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The Future of the Connected Home: The Rise of Home Applications

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Executive summary

Since their first launch, broadband networks have evolved massively: modern networks are now capable of delivering multigigabits per second into consumer homes. As speeds have increased and markets matured, differentiating around speed alone has, however, become increasingly difficult. Although speed remains important, service providers are turning their marketing attention to overall service quality of experience (QoE). The home network is critical to this venture, because it is the final part of the network that connects the user's end devices. Although not technically part of the traditional telecommunications operator's domain, the home network has now become a key area of focus and investment for broadband service providers around the world.

Advanced Wi-Fi management is an essential element of this investment and was a key focus of the Broadband Forum's last connected-home report, "The Future Telco-Connected Home." Advanced broadband service providers are now moving beyond Wi-Fi management, turning to broadband value-added services (VAS) to further enhance the customer experience beyond simply a high-quality and reliable connection. VAS such as advanced parental controls, Wi-Fi guest access, and internet and Internet of Things (IoT) cybersecurity are today seen by many providers as essential to the overall broadband service. However, service providers are also keen to explore a range of other services that can either further enhance the customer experience or open potential new revenue streams.

To achieve this, however, it is important that service providers can quickly and efficiently onboard and offboard new applications and features. To enable greater innovation, developers of all sizes and types need to be able to create and integrate new applications for the broadband service provider community in a cost-effective way and gain scale quickly. To meet both objectives, industry standards and open frameworks are vital because they remove technical barriers and enable broadband service providers to better compete with global tech and consumer electronics companies.

The Broadband Forum's User Services Platform (USP) is one standard that will help service providers manage this more complex connected-home environment. Developed to help deploy, implement, and manage all aspects of the home network including consumer 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 new business model opportunities as a consequence.

The analysis in this report is based on a quantitative service provider survey of 111 representatives across 18 individual countries plus the Scandinavian region; in-depth qualitative interviews with key executives from 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

- TV and video remain important revenue sources for broadband service providers, but they must continue to invest to remain relevant.** Although the traditional pay-TV market is declining in many markets, it still represents the largest noncommunications consumer revenue opportunity for telcos and cable operators. Online video represents a faster-growing opportunity but one where the broadband service providers face heavy competition from pure-play providers. Still, online video services represent both a natural progression for regular pay-TV services and a way for service providers to enhance their service bundle by integrating third-party video applications. To remain relevant, however, service providers need to show value above and beyond what consumers can receive via other channels such as a smart TV's app store. Providing guaranteed superior viewing quality via the use of traffic prioritization might be one tool that service providers can utilize in this aim.
- Certain broadband VAS are now seen as “table stakes,” but they still need to evolve.** Applications such as Wi-Fi management and troubleshooting, Wi-Fi guest access, parental control, and to some extent, IoT cybersecurity are now seen by most broadband service providers as applications they must deliver as part of the overall broadband experience. However, such applications still require investment and regular updates if they are to remain useful to the end consumer and keep them engaged.
- The broadband speed test is becoming a vital tool for service providers.** An increasing number of service providers are now integrating broadband speed test capability both in the customer premises equipment (CPE) and with other useful tools such as aids for Wi-Fi extender placement within their consumer-facing Wi-Fi management apps. Such tools are being used to ensure QoE is maintained and could become an element of stricter service provider service-level agreements (SLAs) in the future.
- Application prioritization and smart home are seen as potential areas of future investment.** Application prioritization and various smart home technologies (such as Matter and Wi-Fi sensing) and use cases (such as energy management, healthcare, and home security) are all seen by service providers as interesting potential new areas of revenue growth. Exactly what, how, and when are still major questions that many service providers continue to face. What is clear, however, is that if service providers are to be able to innovate quicker and capitalize on opportunities when they do arise, they need a platform that enables them to launch new services quickly and efficiently, limiting risk as much as possible.
- Open source frameworks and industry standards are key to this success.** The industry needs to work toward not only reducing the fragmentation of CPE hardware and software 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 customers across multiple service provider footprints, thus making the industry far more attractive to the developer community.

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- **The Broadband Forum's USP is viewed as a key development that many service providers are already investing in with many others keeping a watching brief.** USP is seen as a key development by the industry for both further Wi-Fi optimization and the delivery of new broadband value-added services. Although not all service providers are fully committed to implementing USP yet, in the Broadband Forum's survey approximately 30% of service provider executives surveyed stated they are currently investing, and roughly 30% more are looking to do so in the next six months.

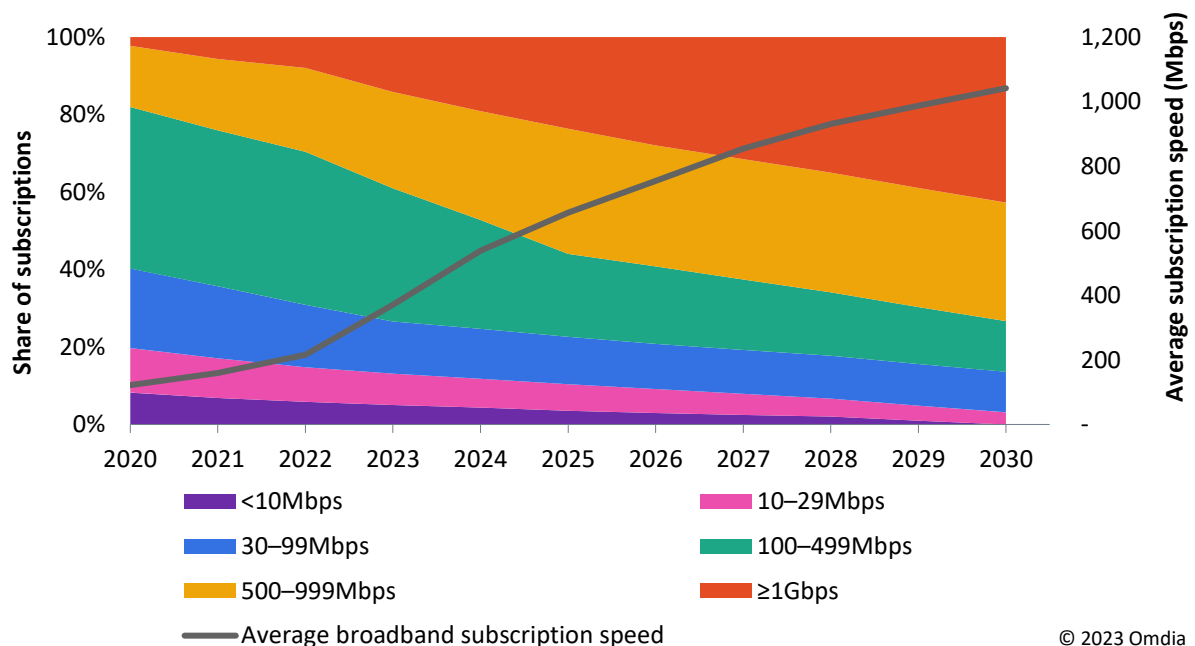
Broadband market overview

The rise of gigabit broadband services

Broadband networks have evolved rapidly, and residential gigabit broadband services are now available in many countries. Omdia predicts that by 2030, 44% of all consumer subscriptions globally will offer speeds of 1Gbps or more with the average subscription speed topping just over 1Gbps. This is a rapid rise over a 10-year period starting 2020, when the percentage of gigabit subscriptions was only 2% and the average subscription speed was 122Mbps (see **Figure 1**).

Figure 1: The rapid rise of gigabit broadband subscriptions

Global consumer broadband subscriptions by speed, 2020–30



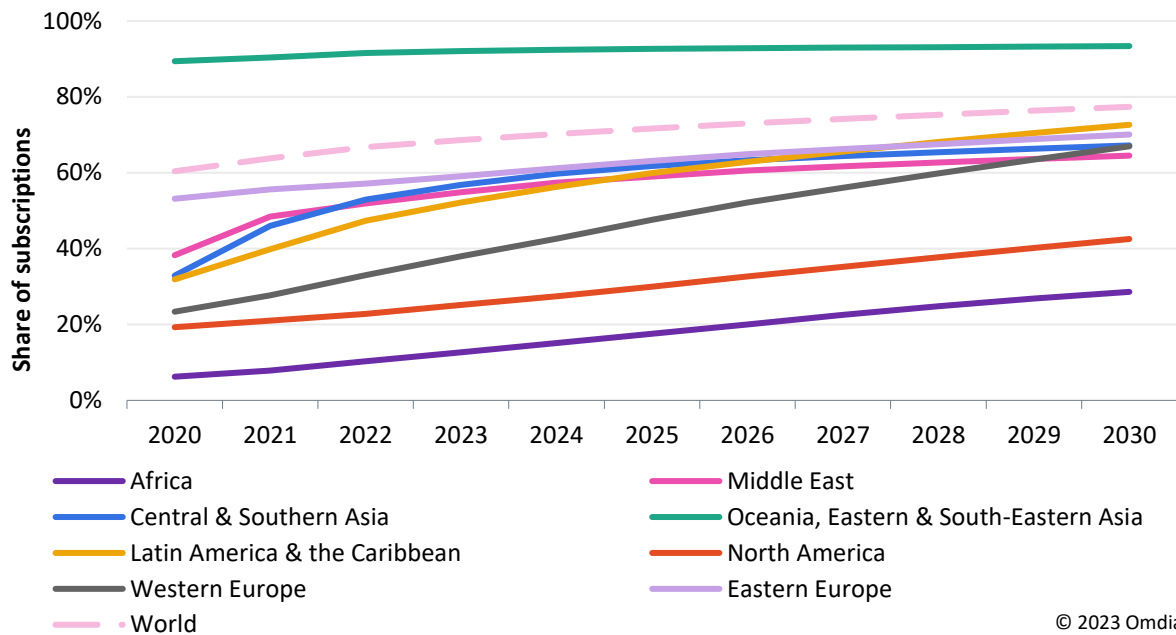
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Source: Omdia Consumer Broadband Subscription and Revenue Forecast

A significant driver of this rapid increase in subscription speeds is the evolution of broadband network technology from copper-based technologies such as xDSL to fiber-optic infrastructure and Passive Optical Network (PON). As of 2022, 67% of consumer broadband subscriptions were delivered over fiber, and this will rise to 77% by the end of the decade (see **Figure 2**). After small business connections are removed, this is the equivalent of 44% of households globally being connected to fiber broadband services by 2030.

