single-vendor solutions. This drives customer frustration and service provider costs. Initiatives such as prplMesh and EasyMesh need to be continued to be developed and adopted to resolve such issues.

Open platforms are needed to drive scale

On the middleware side, fragmentation must be removed if the broadband industry is to attract the developer community to help drive new revenue opportunities. Middleware fragmentation is a particular issue for small innovative developers (the type of companies broadband service providers need to attract to help create innovative services and features), because it means that it is extremely difficult for them to gain sufficient scale. Currently, to work with broadband service providers developers need to integrate with each operator separately and then, quite possibly, with a variety of other vendors that are already present in the network. This is a slow and costly exercise, especially for smaller companies. It is therefore imperative that the industry creates not just the technical but also the business conditions to make it easier and cheaper for third parties to bring new ideas.

To achieve this the industry needs to work toward not only reducing the fragmentation of CPE middleware platforms but also developing an open standard application platform. An application platform based on open standards enables developers to integrate once to gain instant access to potentially millions of boxes across multiple service provider footprints, thus making the industry far more attractive to new software companies.

Ironically, this initiative will also aid smaller competitive broadband players. Without an open framework, those developers that are willing to put in the investment are naturally drawn to the bigger service providers because of their scale. More open systems level the playing field by enabling smaller players to take advantage of more general industry developments.

Testing is crucial to avoid future fragmentation

Testing becomes an essential part of the process to remove fragmentation. Once an open standard framework has been implemented, many vendors will often state they comply with it, but at the same time they will change some part of the implementation to meet their own needs or add their own differentiation. This serves to add fragmentation back into the industry. Testing defined as a certification program is therefore key to avoiding future fragmentation and ensuring the market remains open to innovative third-party developers.

Maintaining consumer trust will be pivotal to success

Broadband service providers are gaining a growing insight into their customers' homes, the devices connected within them, and the applications they are running. Since people are basically connected to the network 100% of the time in one way or another, analyzing this data can provide a deep, and very valuable, insight into the daily lives of customers within the service provider's network footprint.

As discussed, broadband service providers have a desire to open up their middleware platforms to a growing number of software developers to help create new services and features, and in doing so it is clear that such developers will want to gain access to this valuable consumer data. However, service providers need to tread carefully. Consumer trust in their brands is an important asset and not something to be toyed with.

To get round this, service providers Omdia has interviewed see a future where the way that apps can access data is standardized, with legal ramifications set out to ensure data is only used for that stated purpose. In the same way as on mobile platforms, applications must state what data is required and ask for customer opt-in permissions. In addition, however, to ensure customer trust, these requests should be fully justified so that consumers can make informed decisions. Such initiatives can only become efficient through industry standardization.

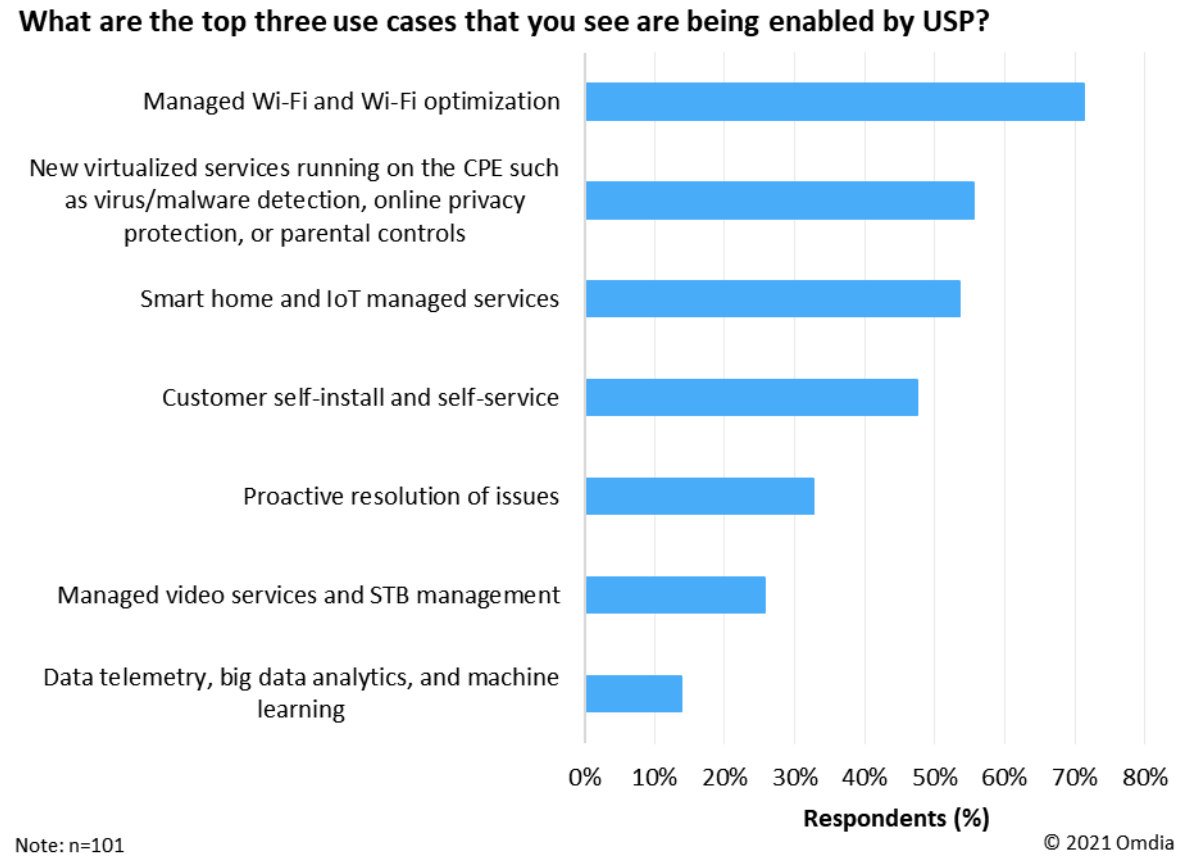
User Services Platform and connected-home evolution

Although initially designed to enable self-install and remote management of broadband Wi-Fi CPE, over the years TR-069 has spread to other connected devices such as TV STBs and network-attached storage (NAS) devices and, even more recently, into consumer IoT. However, consumer IoT really stretches the protocol's capabilities, and therefore the Broadband Forum has developed User Services Platform (USP), which is designed to manage the entire connected/smart home.

