

# ISP Support Experience Report

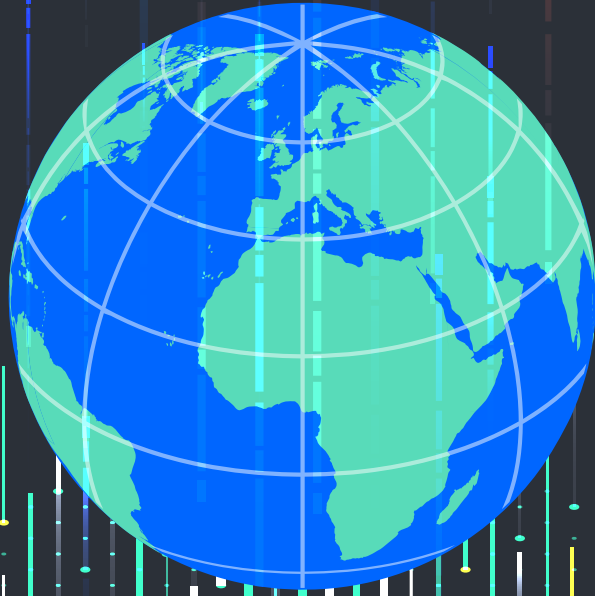
A global look at what's driving  
ISP support interactions



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# Methodology

This report leverages the insights gained from millions of home network diagnostic scans conducted using the RouteThis platform. These scans, which date back to January 2019, span the RouteThis customer base of internet service providers (ISPs) and smart home device manufacturers and include nearly:

**3,000 ISPs in over 200 countries.**

While the users initiating these scans may not necessarily represent the average internet subscriber, they do represent the average subscriber who contacts their ISP for support.

Throughout this report, we've aggregated data based on four geographical regions:

- Australia and New Zealand (ANZ)
- Europe
- North America
- United Kingdom and Ireland (U.K. and Ireland)

These regions are composites of their constituent countries and can be interpreted as representing the hypothetical average ISP.

In some analysis, we show anonymous data from particular ISPs; these ISPs were subjectively selected as representative examples. In other words, they are not outliers.

# Executive summary

For today's ISPs, managing the quality of experience (QoE) in the home is more of a priority than ever, and an aggregate analysis of millions of home network diagnostic scans conducted from 2019 through 2021 reveals that preventing and addressing WiFi issues should take center stage.

While the average number of connected devices within home networks remained steady, device upgrades and pandemic-related behavioral shifts have put greater demands on home WiFi environments.

And although there's evidence that many subscribers aren't rightsizing their service plans to meet the needs of their devices, the size of their pipe is likely only a secondary issue. Indeed, the experienced speeds returned by diagnostic tests increased considerably during the study period.

Instead, issues with the home WiFi network appear to be a major culprit—perhaps the largest one—driving support interactions.

Every new device added to a home network competes for shared resources and increases the opportunity for a poor subscriber experience—and a support interaction—and the more devices within a home network, the more likely that a subscriber will notice a problem.

**In fact, once a home network hosts more than six or seven devices, it's more likely than not that at least one device will suffer from a poor-quality connection.**

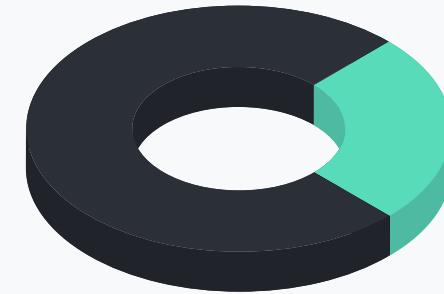
Range extenders offer a potential solution, but the evidence indicates that many home networks are configured poorly. For example, even though the number of devices positively correlates with the presence of a range extender, quality issues persist—suggesting too few extenders<sup>1</sup> are being used or they aren't being placed appropriately.

Unfortunately, many ISPs struggle to cost-effectively diagnose WiFi issues, owing to a lack of visibility into the home network. Regardless of the size of their subscriber base, ISPs must contend with a diverse mix of CPEs—which undermines attempts to gain consistent and universal visibility. Plus, large portions of the subscriber base elect to purchase third-party equipment, all but assuring that CPE-based diagnostics will suffer from coverage problems.

<sup>1</sup>For the purpose of this report 'extenders' refers to any infrastructure that extends WiFi signals passed the CPE.

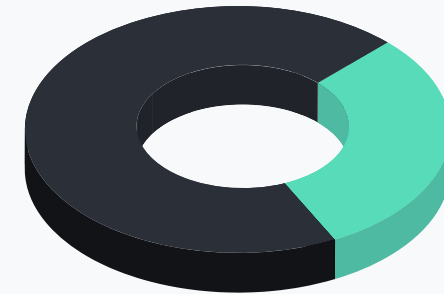
**25%**

of diagnostic scans reveal that there is a less congested WiFi channel available



**30%**

indicate an underlying problem of signal strength





## Executive summary

Taking an aggregate view of millions of in-home network diagnostic scans leads us to two high-level conclusions:

- 1 Since such a large proportion of support engagements—as much as 50%, for some ISPs—can be traced back to problems with the home WiFi setup, ISPs can dramatically reduce costs and improve customer satisfaction (CSAT) by helping to prevent these problems in the first place and, when they do arise, by diagnosing and resolving them more efficiently.
- 2 It's clear that universal, understandable, and convenient diagnostics are essential both for enabling subscriber self-service utilities and for equipping service agents with essential information. It's time for ISPs to accept that for a number of reasons, including some completely beyond their control, CPEs are not addressing this need and perhaps never will.

Combined with educational self-service resources about common home network issues and potential resolutions, a proactive approach to WiFi management and efficient diagnostics capabilities can transform the traditional support relationship—ultimately slashing ISP support costs and contributing to greater subscriber satisfaction.

# Introduction

In the last decade, ISPs have enabled and endured a number of significant and sometimes sudden shifts in consumer usage patterns, including:

- The explosive growth of high-quality video streaming services
- The popularization of live streaming and the arrival of cloud-based gaming
- The widespread adoption of smart devices and the internet of Things (IoT)
- The arrival and gradual penetration of mesh networking solutions
- The well-documented impacts of the COVID-19 pandemic, including working from home, remote schooling, and telemedicine

However, myriad factors, many of which fall within the home network, can harm the performance of applications and devices, causing subscribers to contact their ISP.