Figure 2: By the end of the decade three-quarters of broadband subscriptions will be fiber

FTTH as a proportion of all consumer broadband subscriptions, 2020–30



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Source: Omdia Consumer Broadband Subscription and Revenue Forecast

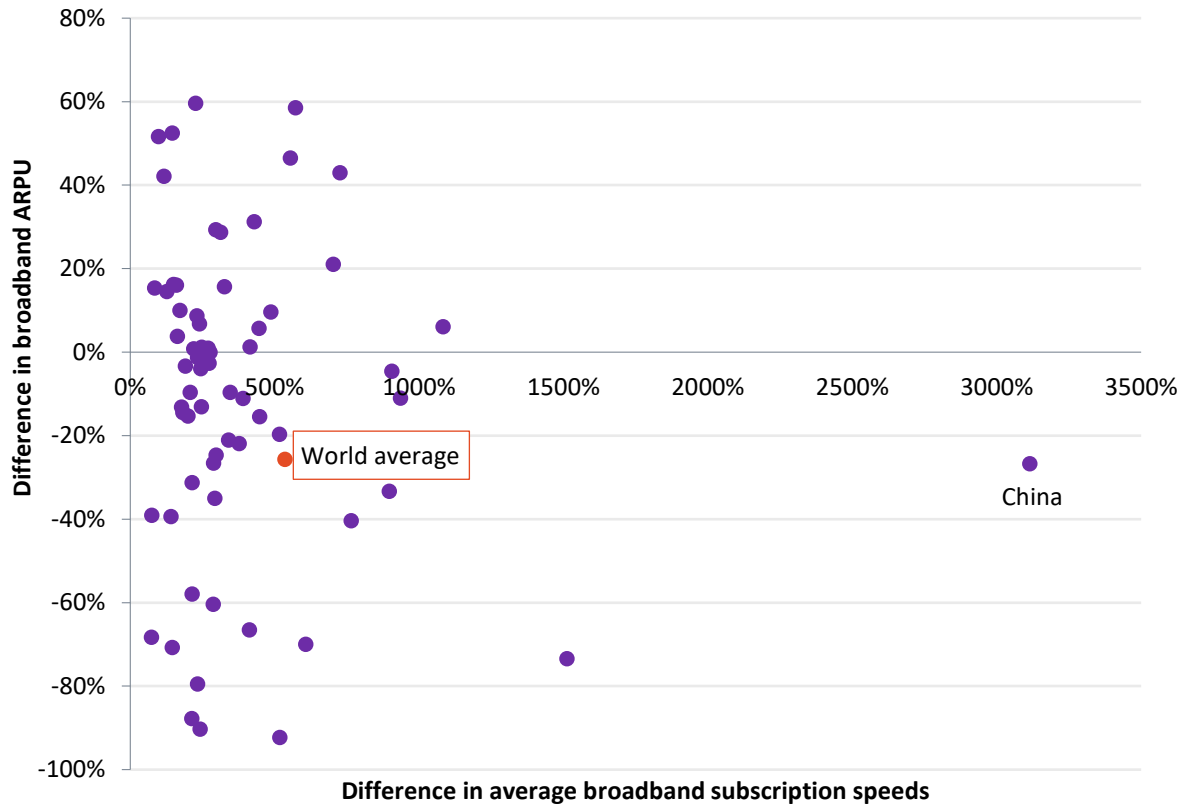
The shift from marketing speed to overall quality of service

Broadband speed will always be important: having adequate bandwidth is critical for the quality delivery of digital applications, the demands of which are only set to accelerate further as we move toward applications such as ultra-high-definition (UHD) video and virtual reality (VR). Speed, therefore, has been at the forefront of service provider marketing and broadband subscription tiers for many years. However, because of heavy market competition, broadband service providers have struggled to turn faster speed into a successful way of increasing ARPU. Instead, broadband speeds have simply tended to increase across all subscription tiers as prices remained broadly static or even fell in some markets.

Figure 3 depicts the difference in average speeds offered and broadband ARPU over the past five years for more than 70 countries, together with the global average. The chart clearly shows that there is no evident trend of ARPU increasing along with speed, and although there are some countries that have managed to increase their ARPU over the past five years, these largely tend to be developing markets or markets with overall heavy inflation. On average, the actual speed offered has increased by over 500% over the past five years, but ARPU has fallen by 30%. In developed markets such as China, speeds have increased by 3,000% with ARPU falling by 25%.

Figure 3: On average, broadband speeds have increased and ARPU has fallen

Broadband speed increases versus ARPU change by country, 2017–22

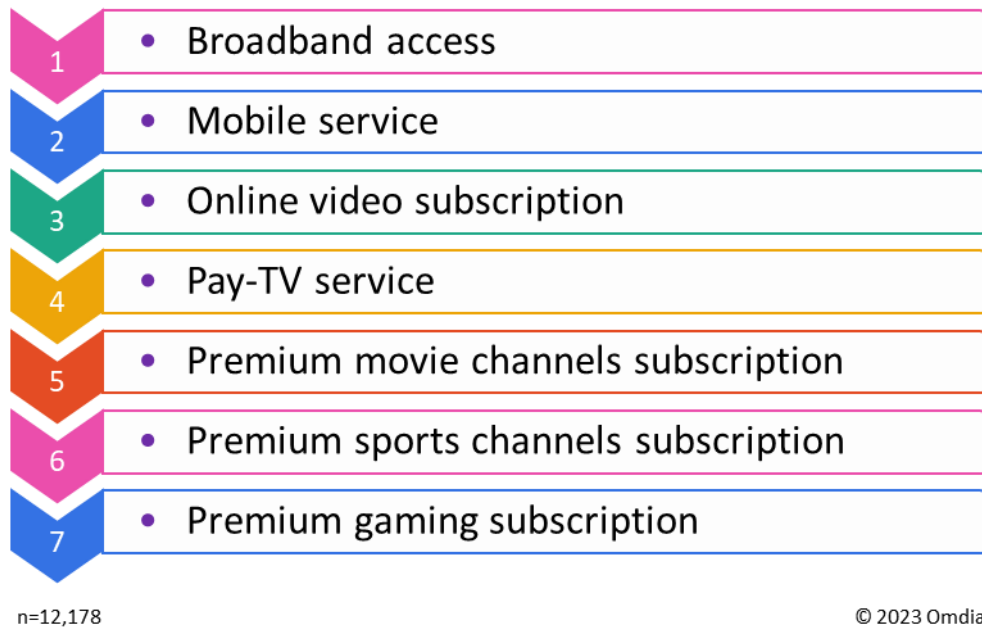


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Source: Omdia

It is critical, therefore, that service providers look to break out of this never-ending cycle of increasing speed and decreasing ARPU. Especially since the pandemic, home broadband services have become essential to daily life in households in developed countries. Indeed, broadband is the one digital service that consumers in these countries say they could now least live without, even in the current global financial climate (Figure 4). By changing their marketing strategy to focus more on delivering an overall quality service beyond pure speed, it should be possible for service providers to build on this new perceived importance of broadband services to increase their broadband ARPUs.

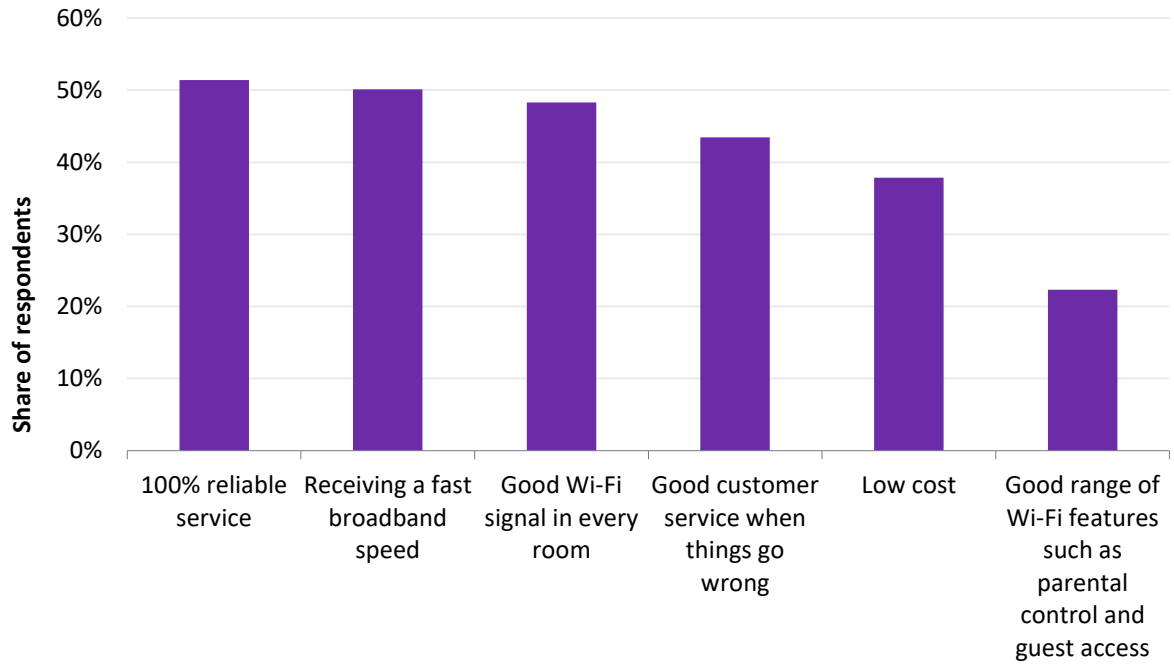
Figure 4: Services consumers are least likely to cut or reduce spend on over the next six months



Source: Omdia Digital Consumer Insights survey, October 2022

Broadband speed may be important, but it is not the only broadband characteristic that makes a high-quality broadband service. Having low and consistent network latency is critical for highly interactive or real-time applications and use cases such as cloud gaming, smart home, and videoconferencing. Because of the increasing importance of such applications to modern-day living, customers require high broadband service reliability, high-quality connectivity in every room of the home, and efficient customer service when things do go wrong. All these characteristics were ranked by respondents to Omdia’s Digital Consumer Insights survey as being more important than the cost of the service (Figure 5). Finally, consumers are increasingly relying on broadband VAS and applications that help them manage their broadband and connected-home experience. By excelling in all these areas, broadband service providers can both differentiate their service brand and drive new broadband ARPU and revenue.

