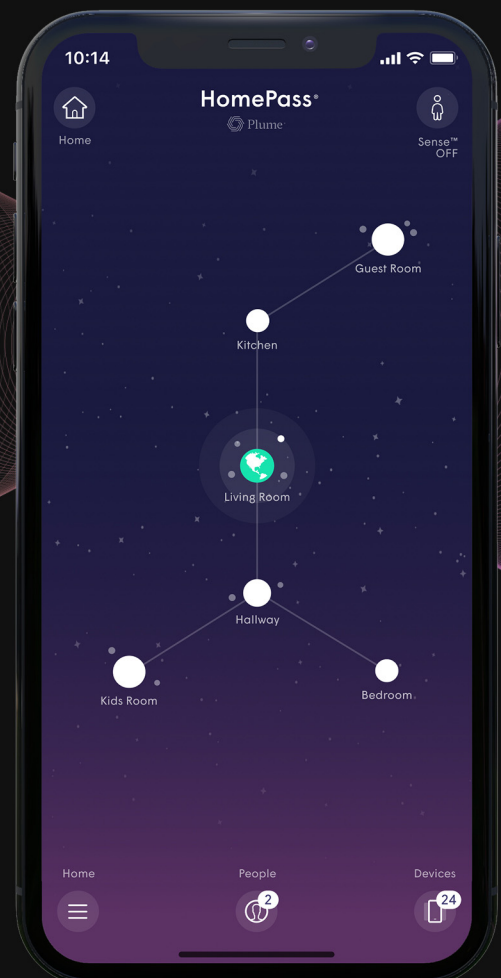# CSPs can secure their profitability in 2021 by utilising the power of Wi-Fi 6 for smart homes

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CSPs can secure their profitability in 2021 by utilising the power of Wi-Fi 6 for smart homes

Smart homes are becoming data-centric ecosystems that employ a portfolio of value-added security and convenience services as well as a wide range of smart devices, write Beecham Research's Robin Duke-Woolley and Bob Emmerson. They include security systems, voice assistants, smart thermostats and smart speakers. The market is healthy and growing. Statista is predicting worldwide consumer spending to reach US$62 billion in 2021 and $88 billion in 2025. The Wireless Broadband Alliance indicates that by 2023 1.6 billion devices will be sold and by the same year the average person will employ more than nine devices.

Wi-Fi 6 will help drive that growth. The new standard allows network access points to communicate simultaneously with more users and devices while using less power. And Wi-Fi 6 routers pack more information into the signals they send, enabling faster and more efficient communications with devices.

In addition to the increased throughput and power saving, Wi-Fi 6 enhances security and lowers latency. The Wi-Fi Alliance raised the security bar with the introduction of WPA3, which must be included in every W-Fi certified device. In home environments low latency is significant for on-line video conferencing, including working from home, as is network prioritisation, which uses VLAN technology in order to prioritise the traffic of key users.

Home working and running a small business from home is a trend that came from the pandemic but the paradigm looks set to become the new norm. These are indications of the way that customers' expectations of smart homes are changing. They are finding new ways to use networking and mobile services, employing new Smart Home 2.0 devices to access voice, video, and data services, and adopting new technologies such as cloud-centric services from the big technology companies.

The emergence of this ecosystem represents brand-new, profitable opportunities for communications service providers (CSPs) as well as a challenge to the regular service offers. To compete and win in this ultra-competitive ecosystem CSPs must be able to deliver a comprehensive portfolio of leading-edge smart services at scale, and to continue adding the latest services. They must also employ new business models and strategies that reflect the changes in customers' expectations.

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Key challenges

Legacy solutions are constrained by designs that are hardware-centric and based on yesterday's technologies. They are largely responsible for the recurring issues of lack of speed and the agility needed to support business-level initiatives, which in turn hold back the generic transition to cloud-centric solutions. This results in four key challenges.