USP was developed to help deploy, implement, and manage all aspects of the home network including consumer IoT. It creates a data model, architecture, and communications protocol to enable devices from a large number of vendors to connect to the Wi-Fi home gateway and be managed by the broadband service provider, opening up new business model opportunities as a consequence.

USP, therefore, is seen as a key development for both further Wi-Fi optimization and the delivery of new broadband value-added services and smart home managed services, two fundamental strategic areas for broadband service providers.

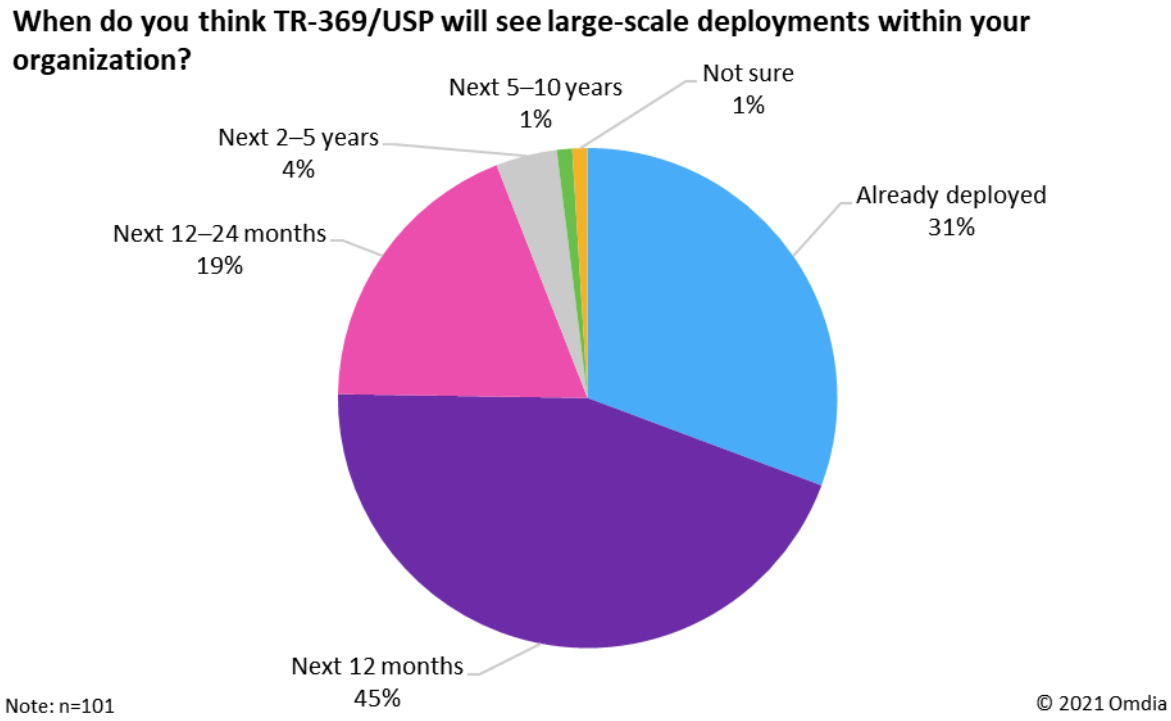
Figure 23: Optimizing Wi-Fi and helping to deliver new smart home features are key use cases for USP



Source: Omdia's Service Provider Connected Home survey, November 2020

Interest in USP from the broadband service provider community is high, because it is seen as one of the important steps toward enabling the connected/smart home services of the future. In Omdia's Service Provider Connected Home survey, 31% of respondents said their companies had already started to implement USP, with a further 45% saying they expect to do so in the next 12 months.

Figure 24: Three-quarters of surveyed service providers have either already deployed or plan to deploy USP in the next 12 months



Source: Omdia's Service Provider Connected Home survey, November 2020

Appendix

Methodology

This report is a follow-up to a report produced in 2015 in association with the Broadband Forum entitled *Efficient and Automated Smart Home Rollout*. As for the 2015 report, Omdia conducted a quantitative service provider survey of more than 100 representatives across 19 countries. However, for this report Omdia also added in-depth qualitative interviews with key executives from 11 services providers in Latin America, North America, Europe, and China. As well as information and data from this survey and interviews, Omdia has included data from its extensive research sets across the broadband, connected, and smart home industries.

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We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help your company identify future trends and opportunities.

About the Broadband Forum

Broadband Forum is the communications industry's leading open standards open software development organization, focused on accelerating broadband innovation, standards, and ecosystem development.

Broadband Forum is an open, nonprofit industry organization composed of the industry's leading operators, vendors, and thought leaders that are shaping the future of broadband. Its work to date has been the foundation for broadband's global proliferation and innovation. For example, the Forum's TR-069 CPE WAN Management Protocol has more than 1 billion installations worldwide.

Broadband Forum's projects span across 5G, connected home, cloud, and access. Its working groups collaborate to define best practices for global networks, enable proven new service and content delivery, establish technology migration strategies, and engineer critical device and service management tools, driving open standards and best practices with recognized vendor interoperability and certification programs for the global broadband industry.

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