Figure 5: What are the most important broadband service features?



Note: n=9,350

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Source: Omdia Digital Consumer Insights, October 2022

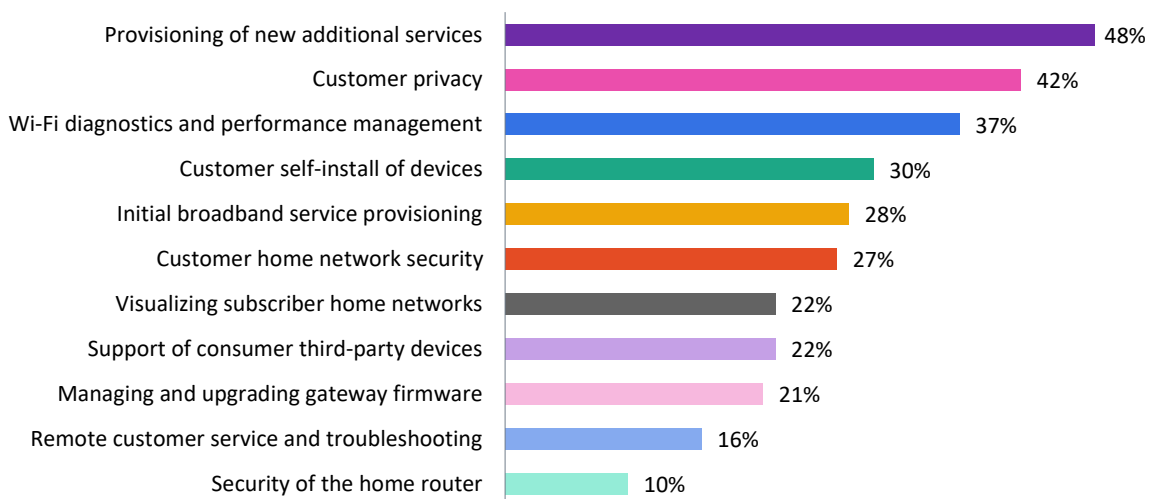
The importance of the home network

A fiber-optic network provides the best quality of broadband service across all experience metrics. Greater investment in fiber network technology in the core and access networks is therefore critical to the delivery of high-speed and high-quality broadband services. However, delivering high-quality services to the front door is pointless if that level of service does not stretch all the way to the end device. To achieve this, a highly advanced home network is required to bridge the gap between the end device and the broadband access network. Without this investment, the home network simply becomes the new broadband bottleneck—a key source of customer dissatisfaction, customer service calls, and eventually, customer churn.

This evolution of the home network was the core focus of the Broadband Forum’s 2021 report “The Future Telco-Connected Home.” At that time, management of the Wi-Fi performance was already recognized as a key challenge for operators (**Figure 6**), and it has since become a key area of active investment.

Figure 6: In 2021 Wi-Fi performance management was high among device management challenges

What do you think are the top three device management challenges broadband operators are facing today?



Note: n=101

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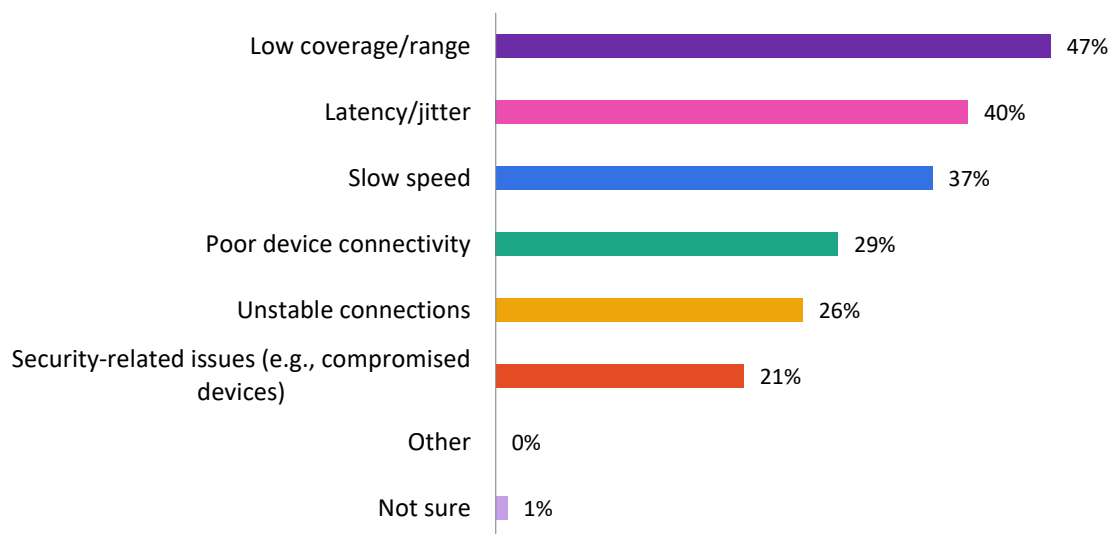
Source: Broadband Forum “The Future Telco-Connected Home,” 2021

Hardware versus software

Like all wireless technologies, Wi-Fi suffers from a reduction in signal power over distance as well as interference from other electronic items or blocking from physical objects such as walls. In the Broadband Forum’s 2021 survey, 47% of respondents stated that the main issue their customers faced with regard to their Wi-Fi service was low coverage or range, and a further 37% cited slow speed as the main issue. This perception has led to significant investment in more advanced Wi-Fi hardware and additional devices such as Wi-Fi extenders. Of the service providers covered in Omdia’s *Service Provider Smart Wi-Fi Tracker and Benchmark – 1Q23*, 67% offered Wi-Fi 6 devices (capable of delivering real-world speeds of 1–2Gbps), and 76% had deployed Wi-Fi Mesh capabilities.

Figure 7: In 2021 Wi-Fi range was perceived to be a key issue but not the only one to resolve

What are the leading problems you encounter with customers’ Wi-Fi?



Note: n=101

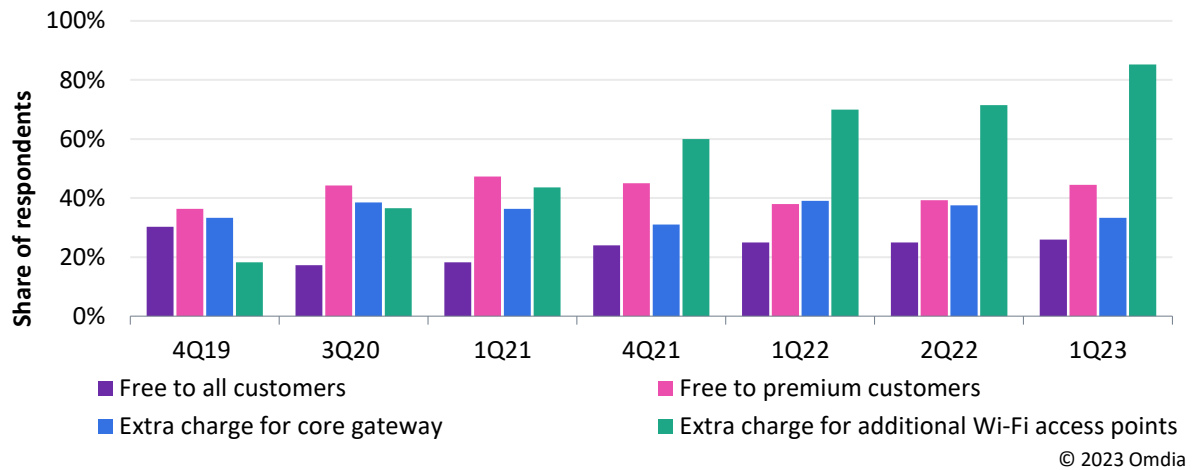
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Source: Broadband Forum “The Future Telco-Connected Home,” 2021

Broadband service providers have also clearly recognized the ability to capitalize on consumers’ desire to solve Wi-Fi range issues through the offer of additional Wi-Fi devices, either within their top-tier broadband service bundles or as an additional paid extra (or both). In Omdia’s Tracker, 85% of service providers were found to offer Wi-Fi extenders as a premium option (**Figure 8**).

Figure 8: Broadband service providers see additional Wi-Fi devices as a key way of driving ARPU

Broadband service providers, home Wi-Fi pricing strategy



Source: Omdia Service Provider Smart Wi-Fi Tracker and Benchmark – 1Q23

However, Wi-Fi range is not the only source of poor Wi-Fi performance. Contention from other Wi-Fi devices or electrical interference from other electrical equipment can also affect signal strength: in a study by Domos, 60% of poor Wi-Fi performance was mainly attributed to interference rather than poor range. Supplying additional Wi-Fi extenders into homes with interference issues would be a wasted investment and could do more harm than good in terms of customer satisfaction.

In addition to more advanced Wi-Fi hardware therefore, Wi-Fi diagnostic and performance management software is also a key investment for service providers to make in order to help maintain a good level of Wi-Fi service in the home and to supply detailed customer diagnostic data to customer service, service strategy, and marketing teams. By using artificial intelligence (AI) data analytics, such platforms can dynamically monitor and flex the home Wi-Fi network to optimize its performance, in many cases resolving customer issues before the customer is even aware of them. Such data can then also be used to identify customers who would benefit from additional hardware devices such as Wi-Fi extenders, optimizing such deployment strategies.

Omdia’s research suggests the deployment of Wi-Fi management software platforms in line with more advanced Wi-Fi hardware has led to significant improvements in service provider operations:

- A 60% reduction in setup support calls
- A reduction in overall customer service calls of up to 30%
- A reduction of 30% in engineer support visits
- Better customer experience, leading to an increase in Net Promoter Score of 10–40 points
- Reductions in customer churn figures of 12–30%

Extending the customer experience through VAS

The combination of more advanced hardware and Wi-Fi management software is already having a positive impact on the customer's home Wi-Fi experience. However, to continue to improve overall experience and service provider differentiation, the more progressive service providers are now looking to further ramp up their investment in and capabilities around new, or more advanced, broadband features and value-added services.