Firstly, significant backlogs of services and products. CSP product deliveries are complex and everything from IT ordering systems, activation, marketing, pricing tariffs and support training are needed for successful launches. Disjointed back-end systems and slow gateway firmware compound this issue.

Secondly, the percentage of single-play customers has risen and this has resulted in higher churn. There has been a shift from legacy triple-play services, voice, video and data, to single-play, broadband services, usage of which is currently just under 40%. In turn this has resulted in churn rates that exceed 20%. New service revenues accompanied by lower churn are needed to reverse this trend.

Thirdly, operational expenses to support customers who call in or need truck rolls are increasing rapidly for legacy connectivity services. Support options are limited, leading to inaccurate troubleshooting, unnecessary equipment replacement and truck rolls.

Fourthly, the systems used for provisioning, service activations, monitoring and life-cycle management are difficult to update. This limits the ability to introduce enhancements and improvements without involving long lead times.

About Plume

Plume, which dropped legacy Wi-Fi when the company was formed in 2014, has created Smart Home 2.0 solutions that are software – and cloud-centric. These are agile and able to adapt and even anticipate changing market requirements. The company created the first software-as-a-service (SaaS) experience platform for CSPs and their subscribers. It has been deployed in more than 22 million homes globally. It is currently the only open and hardware-independent solution.

Challenges equate to opportunities

Plume's solutions take the brake off Wi-Fi's potential and enable CSPs to deliver the requisite services for smart home environments. Consumers can now benefit from:

- Perfect Wi-Fi connectivity and wall-to-wall coverage
- Ability to effortless upgrade and deploy new services
- High-level support for homes located in challenging connectivity environments (the result of reduced opex costs)
- Services that employ big-data analytics and web-based application programme interfaces (APIs) for provisioning and monitoring
- Services that are self-installed
- A mobile app

CSPs that employ Plume's solution are delivering these benefits to their customers. Moving to a cloud-based platform enables them to continue their digital transformation while reducing operational costs. Customer self-installation slashes costs. If technical assistance is needed, as in legacy systems, the cost of adding a new service can be greater than five months of total operating profit. CSPs that do not have a mobile app option are effectively forcing their customers to set it up themselves. A customer-friendly mobile app, with the ability to interact with the service at home or remotely, is required for today's smart home environment.

These solutions are currently serving over 20 million households in more than 23 countries. They employ advanced technologies such as machine learning and artificial intelligence as well as a cloud-controlled, software-defined approach to Wi-Fi. This capability enables CSPs to compete with the big tech companies on a level playing field.

Deployments and performance

The company's solution is widely employed by CSPs of all sizes. They include the top two CSPs in the USA, three of the top four in Canada, two of the three largest fixed-line CSPs in Europe, and the largest cable TV operator in Japan. They are serving half of all homes in North America, millions of homes in Europe, and 450 million connected devices in total.

In addition to the above stats, usage of the platform resulted in a 36.7% saving in opex and marketing; a 51% lower rate of call ins; a 67% reduction in truck rolls and a 95% self-installation success rate. These and other performance figures are enabling CSPs to operate profitably in highly competitive market.