As a leading provider of in-home network diagnostics for ISPs and smart home brands, RouteThis has unmatched visibility into consumer networks around the world.

In this report, we've drawn upon our privileged position to reveal what today's home networks look like, what factors are behind many support engagements, and how ISPs can improve CSAT while reducing support costs.

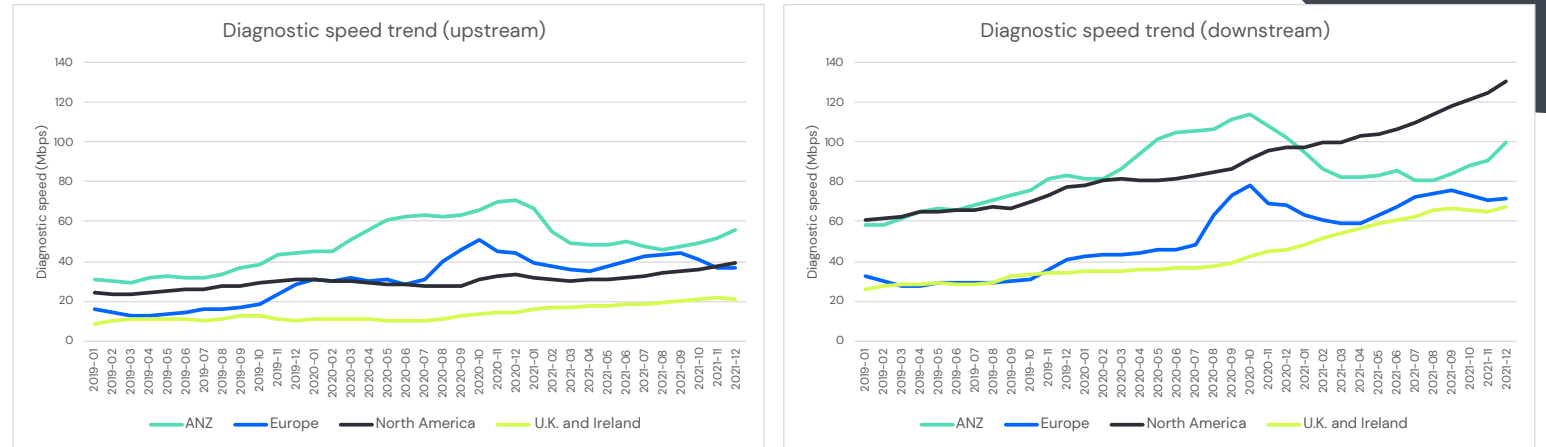


# Speeds and feeds

Over the years, the peak speeds of internet services have increased dramatically, with many densely populated regions now offering downstream bandwidth in excess of a gigabit per second. However, because of a number of factors—including an urban/rural divide, the oversubscribed nature of shared infrastructure, and the complex paths packets traverse—the speeds experienced by subscribers often don't match the speeds provisioned by ISPs.

Testing the speed of a home network's connection to an internet resource is a useful diagnostic mechanism, as doing so can inform troubleshooting efforts. Tracking these results over time and in the aggregate provides insights into the real experience of subscribers who initiate a support engagement.

From 2019 to 2021, the average speeds returned during diagnostic scans grew steadily (**Figure 1**). The U.K. and Ireland experienced the largest relative growth, with diagnostic upstream and downstream speeds increasing by 185% and 167% respectively (**Table 1**); however, the region also exhibited the lowest average speeds. Europe saw both the upstream and the downstream grow by more than 70%, while North America's gains were primarily shown on the downstream (125% growth to more than 125 Mbps). Australia and New Zealand had comparatively modest speed increases, but those came on top of the highest combined baseline.



**Figure 1:** A three-year view of household networks shows a gradual increase in diagnostic speed.

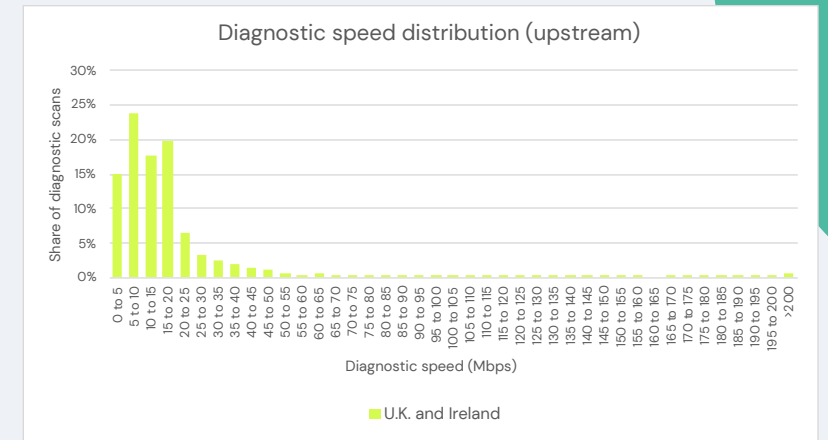
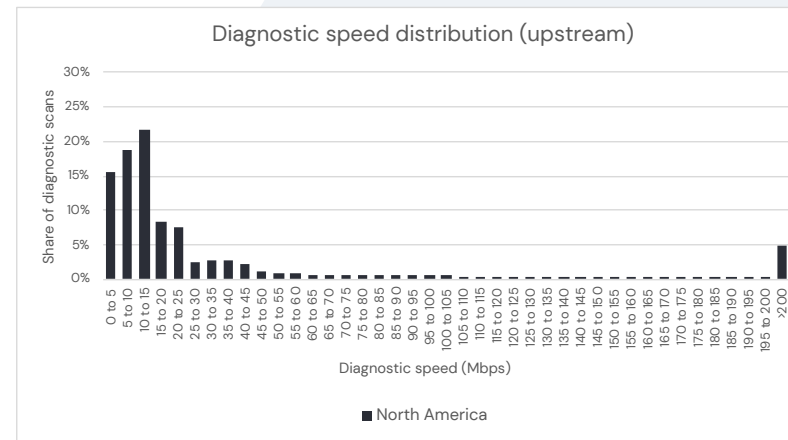
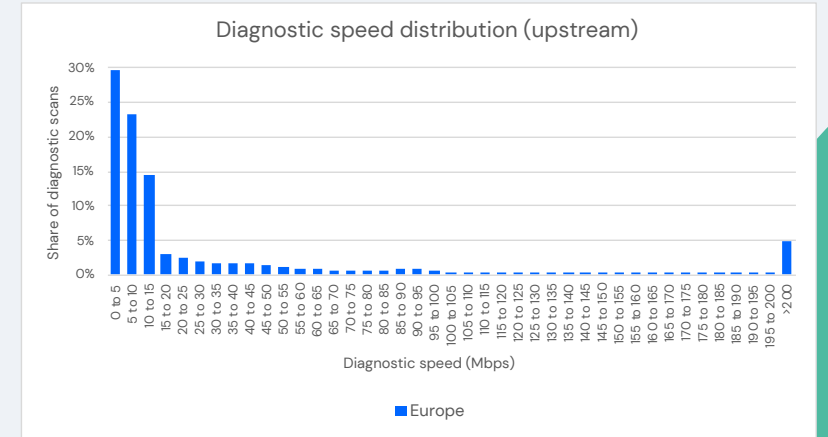
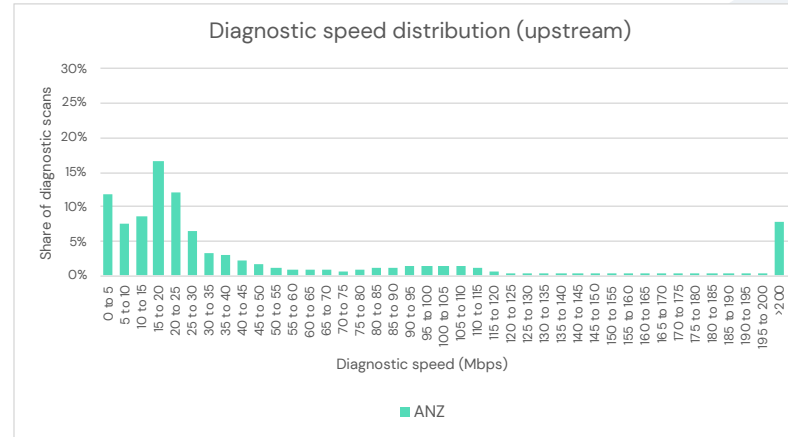
	Upstream		Downstream	
	2021 Q4 mean	Three-year change	2021 Q4 mean	Three-year change
ANZ	52.2 Mbps	+74%	92.8 Mbps	+57%
Europe	38.4 Mbps	+75%	71.9 Mbps	+71%
N. America	37.5 Mbps	+51%	125.5 Mbps	+125%
U.K. and Ireland	21.4 Mbps	+185%	66.2 Mbps	+167%