TV and video remain the most important telco VAS

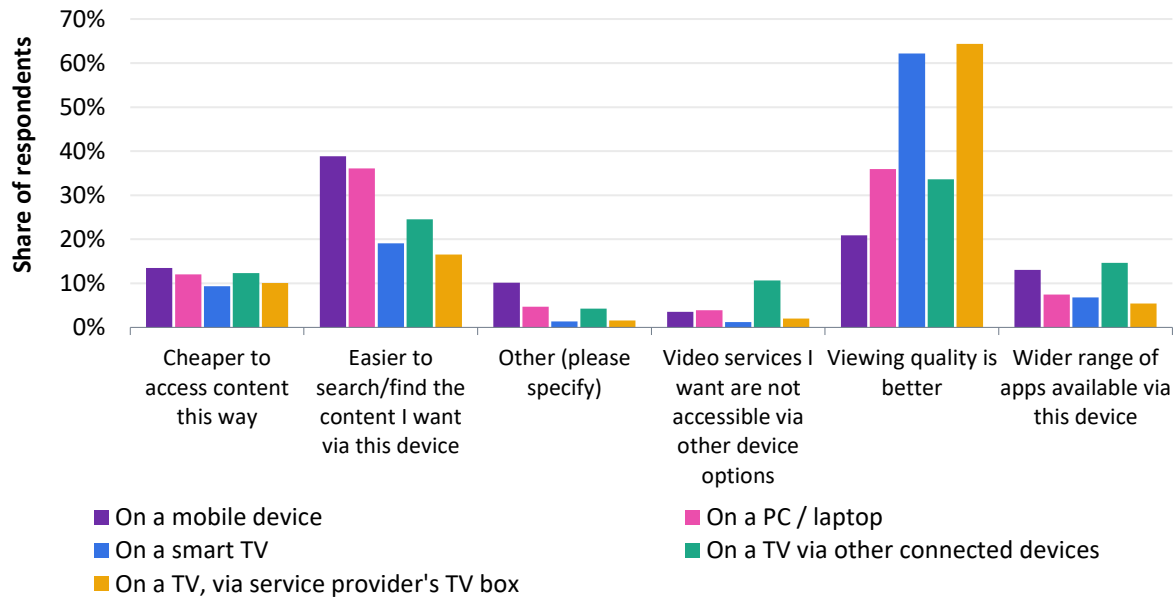
Though the traditional subscription-TV business is declining in most markets, it still represents the telcos' and cable operators' biggest noncommunications consumer revenue opportunity, generating almost \$353bn for them globally between 2022 and 2027. In addition, telcos are expected to generate a further \$25bn from their own-brand online video services. Although telcos will only capture a limited share of this faster-growing online video segment, which will remain dominated by pure-play, network-agnostic providers, online video services still represent both a natural progression for their regular pay-TV services and a means for them to enhance their service bundle by integrating third-party video applications.

Telcos may bolster their video content offering through over-the-top partnerships, but that same third-party video content is easily accessible through readily available app stores on common devices such as the smart TV, so keeping the consumer engaged in the telco offering remains a challenge. To do this, service providers will need to show, beyond any premium content their own-branded service may provide, they bring additional value to third-party services over and above what the consumer can enjoy via these other channels.

Figure 9 shows that because of aggressive pricing across all channels, no channel has any distinct advantage when it comes to price, even though service providers have an advantage of offering comprehensive x-play service bundles. Where service providers are at least perceived to provide an advantage is in superior viewing quality, although the score here is only slightly higher than for viewing via a smart TV, demonstrating how difficult it is for telcos now to compete with direct-to-consumer offerings via this channel. End-to-end traffic prioritization, which can be used to try to ensure a certain level of experience even over highly contended networks, may be one technique that telcos use to meet this challenge. This topic is discussed in more detail in *The increased role of application QoE and prioritization*.

Figure 9: Telcos must continue to enhance the video experience if they are to remain relevant

What’s the main reason you choose to watch online video delivered in that way over other device options?



Note: n=7,738

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Source: Omdia Digital Consumer Insights survey, October 2022

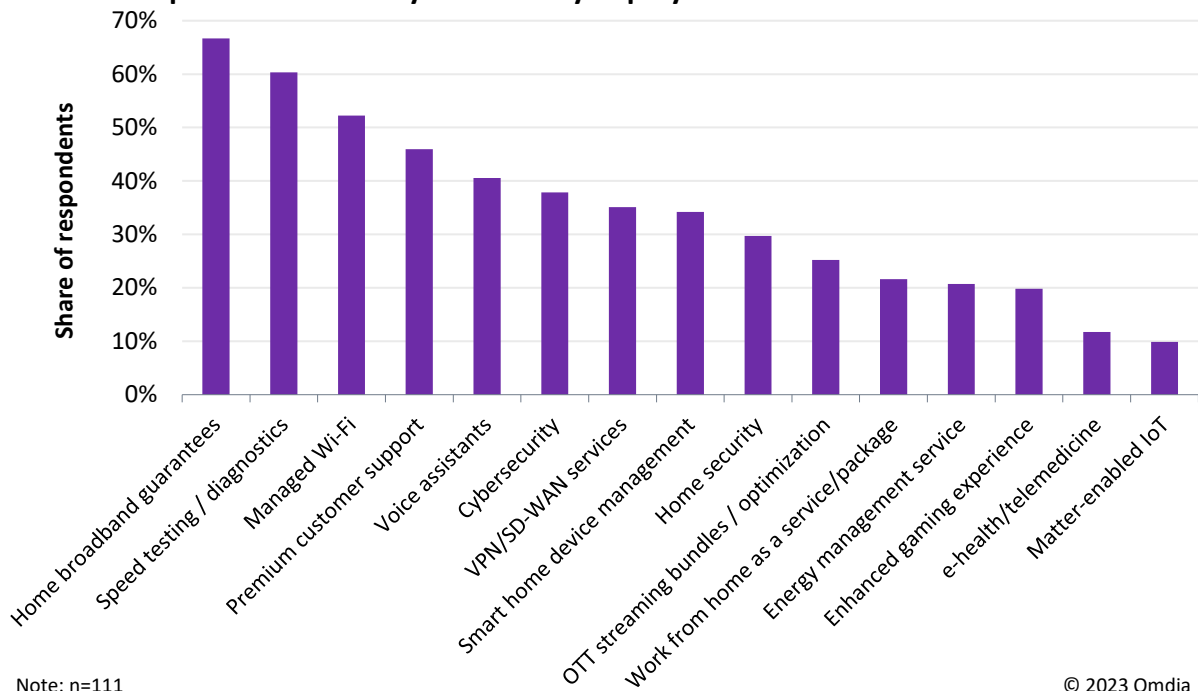
The essential broadband VAS

Some broadband VAS have become “must-have services” that consumers have come to expect as a standard part of their broadband service. These applications are typically those that support the customer through key use cases such as resolving service or technical issues, granting guest access, and keeping the customer safe while online. In Omdia’s *Service Provider Smart Wi-Fi Tracker and Benchmark – 1Q23*, 80% of tracked broadband service providers offer applications that cover these three core areas.

In this year’s Broadband Forum’s Connected Home survey, supplying speed test capabilities, Wi-Fi management, and premium customer support were highlighted as being some of the most popular broadband VAS already being offered (Figure 10). Surprisingly, home broadband service guarantees were listed as the number one value-add being offered. In Omdia’s research only a smaller percentage of broadband service providers currently offer an actual guarantee with some sort of stated SLA. It is assumed here, therefore, that respondents mean they are marketing some type of customer promise or providing ways to help maintain a good level of service without actual hard SLAs, an area that Omdia believes more service providers will increasingly move toward in future.

Figure 10: Home Wi-Fi support services are now key to the overall broadband experience

VAS that respondents said they had already deployed



Note: n=111

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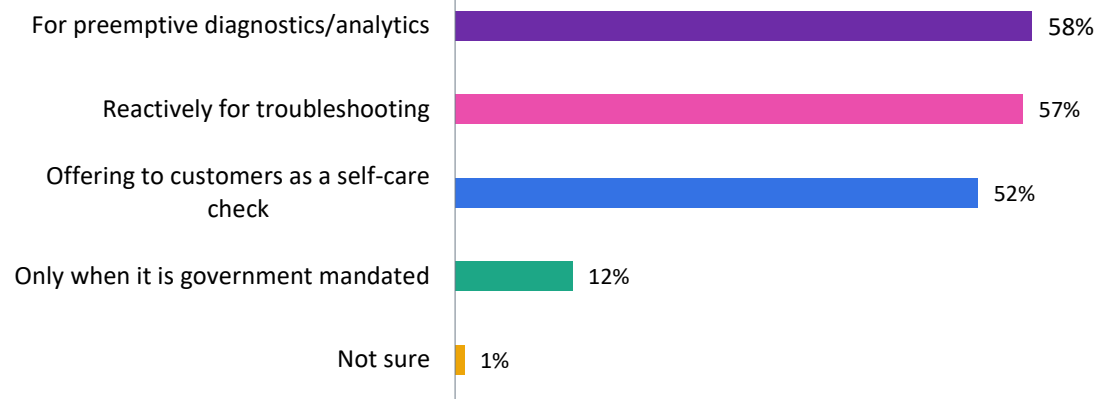
Source: Broadband Forum Connected Home Survey 2023

In-built speed tests are becoming a critical tool

It is an often-quoted maxim that the number one app for high-speed broadband services is the speed test, with consumers going online as soon as they receive their new service to test whether they really get the speed they were promised and being quick to complain when they do not. One might think, therefore, that the speed test has become something of a curse for modern-day broadband service providers. However, in more and more cases service providers are adopting the speed test to help them meet service obligations and to provide tools to help the consumer maximize their own service (e.g., as part of an app to help find the best position for Wi-Fi access points). In the Broadband Forum survey, more than 55% of respondents said that they are now using speed tests to carry out preemptive diagnostics and analytics to help maintain service quality, and more than 50% said that they also provide such functionality to their customer base for self-care purposes (Figure 11).

Figure 11: Speed tests are increasingly being used to ensure customer satisfaction

What is your strategy for offering speed tests?