Churn reduced up to

30%↓

ARPU increased by

$15↑

Support calls reduced by

50%↓

Truck roll rates (TRR) reduced by

67%↓

Services deployment timelines reduced by

67%↓

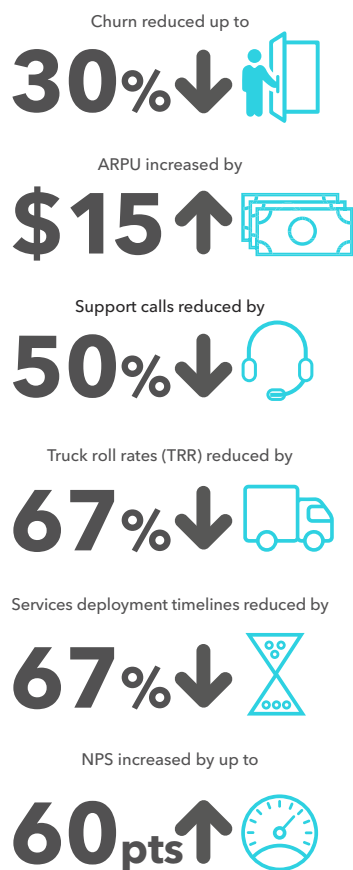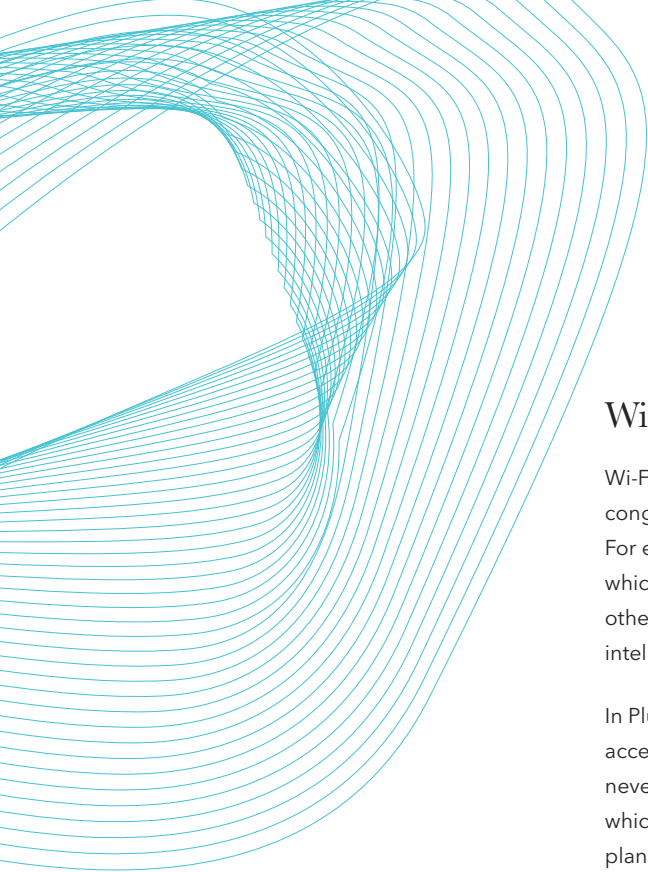NPS increased by up to

60pts↑

Figure 1. These and other performance figures were compiled based on Tier 1, 2, 3 CSPs that had deployed Plume's Consumer Experience Management (CEM) Platform. They include call-in records for more than two million customers from November 2018 to August 2019.

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Wi-Fi 6

Wi-Fi has some well-known limitations, the biggest being coverage, congestion and interference. These limitations are accentuated by Wi-Fi 6. For example, the all-round improved performance extends the signal range, which means that interference can occur between adjacent homes. There are other issues, but they can all be addressed by solutions that employ intelligent management.

In Plume's distributed system, the Wi-Fi signal is forwarded across multiple access points. If there are a sufficient number of nodes (pods), the signal never has to travel far. This reduces the opportunity for the signal to degrade, which maintains data rates throughout the home. The cloud-based control plane is scalable and not hardware dependent, while being able to deliver high quality of service. This means that it is easy to employ additional nodes and routes.

This feature is provided by the use of virtualised controllers. Being hardware agnostic enables nearly any hardware to be employed and allows for different types of access points to be deployed on the same network. Wi-Fi network controllers first emerged in the enterprise environment to handle coordination among multiple access points. Solutions have been steadily migrating towards virtualised controllers.

CSPs can therefore deliver state-of-the art enterprise Wi-Fi functionality to the home and also leverage the power and performance of W-Fi 6.

Customer expectations

CSPs clearly need to be able to match the changes in customers' expectations, a mission-critical capability that is reflected in the CEM Platform. It's a SaaS platform, used by CSPs and their subscribers, that enables the rapid delivery of new services for connected homes on a massive scale. It provides SaaS-based access to analytics, machine learning and artificial intelligence capabilities, and user-friendly dashboards and support tools that enable rapid troubleshooting.