**Table 1:** Every region showed significant increase in diagnostic speed from the beginning of 2019 to the end of 2021.

# Speeds and feeds

**Figure 2** shows the distribution of diagnostic speeds during 2021 Q4 using increments of 5 Mbps, with the final bucket capturing all scans that exceeded 200 Mbps. A simple visual examination shows that:

- The averages shown in **Table 1** can hide considerable variation within the subscriber population of a given region
- Regardless of the region, diagnostic upstream speeds tend to be concentrated below about 25 Mbps
- The downstream averages are significantly influenced by a large population of subscribers with diagnostic speeds in excess of 200 Mbps



**Figure 2:** A histogram view of diagnostic speeds shows tremendous variation within each region.



# Speeds and feeds

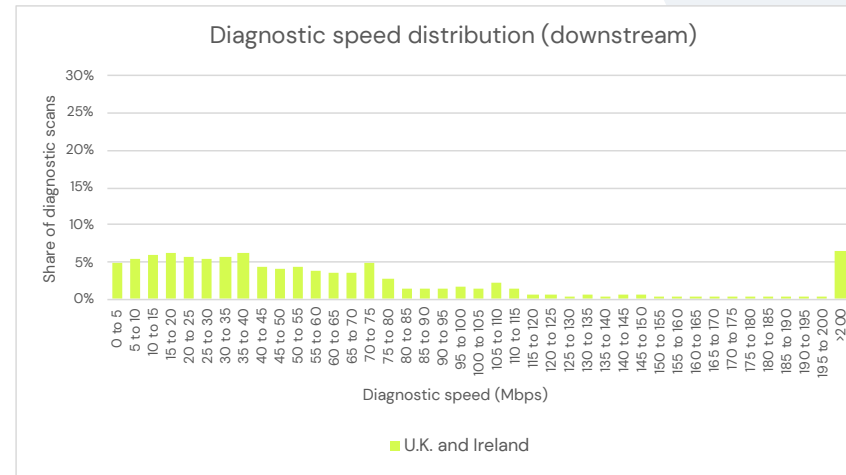
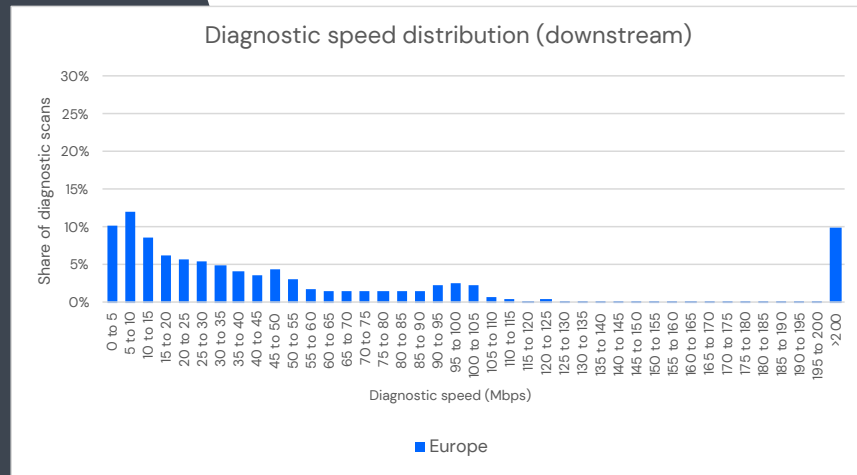
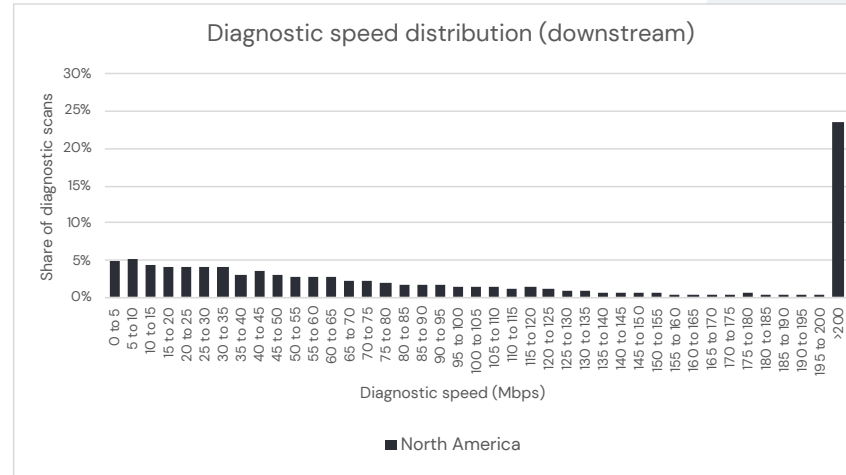
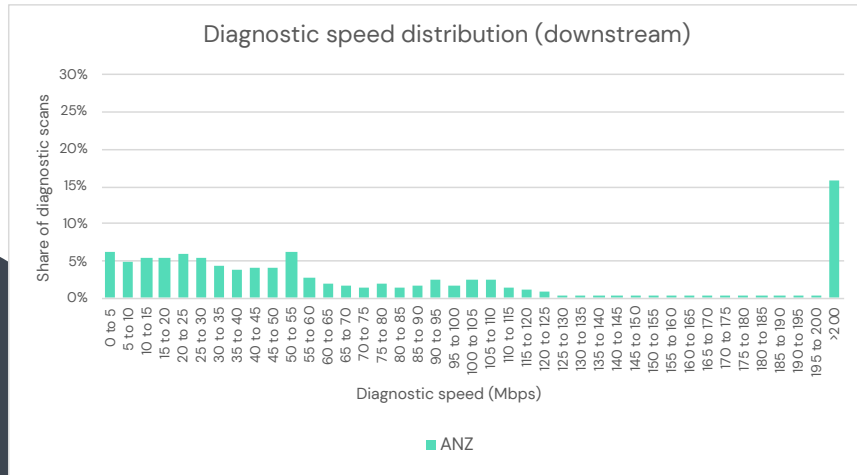