Note: n=111

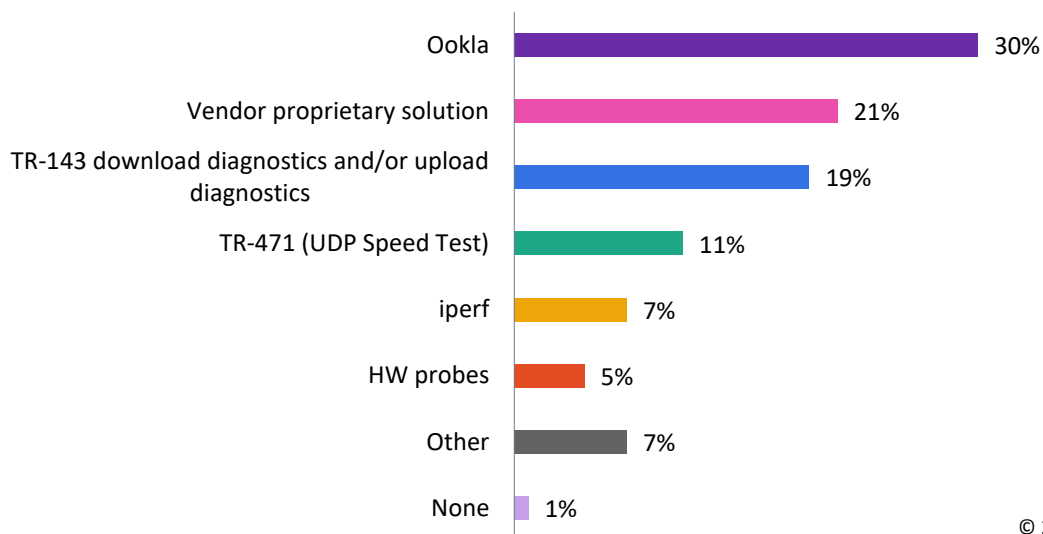
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Source: Broadband Forum Connected Home Survey 2023

Thirty percent of respondents were utilizing data models defined by protocols TR-471 and TR-143 to conduct speed tests, just over 20% were using proprietary solutions provided by their Wi-Fi vendor, and just under 30% were using independent speed test specialist Ookla (Figure 12).

Figure 12: Independent specialist Ookla is the most popular speed test to deploy

What speed test solution, if any, are you using?



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Source: Broadband Forum Connected Home Survey 2023

VAS must continually evolve to remain effective

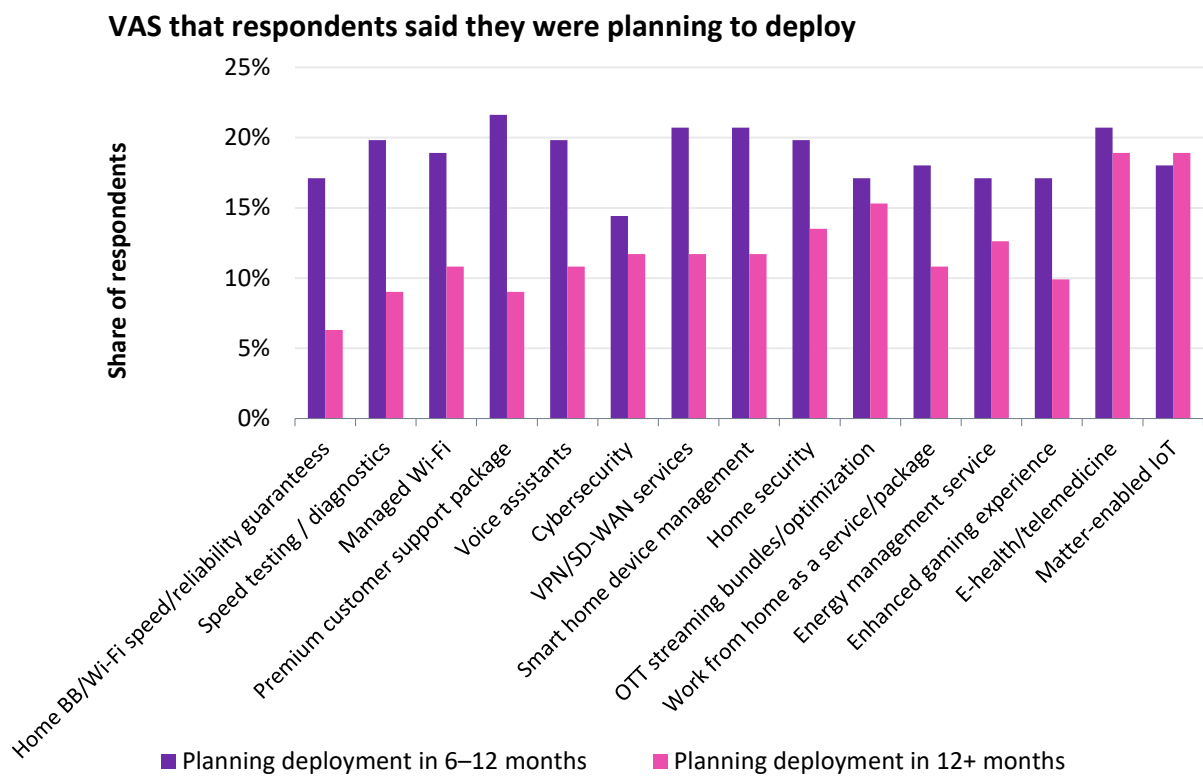
It must be recognized that although service providers might already offer applications that cover the essential broadband VAS areas, it is critical that they continue to innovate and develop them over time. The parental control app is a classic example of a VAS that has been offered for many years but that has developed significantly over time, adding features that enable a more sophisticated but far simpler service for users to use and, in Omdia's experience, make today's versions far more useful and therefore popular with consumers. It is vital, therefore, that service providers continue to invest in and upgrade such VAS as newer and more advanced versions and features come on to the market to ensure they remain relevant.

Moving beyond the basics

Service providers are looking to expand their VAS portfolios beyond the core offerings, both to further improve the overall broadband experience and to look for new revenue opportunities. When they were asked what VAS they were looking to deploy in the next six months, as shown in **Figure 13**, respondents to the Broadband Forum survey still listed the same core areas of service guarantees, speed testing, Wi-Fi management, and premium customer support. After all, as **Figure 10** showed, not all respondents have fully deployed these services yet. What is interesting, however, is when they were asked what they were looking to deploy in the next 12 months or more, home security services, working-from-home packages, energy management, and IoT enablement through Matter started to rise to the top. This trend is also in line with the qualitative interviews.

One area that is still lower down in terms of popularity in the quantitative survey but that was discussed at length in the qualitative interviews is e-health applications, especially those enabled using Wi-Fi sensing technology. However, most of the service providers that contributed to the qualitative interviews would agree that this market and technologies such as Wi-Fi sensing are still considered to be relatively immature. E-health may therefore be lower down in the service provider's plans today but is certainly seen as an area with longer-term potential.

Figure 13: Some VAS are higher up the current priority list



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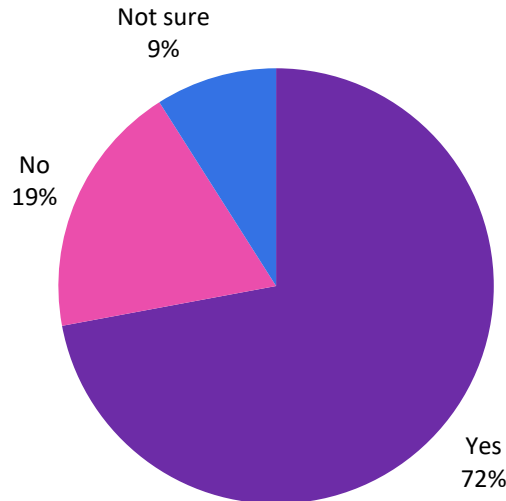
Source: Broadband Forum Connected Home Survey 2023

The increased role of application QoE and prioritization

As the demands on the network from high-bandwidth applications such as UHD video and Web 3.0 applications such as VR and the metaverse increase, application prioritization is likely to play an increasingly important role in ensuring a high level of experience. Prioritization can be provided over the Wi-Fi network or even on an end-to-end basis. More than 70% of respondents to the Broadband Forum’s survey said that they planned to use such technology to differentiate their services on a per application basis at some point in the future (**Figure 14**). Executives interviewed in the qualitative interviews largely agreed; the bigger question that came out of those interviews is what to prioritize and how.

Figure 14: Service providers are actively exploring application prioritization use cases

Regarding the management of connectivity QoS/QoE, do you plan to differentiate customer QoE on a per service basis?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

Although there are some examples of application prioritization already on the market, mainly around gaming, it is fair to say that the industry as a whole is largely at the exploration and experimental stage when it comes to prioritization, especially when it comes to the use cases that consumers are most likely to buy into. Gaming is an obvious one: high-end online gaming is heavily reliant on having a highly reliable and consistent network that supplies high speed and low latency. Still, successfully positioning prioritization within the broadband bundle in a way that means consumers pay a premium remains a keen topic of discussion. One model that often comes up in service provider discussions is that perhaps the consumer does not pay: perhaps the media company pays and then offers a premium tier to its own customers in a similar way to how some online video companies offer a premium for higher-grade video formats.

The second area that is also gaining interest is the working-from-home use case. As more people embrace flexible working, there is an obvious need to make sure they have reliable and highly capable broadband service. The question again often comes down to the payment model: Does the employee or the employer pay the bill for such a service? Regardless of payment model, however, most service providers agree that this could be an interesting use case for application prioritization.

Service providers see a mix of cloud and CPE deployments

Moving data and intelligence into the cloud can bring advantages to both the consumer and the service provider. From a customer point of view, new features and experiences can be provided that

can only be created through cloud functionality; cloud backup would be a simple example. For service providers, the cloud can bring cost savings by reducing the complexity of CPE, enable quicker time to market for new applications, and offer other operational efficiency benefits generated by cloud data analytics.