The platform combines the benefits of back- and front-end support for smart home services. Haystack is the back-end component that employs an operations, analytics, and insights suite. HomePass is the front-end component that is used to personalise the subscriber's digital experience.

Haystack is a comprehensive back-end monitoring solution designed to support engineering, and operations teams. It provides insights for Tier-1, -2, and -3 CSPs and has dashboards that monitor the operational aggregate health of the network. In addition, a predictive analytics system that pinpoints unhappy customers and proactively generates outbound customer self-help contact to reduce calls and increase customer satisfaction.
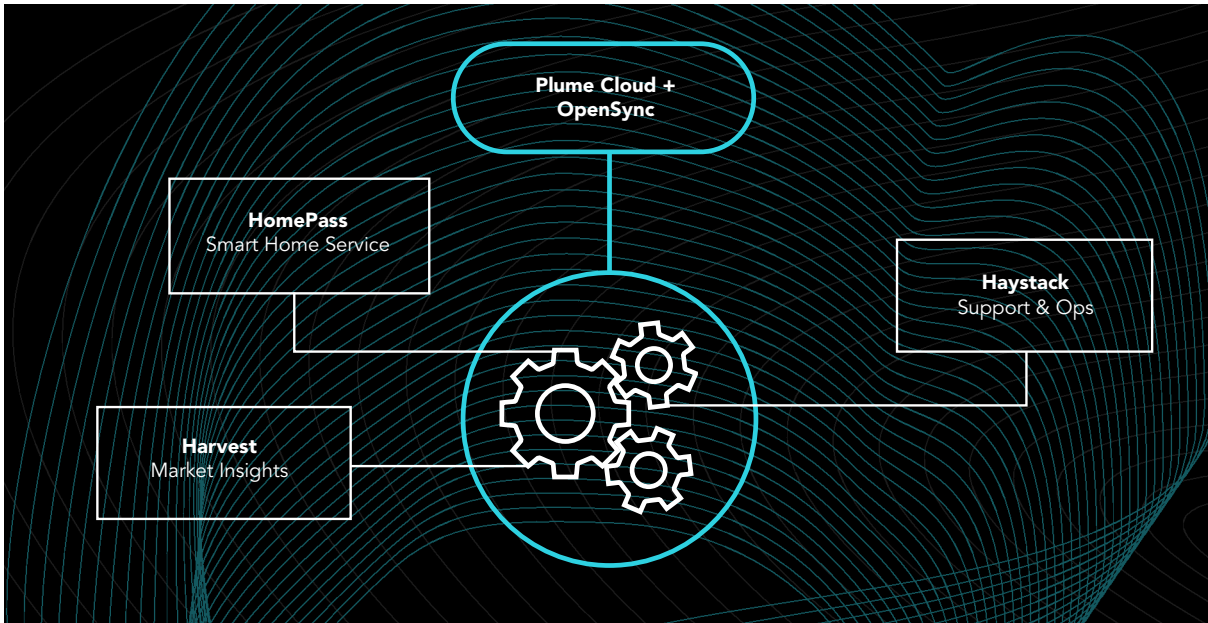
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Figure 2. Plume Cloud, which hosts OpenSync, scales from one home to millions. Plume is responsible for upgrades, maintenance and scaling of the platform to meet CSPs' growing requirements.

HomePass, the company's services suite, is managed by the Plume Cloud, a data- and artificial intelligence (AI) -driven cloud controller currently running the largest software-defined network in the world. HomePass uses OpenSync, an open-source framework which comes pre-integrated and supported on the leading silicon and platform software developer kits (SDKs). All HomePass services are managed via the HomePass app – a third component – that is available for both Android and iOS.

Harvest, the third CEM component, captures customer device trends, usage behaviour, and application patterns. This information can be used to help drive marketing, promotional, and product decisions and take advantage of network trends and customer purchasing decisions.