Figure 2: A histogram view of diagnostic speeds shows tremendous variation within each region.

## Key takeaways:

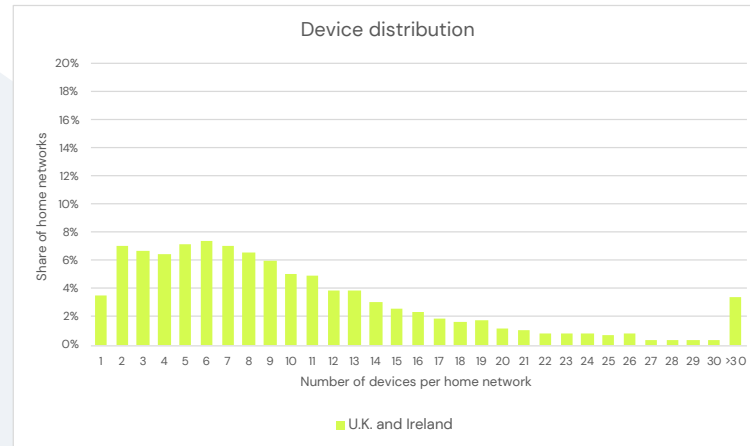
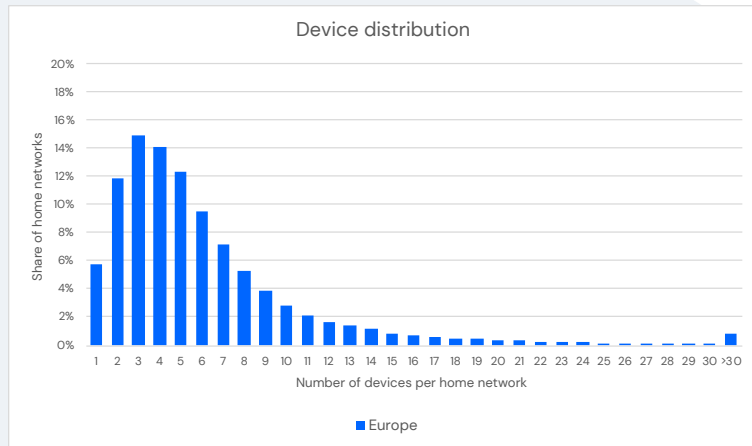
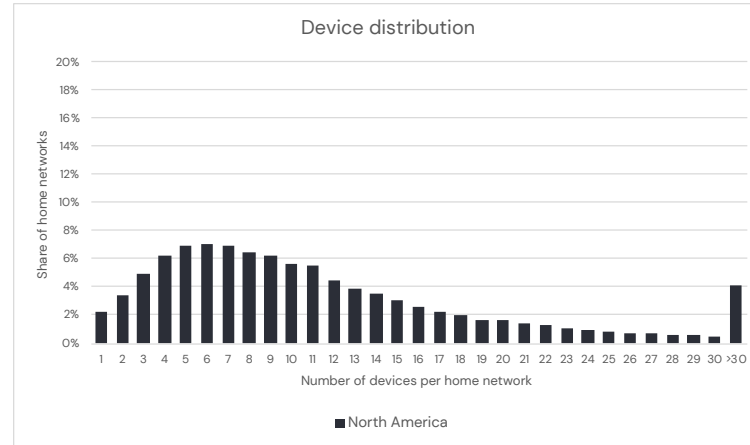
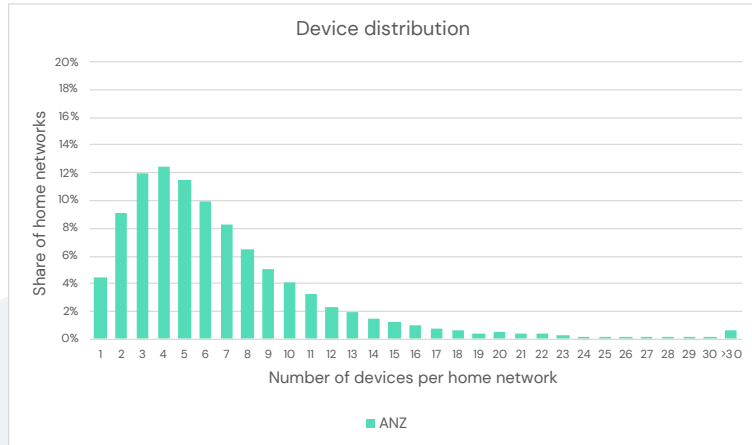
- Speed tests can inform troubleshooting workflows, and so are an important element of diagnostic scans—they also reveal how network speeds have changed over time and how subscriber experiences vary
- From 2019 through 2021, all four regions examined showed significant diagnostic speed increases, led by the U.K. and Ireland (+185% on the upstream, +167% on the downstream)
- There is tremendous diagnostic speed variation within a region, underscoring the importance of per-subscriber insights rather than network-level views

# Device demands

Home networks provide data service to a wide range of devices, from internet-enabled appliances and security systems to gaming consoles and smart TVs, plus the usual array of smartphones, tablets, and laptops. Each new device places some level of demand on the home network and competes for scarce resources, increasing the opportunity for a poor experience that triggers a support interaction. Consequently, one of the most helpful fundamental diagnostic insights is to count how many devices are relying on this shared infrastructure.