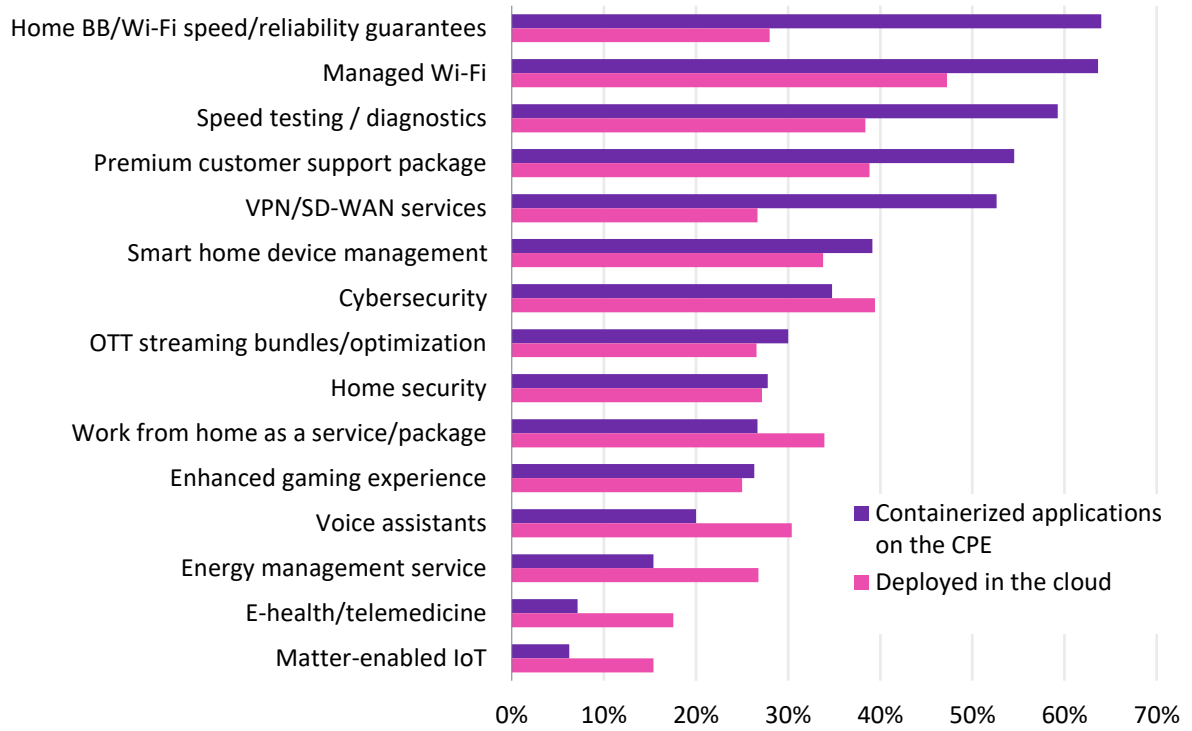
Because of these advantages, there have been growing calls over the years for greater and greater intelligence to be placed in the cloud, in some scenarios going as far as removing the need for CPE altogether or at least reducing this to very basic connectivity devices. However, although cloud brings certain advantages, shifting all intelligence to the cloud also has its drawbacks. Through the utilization of a more hybrid approach, maximizing both CPE and cloud functionality, numerous benefits can be realized:

- **Responsiveness:** Storing intelligence and data for time-critical applications locally can reduce network latency and thus maximize the customer experience.
- **Scalability and efficient use of cloud:** More efficient use of cloud resources can be achieved by making use of local CPE functionality where cloud capability is not required.
- **Reliability:** With specific intelligence placed locally, critical functions can continue to work even when the broadband connection is down.
- **Sustainability:** Energy efficiency can be maximized by keeping some communications local and utilizing embedded processing.
- **Privacy:** Consumers have become wary of having all their data stored in the cloud, so enabling more sensitive data to be stored locally will reassure consumers and maintain trust.

In the Broadband Forum's survey, therefore, there was a true mix of responses when it came to whether applications were to be deployed in the cloud and/or via containerization (**Figure 15**).

Figure 15: Service providers still see a mix of cloud and containerized application deployments

How respondents believe VAS will be deployed



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

The smart home and home app stores

The smart home remains a key area of interest to broadband service providers but one that few have so far turned to their advantage in a meaningful way. However, service providers remain convinced that smart home offers a good long-term opportunity and so, on the whole, seem committed to at least further exploration. Omdia's research and executive interviews suggest that there is a big question still to be answered: What are the service revenue opportunities beyond smart home security, and what will be the broadband service provider's optimal role in the overall smart home ecosystem?

Over the next five years, the smart home services market will grow at a CAGR of 23%, reaching a total of \$76bn in annual revenue by the end of 2027. Home security remains the main story driver for smart home services, so it is not surprising that this is where most telco smart home strategies currently lie. In 2022, professional monitoring and video cloud storage accounted for more than 60% of the smart home service market. These two service categories are expected to reach a combined annual revenue of \$49bn by 2027.

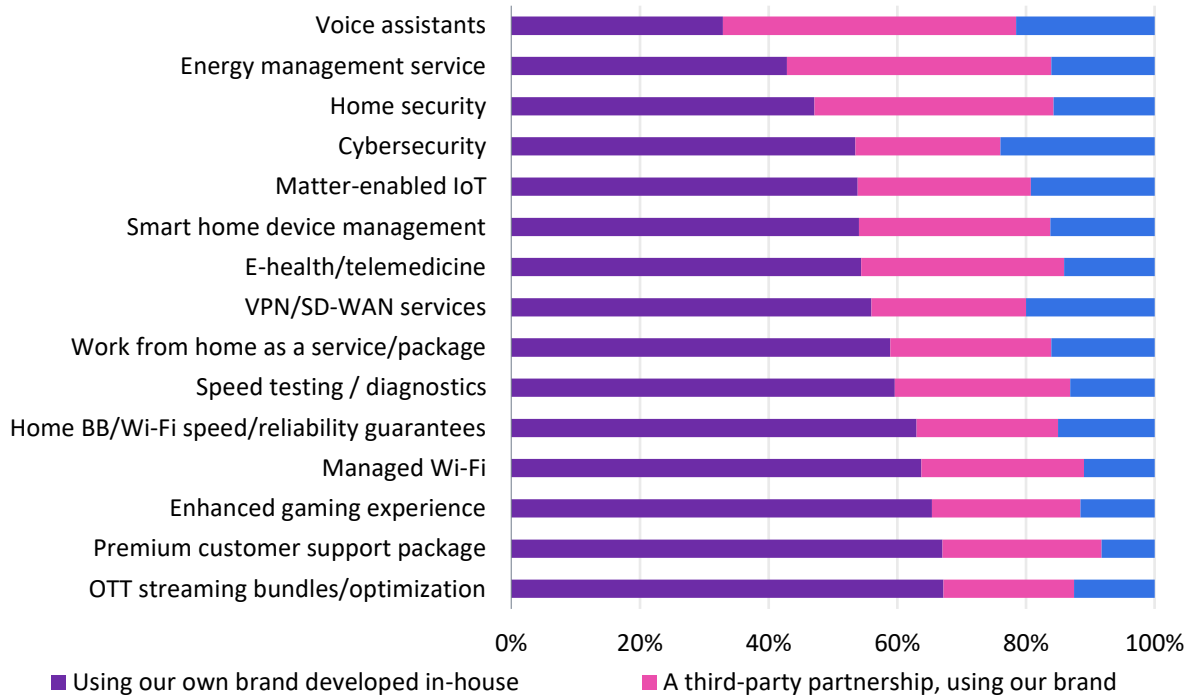
Smart elder care represents the other main service opportunity within Omdia's forecast, worth almost \$8bn in annual revenue by 2027. Despite still being a relatively niche market even in 2027, this service category will have great long-term future potential thanks to the rising costs of social and private care, an increasingly aging population in most developed countries, and people's desire to live independently in their own homes for longer. In terms of long-term potential, therefore, many service providers see elder care as the next big opportunity, even if they do not yet know what role they will play.

Service providers have faith in their own brands

As service providers look to reposition themselves in the connected and smart home, they seem to have a renewed interest in doing so via their own in-built solutions, utilizing their own retail brands. In the 2021 Broadband Forum report "The Future Telco-Connected Home," the trend leaned more toward partnering in smart home with third-party specialists, including using their brands to go to market with. However, in this year's survey, in general the proportion of respondents saying they plan to develop in-house and under their own brand remains relatively strong (**Figure 16**), though there is a gradual decline in this trend as they move away from connected-home features and services toward smart home features and services.

Figure 16: The interest in utilizing the service provider own brand is now strong

How did you brand these services/features or plan to brand them?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

Wi-Fi sensing and Matter may help broadband service providers find their value-add

Although not a topic covered in the Broadband Forum’s quantitative survey, Wi-Fi sensing was certainly a topic that came up often in the qualitative executive interviews and in other conversations Omdia has had (with both service providers and equipment vendors) as part of our standard research. The technology has received interest in recent years, because it enables broadband service providers to introduce a new type of “sensor” into the home and add a new level of intelligence to smart home solutions using nothing more than the Wi-Fi CPE they have already installed into the home. What makes it different from other types of sensors in the home is that it can detect, at least in theory, very granular forms of movement, even down to whether someone is breathing. The use of such technology therefore, especially in the assisted living / elder care space, could be quite compelling. The main question service providers are asking, however, is when the technology will be mature and reliable enough to be used in such settings.

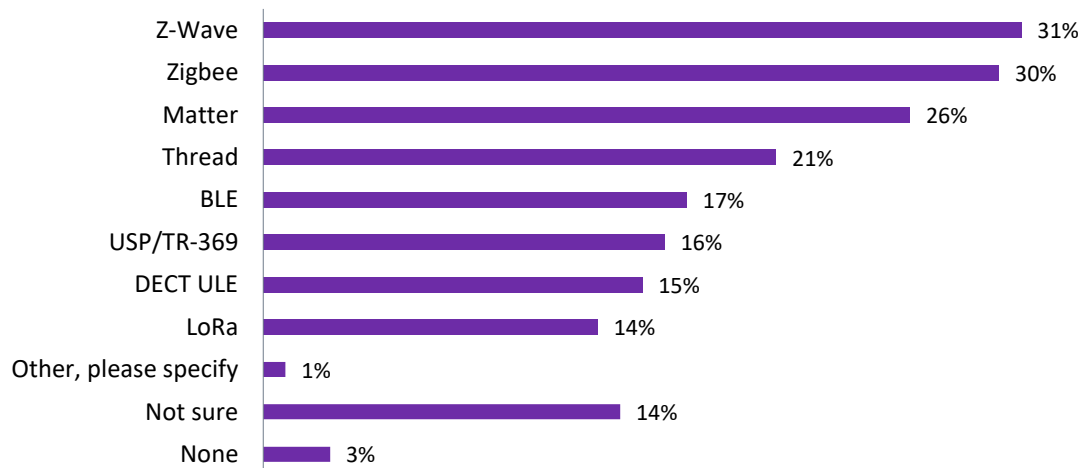
Matter is another technology that service providers believe will change the face of the smart home market and is therefore something they are watching keenly. Indeed, many are active members of the standard’s working groups. In the Broadband Forum’s survey, Matter was listed by respondents as the third standard they are now considering for their smart home rollout (**Figure 17**).