As illustrated in figure 2, the three CEM components are built on OpenSync, which is cloud-agnostic open-source software created for the delivery, curation, and management of services in smart homes. It provides an open-source interface between the Plume Cloud and the customers' CPE, thereby permitting cloud-based applications to access data and management control of the CPE and the Wi-Fi extenders.

HomePass: how it works

HomePass enables CSPs to match changes in customers' expectations. It's a membership-based service set that enables end users to control and manage their smart home environment. It removes the constraints of traditional Wi-Fi networks, mesh Wi-Fi systems and independent Wi-Fi booster networks that only provide a band-aid solution. HomePass was designed to accommodate the increasing numbers of connected devices having individual bandwidth requirements and usage patterns.
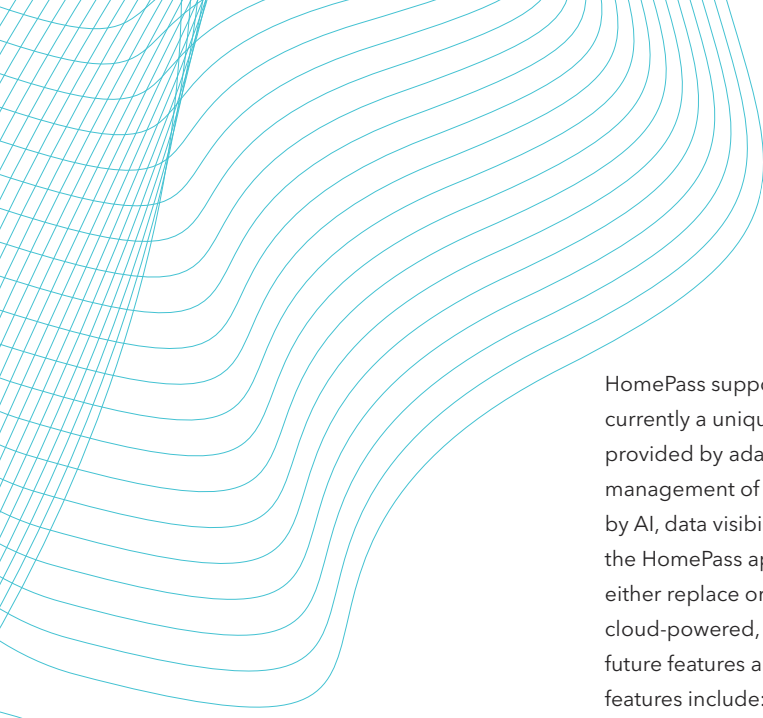
HomePass supports every facet of evolving home networks. A key feature, currently a unique selling point (USP), is the robust connectivity that is provided by adaptive, cloud-controlled technology. It provides intuitive management of people and device access, state-of-the-art security enabled by AI, data visibility and protection. HomePass is powered by SuperPods and the HomePass app. SuperPods work seamlessly with any modem and can either replace or work alongside current Wi-Fi routers. Since HomePass is cloud-powered, the CSP's customer experience will never be out-of-date; all future features and updates to the system will install automatically. Key features include:

- Adapt: Provides consistent speed and self-optimising coverage
- Control: Intuitive tools for managing users, devices, and Internet access
- Guard: Best-in-class security powered by AI
- Sense: Whole-home motion awareness for peace of mind.

Adapt uses AI and machine learning to map Wi-Fi channels and usage around the home, learning from connection patterns in order to deliver the optimum Wi-Fi experience.

HomePass is constantly evolving. It enables CSPs to market new functionality in order to keep up with the demands of modern life. For example, offering more tools for digital wellbeing and for helping the elderly live healthier at home. All members automatically receive cloud updates with new features as they're released.

The comprehensive set of Wi-Fi 6 network services:
- A self-optimising and learning adaptive smart home system
- Parental controls with age-appropriate content filters and website blocks
- Guest management with passwords that expire and device-specific access
- Real-time online protection from malicious threats
- Advanced IoT protection with anomaly detection and device quarantine in case of a breach
- A holistic view of connected devices for easy management
- Built in ad-blocking
- Home motion detection through devices already connected to the system
- Internet speed checks.