The diagnostic scans reveals considerable variation between home networks and between regions:

- Through the three-year study period, the median number of connected devices per household remained steady—led by North America, with nine—suggesting that subscribers tend to replace devices rather than adding to their collection
- Focusing just on 2021 Q4 (**Figure 3**), we see that North America and the U.K. and Ireland have broader distributions; in both regions, more than 20% of households have around 15 or more connected devices, and significant populations have more than 30 devices
- ANZ and Europe are more concentrated at the lower device counts, with more than 80% of home networks hosting fewer than nine devices



**Figure 3:** Connected devices are distributed unevenly between households.

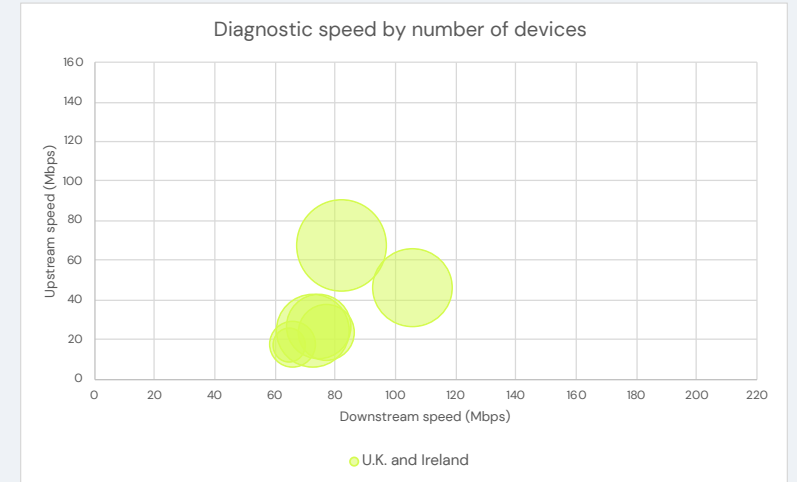
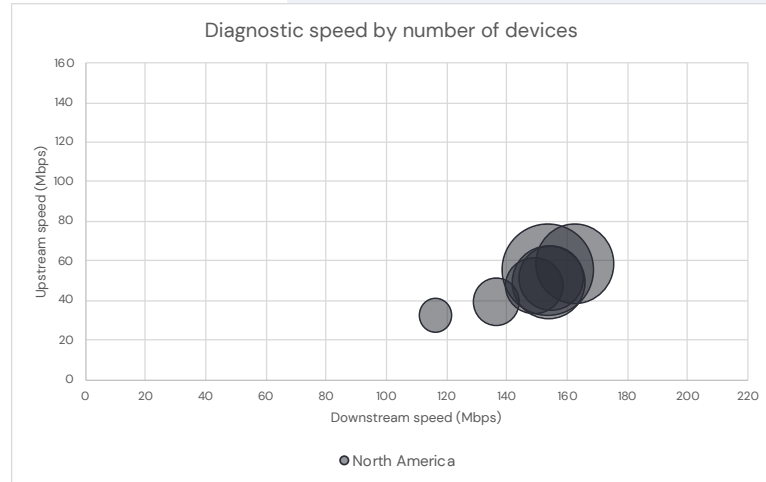
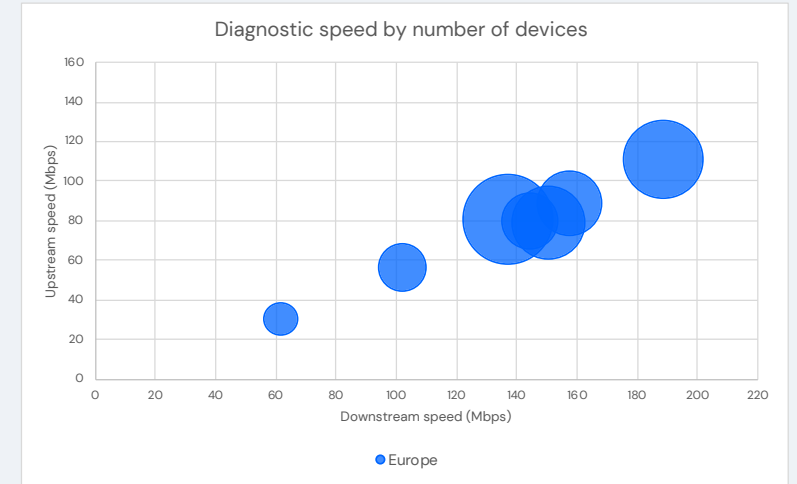
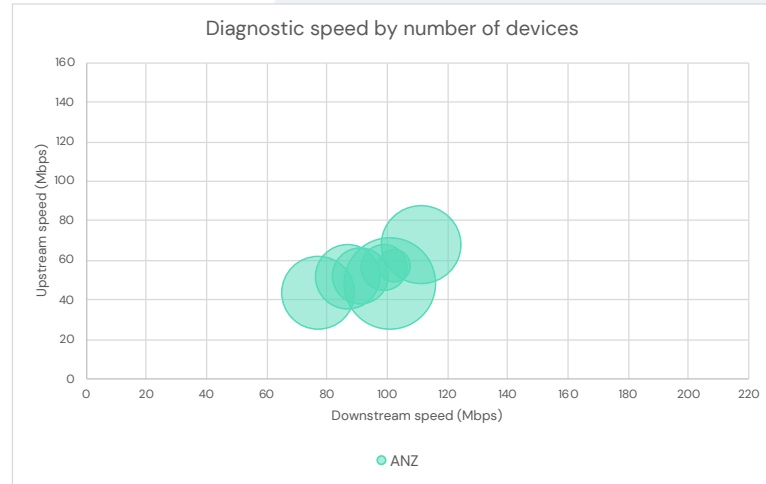
# Device demands

In a perfect world, subscribers would upgrade their service plans to match the increasing demands of a growing device collection. But is this what really happens?