Matter is an open source connectivity standard aimed at improving the compatibility of smart home devices and platforms. On the one hand this removes the service providers’ opportunity to differentiate around a tested “works with” smart home proposition, but on the other it massively simplifies the smart home ecosystem by removing fragmentation so in theory could open up new opportunities for service providers by enabling them to take on more of a orchestrator role within the entire connected and smart home.

All is not rosy in the Matter camp, however. Some noticeable big brands in the smart home space, such as Philips Hue, have pressed pause on their own rollouts of Matter smart home services, but most, including Omdia, remain optimistic about its long-term future. Service providers will continue to actively watch and be involved in Matter’s development.

Figure 17: Matter is seen as a potential game changer

Which technologies, if any, are you considering for your smart home service offering?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

The consensus on the home app store is still out

Broadband service providers are keen to develop and make available to their customers a range of apps that will enhance their overall broadband experience. Today, service providers are focused on a core set of standard apps, such as Wi-Fi management, technical support, and internet/IoT cybersecurity, that will broadly appeal to most households. However, as service providers look to expand the range of applications to further improve the customer experience, different households

will start to value different services and features based on their current household setup and corresponding needs. As the number and choice of applications increases, the trick for the service provider is to make their customers aware of the features they offer and to ensure the customer can choose and enable such features in a simple and efficient way.

One option open to broadband service providers is to expand the current home Wi-Fi application, traditionally supplied to the consumer mainly to manage the home Wi-Fi network, into a fully featured application that includes access to a type of “home app store.” This expanded application platform would enable consumers to control the services and features they have in the home and to browse and select new applications they wish to install.

Just under 30% of respondents to the Broadband Forum’s survey said that the home app store concept is currently how they plan to enable and manage new VAS in the home. However, not all broadband service providers Omdia has spoken to are in favor of a single app store. Some still favor a more varied approach depending on the VAS or feature in question. However, channel aside, the desire to efficiently and quickly onboard and offboard new applications and features into the home is a constant for all service providers.

Technology such as a centralized managed Wi-Fi software platform and software containers enables service providers to efficiently deliver new home applications and features over the Wi-Fi platform. This can allow new apps (e.g., a new cybersecurity app) or software updates (e.g., an update to a user interface), to be pushed down to all customers by the service provider or be personalized, enabling the consumer to select a certain application or feature and for the network to instantly respond. One simple example would be for the consumer to switch on working-from-home prioritization for the duration of an important videoconference.

However, the creation of a wider home app store is not without its perils: for service providers, consumer safety and privacy remain paramount. All service providers Omdia has spoken to have said that although this strategy is of interest, they recognize that it must be done cautiously and in the proper manner so as to not unintentionally damage customers’ trust in their brands.

Key challenges to successful delivery

Wi-Fi CPE strategy has been a key focus

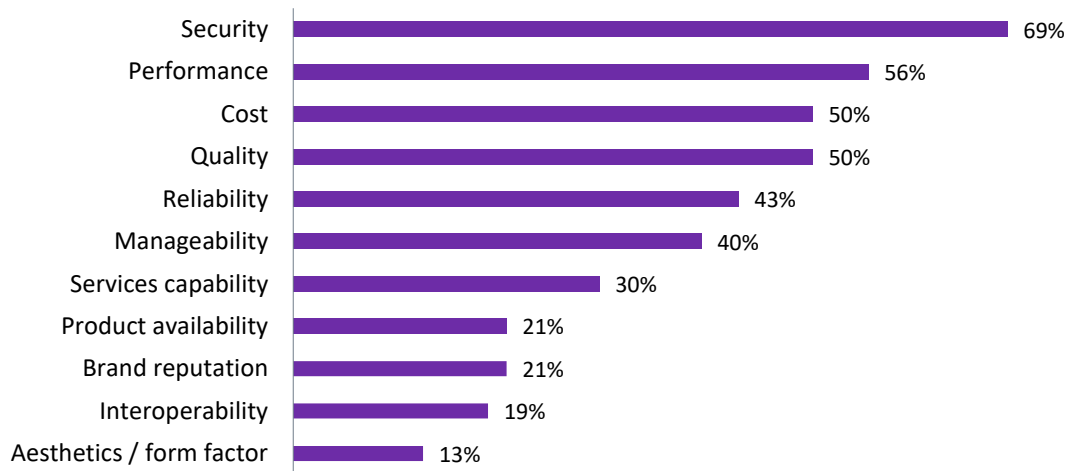
When it comes to broadband CPE, cost has always been and always will be important. Although it is not true in every country, for most broadband service providers the broadband CPE is something they offer “free” as part of the standard broadband service. This being the case, the cost of the CPE is an important part of the broadband business model, and at one time it was the number one driving force behind a service provider’s CPE strategy. However, as the home network has become a key area of differentiation, although cost remains important, other factors must also be taken into account. Indeed, in the Broadband Forum’s survey, cost was ranked only third, behind security and performance, by respondents asked about their top concerns with regard to broadband gateway choice (**Figure 18**).

Security is a key concern for service providers—to protect both their customers and their own network—so they will look for vendors that adhere to security best practices. Gateway performance, especially Wi-Fi performance, is therefore important if service providers wish to remain competitive and deliver a high level of customer satisfaction. To some extent this means keeping up with the latest Wi-Fi technology and standards. However, service providers will mainly invest in technology that will make a noticeable difference to either their operational capabilities or the end consumer. Therefore, as technology development speeds up and the window of Wi-Fi generations shortens, vendors may find that their service provider customers start to skip certain upgrades unless they drive a quick return on investment.

One element not included in the Broadband Forum’s survey, but which came up in many of the qualitative interviews, is the topic of sustainability. With many service providers, especially network owners, now working to company-level sustainability commitments, metrics such as energy efficiency and power-savings measurements are becoming more prominent in CPE requests for proposals.

Figure 18: Security, performance, and cost are the top three concerns when gateway solutions are being chosen

What are your top concerns about your remote gateway choice?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

VAS onboarding is a major challenge

There are many challenges facing broadband service providers as they look to expand their VAS portfolios, but integrating with third-party partners and vendors remains the top one (**Figure 19**). Traditionally, launching a new service has taken many months of integration with numerous different hardware and operational support systems (OSS) vendors and platforms. The investment risk was therefore high, and the rate of innovation was hampered because of it.

The reasons for this slow onboarding of new VAS dominate the top challenges highlighted by respondents to the Broadband Forum’s survey (**Figure 19**). Having to work with multiple vendors, all of which can in turn work with different chipset vendors, and then integrate with the various legacy OSS can make launching new services and applications costly and technically challenging. Add to this the challenge of communicating the benefits of the services to customers and the complications around measuring true return on investment, especially when the VAS are part of a wider bundle, and it is no surprise that service providers have been cautious about their level of investment in the connected and smart home. Resolving such issues through open frameworks and recognized standards is imperative if broadband service providers are ever to evolve their connected-home solutions.

Figure 19: Efficient integration of third-party vendors remains the number one challenge

What are your biggest internal challenges when introducing new value-added services?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

“Best of breed” versus “best of suite” strategies

Lengthy time to market is a clear issue for service providers looking to create innovative new connected-home offerings. One of the main barriers to speedy time to market mentioned to Omdia in virtually all the qualitative interviews was the time it took to implement a new service and integrate it over multiple different CPE devices (potentially using different chip vendors) and platforms that today tend to be using proprietary technology to some degree. In practice, therefore, for service providers to launch a new third-party application across their broadband footprint today, many must integrate it with each of their CPE vendors separately. Conversely, swapping out CPE devices can also be time-consuming because the integration work will need to be redone.

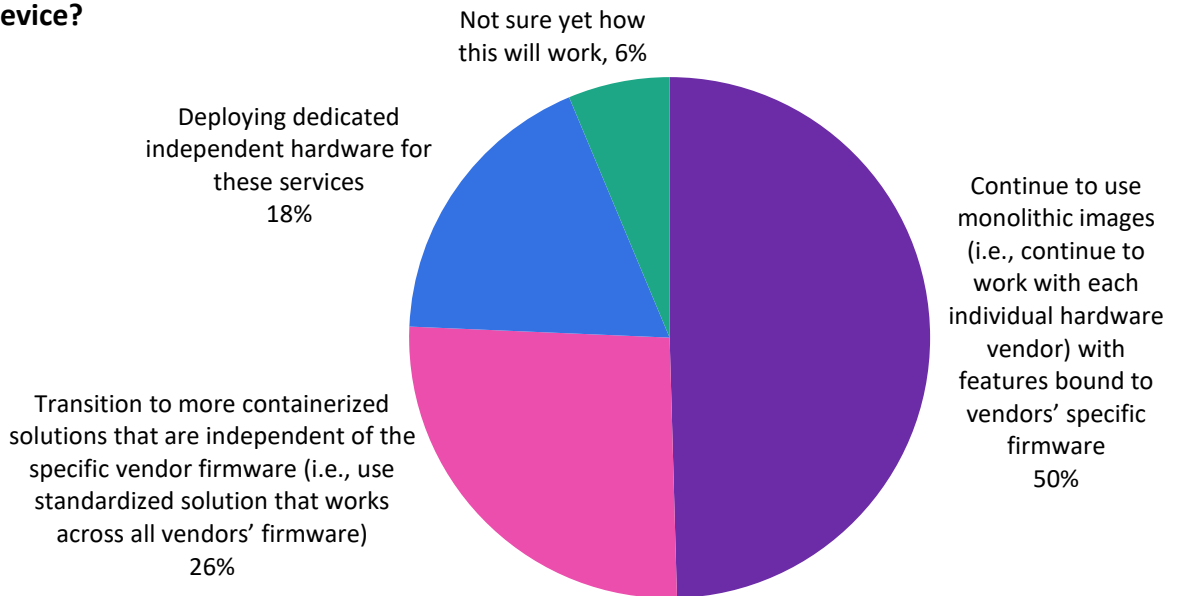
Omdia’s interviews with broadband executives indicate that service providers can look to remove this barrier in one of two ways. The first, and to some extent the simplest, is to work with a single platform vendor that has created an application ecosystem for the service provider and made sure that all the integration work with multiple hardware and chipset vendors has been done. This means the solutions work off the shelf and can be quick to deploy, ideal for service providers that do not have or do not wish to use their own resources to develop such an ecosystem internally. In this report we have called this strategy the “best of suite” strategy.