Summary

This report has highlighted the profitable opportunities for CSPs that embrace Smart Home 2.0 solutions. It is a market that is set to expand in 2021, with home working becoming the new post-pandemic norm for many people. Plume's solutions have set numerous performance bars and the functionality aligns with the demanding requirements of today's tech-savvy consumers. They also exploit the potential of Wi-Fi 6 by delivering state-of-the art enterprise functionality, which in turn enables CSPs to compete with big tech companies on a level playing field.

How Plume supports CSPs in the smart home market

Robin Duke-Woolley, CEO and Bob Emmerson of Beecham Research interview

Tyson Marian, CCO and Bill McFarland, CTO of Plume

Robin: Tyson, Plume has been in the smart home market for more than six years. At the start of 2020 you had 50 communication service providers (CSPs), now you have close to 200. What happened?

Tyson: What happened to stimulate this growth is a mix of the technology being refreshed and a dramatic shift in customer expectations in recent years. The move in terms of technology generation is something that happens every seven to ten years or so, and that is reflected in Plume's smart home solution. Those customer expectations are predicated on services that give customers what they want now, which encompasses the ability to go online, find what they want, buy it and get it delivered to their home. That is today's service model and CSPs who can't provide that can't be competitive. Today's technology model is software-based and cloud-centric and dependent on delivery over broadband networks and this is in contrast to legacy solutions that are hardware-centric and can't deliver the requisite service functionality.

Robin: What impact has Covid had on the market?

Tyson: Covid has accelerated the trend towards that service-centric, "I want it now" model. Our solution has been deployed in more than 24 million homes and in 2020 all-round usage of our services went up by around 200%. Within that, utilisation of desktop devices rose by 125% as a result of more people working from home. Right now, the average smart home has 17 connected devices and we can expect to see more in future so broadband connectivity is needed to accommodate the increased traffic and consumers' expectations are for rates of 100Mbps or even 200 to 250Mbps. However, I don't think smart home deployments should turn into a numbers game. Certainly, high data rates are needed, but the key performance parameter is the ability to optimise the flow of traffic to and from the different devices. It is this that will determine end users' experiences and it hinges upon the ability to optimise billions of individual flows of data, something that can only be managed in the cloud.

Users of different connected devices employ different business models that are tied to the device and many more devices will be added in the near- and medium-term but with legacy, hardware-centric solutions, new devices have been and will continue to be a problem. Installing hardware was traditionally a challenge, so users made lots of service calls, trucks rolled and very often devices were returned. We have addressed the device issue with a Device Provision Protocol technology that asks the consumer to authenticate usage of new devices on their network and when granted installation is automatic and instantaneous.

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Robin: When Plume designed the solution, which was several years ago, did you anticipate how the market would develop?

Tyson: The company was created in 2014 and we started with a clean slate, so there was not a legacy burden that had to be protected. We knew enough to know what we didn't know but we obviously didn't anticipate Covid and the dramatic rise of home working. Even so, we recognised early on that future needs would be uncertain and this meant that the solution we designed had to be flexible and agile enough to accommodate unforeseen development and requirements. In turn, that meant creating a software-centric solution and there were various baseline services that had to be incorporated, such as adding unforeseen services would be enabled by adding new algorithms to the system. We call these microservices and they add value by providing consumers' services such as enhanced cybersecurity, better parental control and motion detection. When a new algorithm is added to the system, the new service is deployed across the entire customer base of 24 million homes simply by flipping a switch.

Algorithms are also used to optimise the performance of the devices and, for example, to provide fast throughput for video services and minimal packet loss for online conferencing. These algorithms can create inputs to advise the user to move from the 2.4 GHz channel to 5 GHz and stay there for some devices, to recommend switching access points to the other side of the house if there is interference from an external source, or to check for malware and advise users in advance to stay away from that site.