The bubble charts in **Figure 4** show:

- The number of devices in a household (by bubble size: 5, 10, 15, 20, 25, 30, more than 30)
- The downstream and upstream speed (on the X- and Y-axis, respectively)

If subscribers scaled up their service plans to the needs of their devices, the bubbles would be neatly arranged from smallest to largest in a line heading up and to the right. However, only Europe comes close to matching this expectation; even there, the home networks with the most devices have middle-of-the-pack diagnostic speed. In the other three regions, the bubbles are closely clustered together, indicating that diagnostic speed and the number of devices are independent.



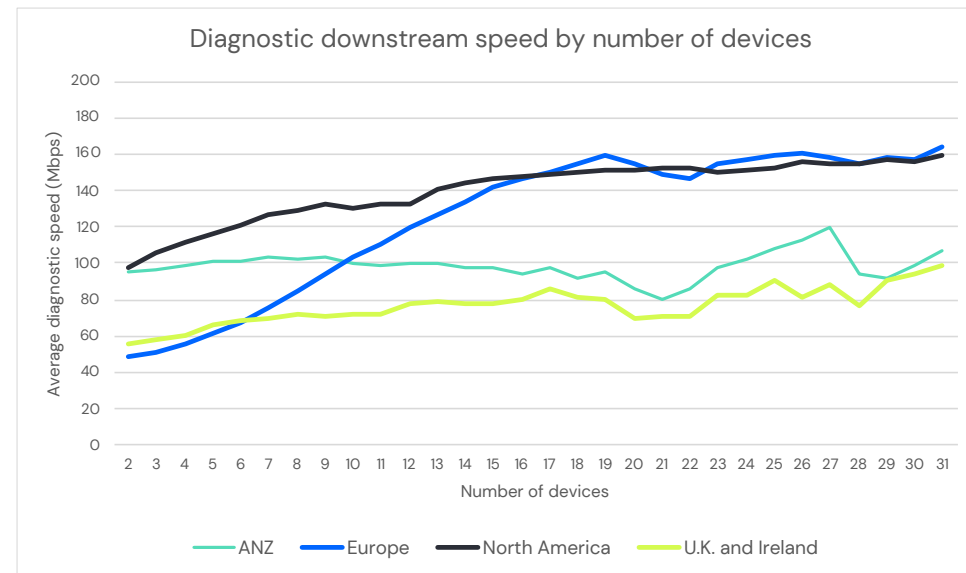
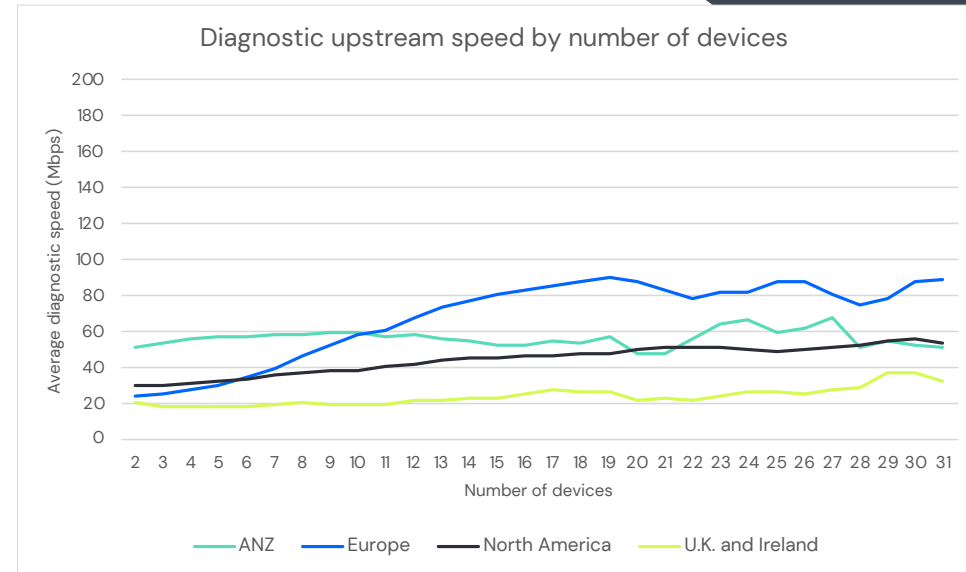
**Figure 4:** Diagnostics from 2021 Q4 suggest that subscribers aren't rightsizing service plans to match growing device demands.

# Device demands

The line charts in **Figure 5** illustrate this reality with single-device resolution. We can clearly see that Europe exhibits the strongest correlation with speeds increasing in lock-step with device count up to about 20 devices, but in general, the overall flatness of the lines demonstrates that subscribers aren't matching plan speeds to larger device footprints.

## Key takeaways:

- Every new device added to a home network competes for shared resources and increases the opportunity for a poor subscriber experience and a costly support interaction
- North America's home networks host the highest median number of devices (nine), while home networks in ANZ and Europe have the lowest medians (four to five)
- Diagnostic observations from 2021 Q4 suggest that subscribers aren't rightsizing their service packages to meet the growing needs of their connected devices



**Figure 5:** Diagnostics from 2021 Q4 suggest that subscribers aren't rightsizing service plans to match growing device demands.