There are vendors on the market that both bring a best-of-suite solution and enable service providers to launch other (either third-party or service provider internally developed) applications via APIs and technology such as containerization. However, the larger service providers that Omdia interviewed tend to be going down a complete “best of breed” route: they wish to fully develop their own bespoke in-home platform, choosing best-of-breed technology and software developer partners as they go. Such service providers believe that this strategy will enable them to take full control over the ecosystem they create and hence give them the best chance of differentiation in the market. To achieve this goal, however, they require a fully open, standards-based model so that applications, hardware, and chipsets can be quickly and efficiently swapped out at any time without the need for further integration work.

Containerization is an increasingly popular way of deploying new applications: a sizable 26% of respondents in the survey said that they are currently evaluating it (see **Figure 20**). Containerization increases the speed to market for new services versus waiting for monolithic firmware upgrades and adding new bundles accordingly. However, there is much work still to be done from both a standards and a vendor perspective to make targeted new intelligent home gateways available to premium users. Given the large installed base of legacy home gateways, legacy firmware will not disappear for some time.

Figure 20: Larger operators will transition to adopt platforms based on open standards

How do you see the current way of adding applications/services to a broadband router or device?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

The importance of open frameworks and standards

Open platforms are needed to drive greater innovation

All operators interviewed by Omdia agreed that reduced fragmentation and proprietary technology at the chipset level, CPE level, and software platform level would significantly help to drive greater innovation. The quantitative survey respondents also agreed: having to integrate different services and technology from different vendors was their number one challenge in introducing new services and service features (see **Figure 19**).

The same barrier also restricts software developers, especially smaller companies. Currently, to work with broadband service providers, developers need to integrate with each operator separately and then, quite possibly, with the variety of hardware vendors that are already present in the operator's network. This is a slow and costly exercise, especially for a small developer company. 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 innovative new ideas.

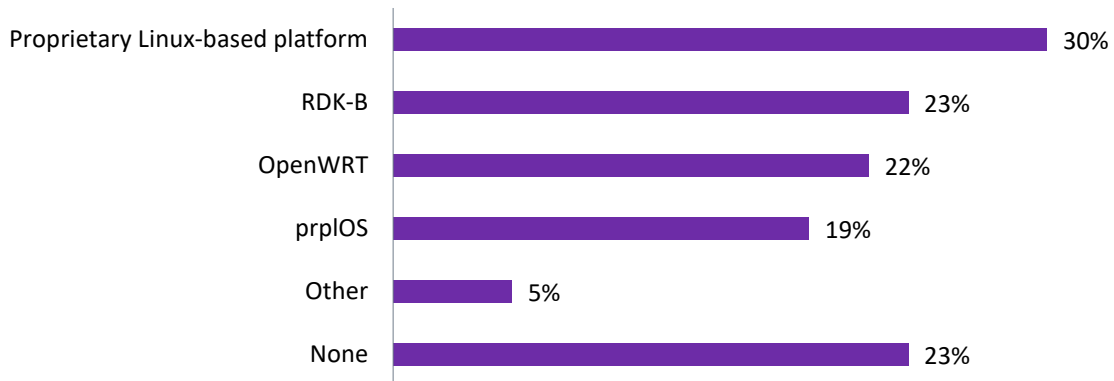
To achieve this the industry needs to work toward not only reducing the fragmentation of CPE middleware platforms but also developing an open standards application platform. An application platform based on open standards enables developers to integrate once to gain instant access to potentially millions of CPE 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 general industry developments.

When it comes to open source software, the executives in the qualitative interviews mainly listed RDK-B and prpl as two of the strongest contenders. In the quantitative survey, OpenWRT was also considered as a potential option alongside prpl and RDB-B for application-enabled CPE (**Figure 21**).

Figure 21: RDK-B, OpenWRT, and prpl are all considered as options for application-enabled CPE

Which open-source platforms are you considering for the development of application-enabled CPE?



Note: n=111

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Source: Broadband Forum Connected Home Survey 2023

User Services Platform and connected-home evolution

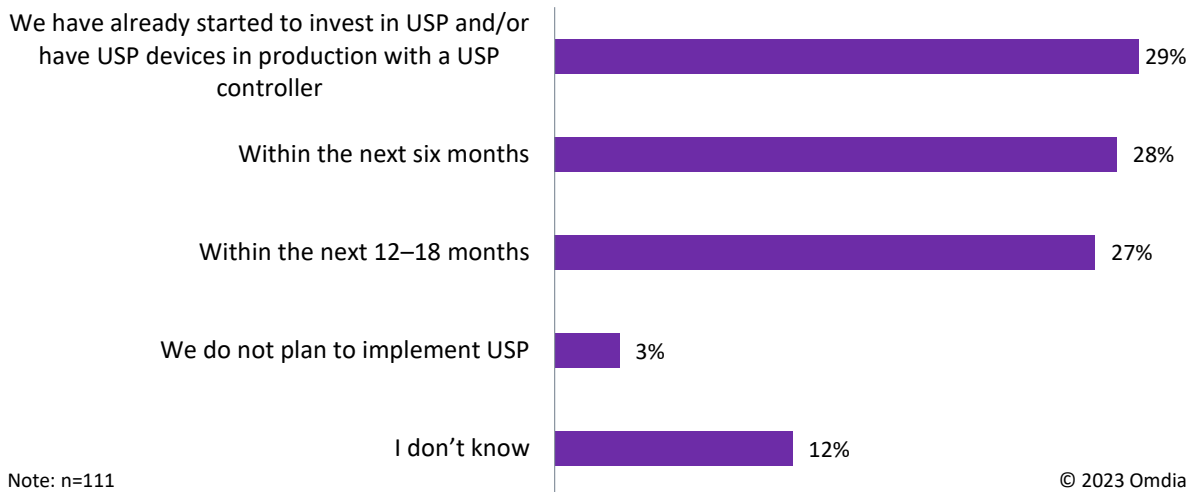
Although initially designed to enable self-install and remote management of broadband Wi-Fi CPE, over the years TR-069 has spread to other connected devices such as TV set-top boxes, network-attached storage devices, and more recently, consumer IoT. However, consumer IoT really stretches the protocol’s capabilities, so the Broadband Forum has developed User Services Platform, 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 VAS and smart home managed services, two fundamental strategic areas for broadband service providers. However, not all service providers are fully committed to implementing USP yet. The interviews conducted by Omdia suggest that certainly some executives regard USP as a must-have, but others have no current plans for deployment but are keeping a close eye on how the standard develops. In the Broadband Forum’s quantitative survey, results were similar: 29% of respondents said they have already started to invest in USP, 28% said that they plan to do so within six months, and a further 27% plan to do so in the next 12–18 months (Figure 22).

Figure 22: Approximately 60% of service providers are either deploying USP or will do so shortly

If you use or plan to deploy USP/TR-369, what is your timeline?

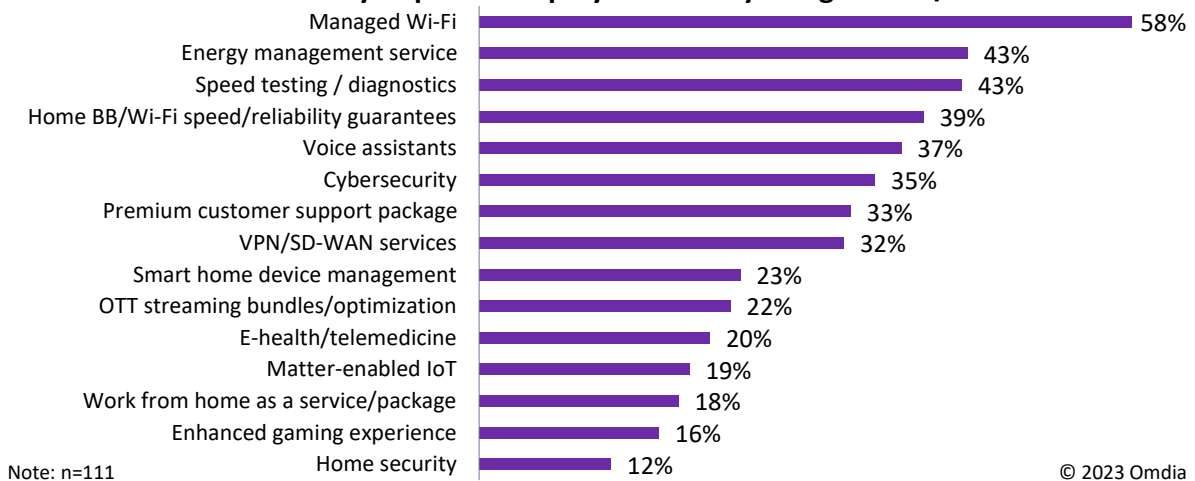


Source: Broadband Forum Connected Home Survey 2023

Of the VAS and features that service providers are looking to deploy using USP, Wi-Fi management is ranked by respondents as the most popular (Figure 23), as it was in the 2021 survey. Self-monitoring and customer support are also still key use cases. New key VAS services that respondents said could be deployed in partnership with USP include energy management, speed testing and diagnostics, signaling an ever-growing role for USP as broadband service providers extend their VAS services.

Figure 23: Managed Wi-Fi remains the top VAS to be deployed using USP

What VAS and features do you plan to deploy exclusively using TR-369/USP?



Source: Broadband Forum Connected Home Survey 2023

Appendix

Methodology

This report is based on a quantitative service provider survey of 111 service provider executives across 18 individual countries plus the Scandinavian region; in-depth qualitative interviews with key executives from service providers in Latin America, North America, Europe, and China; and existing Omdia research and data in the broadband, connected, and smart home domains.

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