Robin: Churn is the top-of-mind issue for CSPs. How has Plume addressed it?

Tyson: Churn is a multi-faceted issue. There is an FCC report that gives percentage figures for consumer issues such as speed and reliability (49%), price (7%), the service bundle (39%) and overall satisfaction (80%). There is no silver bullet solution but it is abundantly clear that if consumers get a bundle of attractive, sticky services that is updated at regular intervals, and these perform in line with their expectations and come at the right price, they have no reason to churn. If they are satisfied with the overall experience, which is the biggest single reason for changing to another CSP, why would they churn? If customers are satisfied and happy there is no need to make meaningless comparisons such as download speeds.

Robin: Bill, how significant is the increased performance and functionality of Wi-Fi 6?

Bill: In order to answer that question I need to break performance down into speed, system capacity, QoE (Quality of Experience) and even battery life. Wi-Fi 6 enhances those parameters and there is a noticeable difference but Wi-Fi 6 is not a game-changer in itself even though it provides the opportunity for a lot more home bandwidth. Wi-Fi 6 E enables operation in the unlicensed 6 GHz band, which doubles the width of the channels, and operating on Wi-Fi 6 devices is more efficient. While the chipsets are quite expensive right now, prices will come down, enabling Wi-Fi 6 infrastructure to become a future-proof solution. The way it enhances end user performance is by reserving a time slot, thereby prioritising different users., In fact, Plume's solution identifies not only different users but different devices. This allows it, , for example, to prioritise the notebook of someone working from home over a child's tablet.

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Robin: Wi-Fi has some well-known limitations, the biggest being interference and they are accentuated by Wi-Fi 6. How does your offer handle them?

Bill: Wi-Fi 6 can actually accentuate that particular issue because its all-round improved performance extends the signal range, which means that interference can occur between adjacent homes. There are other known issues, but they can all be addressed by solutions that employ intelligent management. In a legacy system, each access point (AP) makes a local decision about which channel to use and this can result in an unstable Wi-Fi environment. In our case having intelligence in the cloud means that the status of all the APs in adjacent homes is monitored, therefore channel selection can be optimised across multiple networks. If the adjacent home does not have Plume, our solution can recommend switching access points to the other side of the house.

Robin: Could you summarise the thinking that went into OpenSync, your cloud-based, open-source framework?

Bill: We've been cloud-centric from the beginning because if you can do something in the cloud, it's usually the best place to provide services from. Having intelligence in the cloud has facilitated the management of all the connected devices in our current customer base of more than 24 million homes. This intelligence makes it easy to update all deployments with new services and this becomes a seamless process when an OpenSync agent is embedded in the chipset of the devices, which Qualcomm and Broadcom did in 2016. We realised that making OpenSync an open-source framework would facilitate the development of many more devices that provide an open interface between the cloud and the customer premise equipment (CPE)—they would be compliant from the get-go. This decision to go down the open-source route, which was taken in 2018, has resulted in OpenSync being widely adopted by the industry. The development of today's smart home- and cloud-centric marketplace has been driven by Plume and the mainstream chipset companies that came on board early on and we are, as a result of this development, the clear leader in the smart home market.

Quick Summary: These interviews covered additional marketing and technical ground associated with the theme of *How CSPs can secure their profitability in 2021*. Common highlights included the pivotal role of cloud which is, for example, enabling the optimisation of billions of individual flows of data to and from devices. In addition, the benefits of a software-centric solution, for example employing algorithms to create and deploy new services, are emphasised. A key issue was the current high price and limited availability of Wi-Fi 6 compliant devices and the relatively low impact of Wi-Fi 6 on the smart home environment but this will change rapidly so deploying a Wi-Fi 6 infrastructure today future-proofs the solution.

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Today's smart homes struggle with yesterday's WiFi.

Offer your customers the first and only self-optimizing, whole-home WiFi while reducing churn by up to 30%.

Learn more at plume.com