# The diverse world of CPE

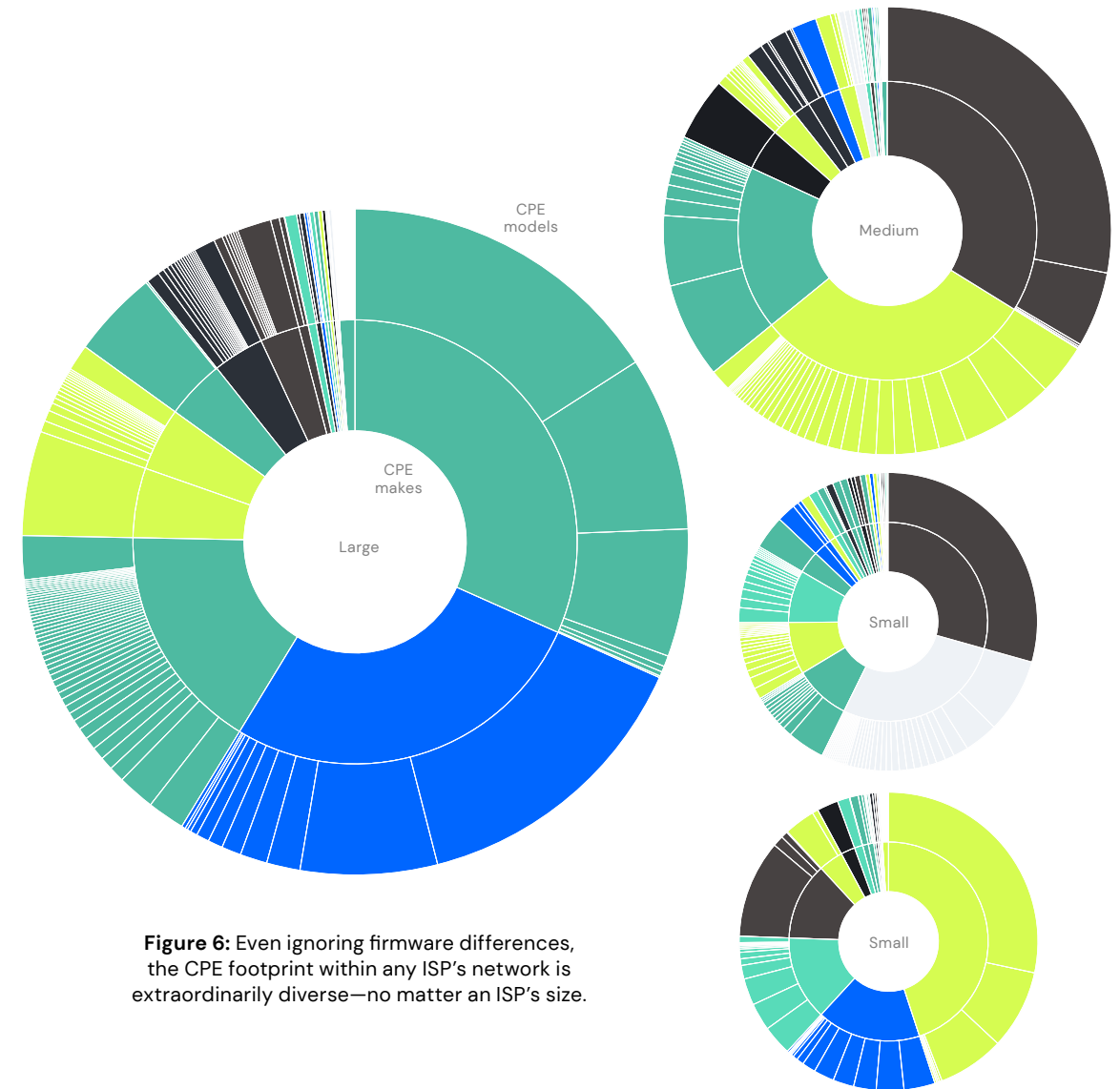
Many ISPs hope to leverage auto configuration servers (ACS) and TR-069 deployments as sources of customer support diagnostics. Unfortunately, these initiatives usually don't meet their lofty expectations for two closely related reasons.

- TR-069 support varies by CPE model and by firmware version; as a consequence, the information available to the support agent—assuming they even have access—changes from subscriber to subscriber
- The landscape of deployed CPEs is extraordinarily diverse, with literally hundreds of makes and thousands of models, and that diversity is increasing

**Figure 6** vividly illustrates this diversity: The inner circle of each sunburst shows the most widely deployed CPE makes (i.e., vendors) within an ISP's subscriber base; the outer circle shows distinct models associated with each make.

The data shows both that CPE diversity—even completely ignoring firmware—is a challenge regardless of the population of an ISP's base, and that this challenge grows as the subscriber count increases. Just within our dataset alone:

- The large ISP (left) has 363 unique make-and-model combinations
- The medium-sized ISP (top right) has 301 unique combinations
- The two smaller ISPs have, respectively, 106 (left) and 103 (right) such pairings



**Figure 6:** Even ignoring firmware differences, the CPE footprint within any ISP's network is extraordinarily diverse—no matter an ISP's size.

# The diverse world of CPE

What's more, this diversity will only increase, combating ISPs' efforts to standardize customer support processes and workflows.

This growing diversification is the result of at least four factors:

- 1 Many consumers purchase their own equipment, and will continue to do so
- 2 Others won't upgrade unless absolutely necessary, ensuring a long tail and widening the gulf between legacy devices and the state of the art
- 3 ISPs will continue to grow through mergers and acquisitions, introducing further diversity into the CPE mix
- 4 ISPs regularly introduce new CPE devices

Let's zoom in on this latter force, as doing so will illustrate a few additional complexities.

ISPs typically have one or more CPE suppliers. When a new subscriber signs up with the ISP, they're provided with a CPE device from an approved vendor. Similarly, when an ISP engages in an upgrade campaign, old CPEs are replaced with new ones from an official supplier.

Ignoring the subscribers who supply their own device and subscribers gained through mergers and acquisitions, every new CPE introduced into the network comes from an approved supplier. In the span of a few years, some significant portion of the subscriber base is on this approved set—and the ISP's efforts at standardization move forward slightly.

However, every few years, something changes—a different supplier offers more favorable terms, or introduces a CPE with compelling diagnostic or management capabilities—causing the ISP to swap suppliers. The same programs continue, with new subscribers and those who upgrade now receiving devices from this new supplier.

In fact, this pattern is evident in the sunburst charts of **Figure 5**. Within each chart, each of the large color slices is the result of a new preferred supplier enjoying a heyday, only to be displaced at a subsequent time.

Over the years, the result is what we see in each of the figures: wave after wave of preferred suppliers. Unfortunately for ISPs, none achieves the widespread install base needed to standardize troubleshooting data and workflows, and none can address the other three forces contributing to CPE diversity: subscribers providing their own CPE, subscribers holding on to legacy devices, and the impact of mergers and acquisitions.

The conclusion is as clear as it is unavoidable: Universal diagnostics—at least for customer care—cannot come from CPE.

## Key takeaways:

- Regardless of the size of their subscriber base, ISPs must contend with a diverse mix of CPEs—which undermines attempts to gain consistent and universal visibility into CPE-based diagnostics
- In the complete dataset powering this report, we observed roughly 300 CPE manufacturers and several thousand CPE models, to say nothing of the seemingly endless firmware versions
- The combination of consumer-provided CPEs, a reluctance to upgrade or update equipment, and regular changes in preferred CPE suppliers means that universal customer care diagnostics will not come from CPEs

# What's driving support interactions?

Devices	Share of home networks in which at least one device has poor connection quality				Share of home networks that are using a range extender			
	ANZ	Europe	North America	U.K. and Ireland	ANZ	Europe	North America	U.K. and Ireland
1	22%	31%	20%	12%	1%	1%	2%	1%
2	32%	42%	26%	31%	2%	3%	7%	7%
3	38%	49%	29%	24%	5%	6%	12%	12%
4	44%	54%	37%	40%	9%	10%	15%	18%
5	49%	59%	42%	47%	12%	16%	17%	17%
6	56%	64%	47%	50%	17%	20%	20%	31%
7	57%	67%	50%	49%	21%	27%	21%	28%
8	63%	68%	54%	53%	23%	33%	23%	35%
9	69%	68%	58%	60%	28%	38%	23%	31%
10	69%	68%	61%	62%	32%	42%	28%	27%
11	72%	72%	68%	64%	37%	47%	25%	30%
12	71%	72%	65%	61%	35%	53%	30%	29%
13	75%	76%	67%	56%	38%	58%	33%	40%
14	80%	69%	72%	49%	40%	60%	32%	37%
15	77%	78%	70%	74%	43%	62%	33%	50%
16	77%	77%	71%	76%	48%	61%	35%	50%
17	79%	81%	73%	70%	48%	62%	38%	51%
18	73%	81%	77%	64%	37%	79%	38%	36%
19	77%	88%	74%	89%	51%	69%	40%	31%
20	87%	82%	76%	76%	52%	62%	39%	81%
21	83%	87%	79%	68%	46%	59%	41%	27%
22	81%	86%	81%	67%	64%	69%	44%	47%
23	88%	89%	81%	77%	65%	78%	40%	45%
24	89%	90%	82%	82%	63%	84%	44%	47%
25	76%	84%	89%	70%	76%	71%	39%	60%
26 or more	81%	80%	85%	78%	61%	65%	44%	41%

**Figure 6:** As more devices are added to a network, there is a greater chance that at least one will experience poor connection quality (left); the chances of encountering a range extender also increase (right).

Every home network diagnostic scan conducted using the RouteThis platform runs a myriad of tests to uncover the factors that may be the cause of, or a contributor to, a poor subscriber experience. While each environment has unique characteristics, when viewed in the aggregate a few common issues stand out.

For example, about a quarter of the scans uncover channel congestion. In many (perhaps even most) of these cases, simply switching channels may resolve the quality issue the subscriber is experiencing.

Another common issue—observed in about 30% of diagnostic scans—is a lack of signal strength. Many factors can contribute to poor signal strength, from the distance between the WiFi router and a connected device, to

construction materials impeding radio waves, to electromagnetic interference from other devices.

But perhaps the most significant factor—at least in terms of correlation with quality issues—is the number of connected devices. The left side of **Figure 6** shows the share of diagnostic scans that revealed at least one device has poor connection quality, and a quick examination shows that the more devices there are, the higher the chance of a problem.

Range extenders may offer at least a partial solution. However, the right side of the figure shows that the quality issues present in device-heavy networks persist despite the presence of a range extender—possibly suggesting that many extenders are installed poorly or that more extenders are needed to provide sufficient coverage.

## Key takeaways:

- About 25% of diagnostic scans reveal that there is a less congested channel available, and about 30% indicate an underlying problem of signal strength
- Once a home network hosts more than six or seven devices, it's more likely than not that at least one device will suffer from a poor-quality connection
- Even though the number of devices positively correlates with the presence of a range extender, quality issues persist—suggesting that many subscribers are not properly placing their WiFi extenders

# Conclusion

As provisioned speeds have risen in recent years, so too have the demands placed upon home networks by ever-more-capable connected devices and by pandemic-related behavioral shifts.

Fairly or not, many subscribers who encounter quality issues default to holding the ISP responsible. Others may recognize that their home network could be the culprit, but lack the technical knowledge or diagnostic tools to troubleshoot the issue. The result in both scenarios is an outreach to their ISP's support channels.

In many cases, a lengthy, costly, and frustrating engagement uncovers that the underlying issue was within the home network: a congested channel, a weak WiFi signal, outdated equipment, or some other common cause.

Taking an aggregate view of millions of in-home network diagnostic scans leads us to two high-level conclusions.

- 1 First, since such a large proportion of support engagements—as much as 50%, for some ISPs—can be traced back to problems with the home WiFi setup, ISPs can dramatically reduce costs and improve CSAT by helping to prevent these problems in the first place and, when they do arise, by diagnosing and resolving them more efficiently.

There's a real opportunity for ISPs to become more proactive in assisting subscribers with configuring and managing their home WiFi environments.

And while many ISPs are already going this route, comparatively few have operationalized WiFi installations and management to the necessary levels; [a survey commissioned of ISP leaders](#) by RouteThis revealed that many ISPs don't have documented best practices for WiFi installations and almost half lack visibility into WiFi performance.

- 2 Second, it's clear that universal, understandable, and convenient diagnostics are essential both for enabling subscriber self-service utilities and for equipping service agents with essential information. It's time for ISPs to accept that for a number of reasons, including some completely beyond their control, CPEs are not addressing this need and perhaps never will.

Instead, what's needed is a diagnostic tool that:

- Is universally applicable to any home network, regardless of CPE
- Delivers clear insights that any support agent—and as many subscribers as possible—can understand
- Is easy to use, so that practically any subscriber can activate it

Combined with educational self-service resources about common home network issues and potential resolutions, a proactive approach to WiFi management and efficient diagnostics capabilities can transform the traditional support relationship—ultimately slashing ISP support costs and contributing to greater subscriber satisfaction.





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## About RouteThis

RouteThis, a leading platform for diagnosing and troubleshooting in-home WiFi connectivity issues, is transforming the way ISPs and smart home brands deploy, manage, and support the connected home. Our 100% software-based approach to solving in-home connectivity issues leverages the power of consumer smart devices so agents and subscribers alike can quickly identify, resolve, and prevent WiFi connectivity issues themselves without making a call to subscriber support.

We're proud to be a trusted partner to hundreds of ISPs and smart home brands worldwide.