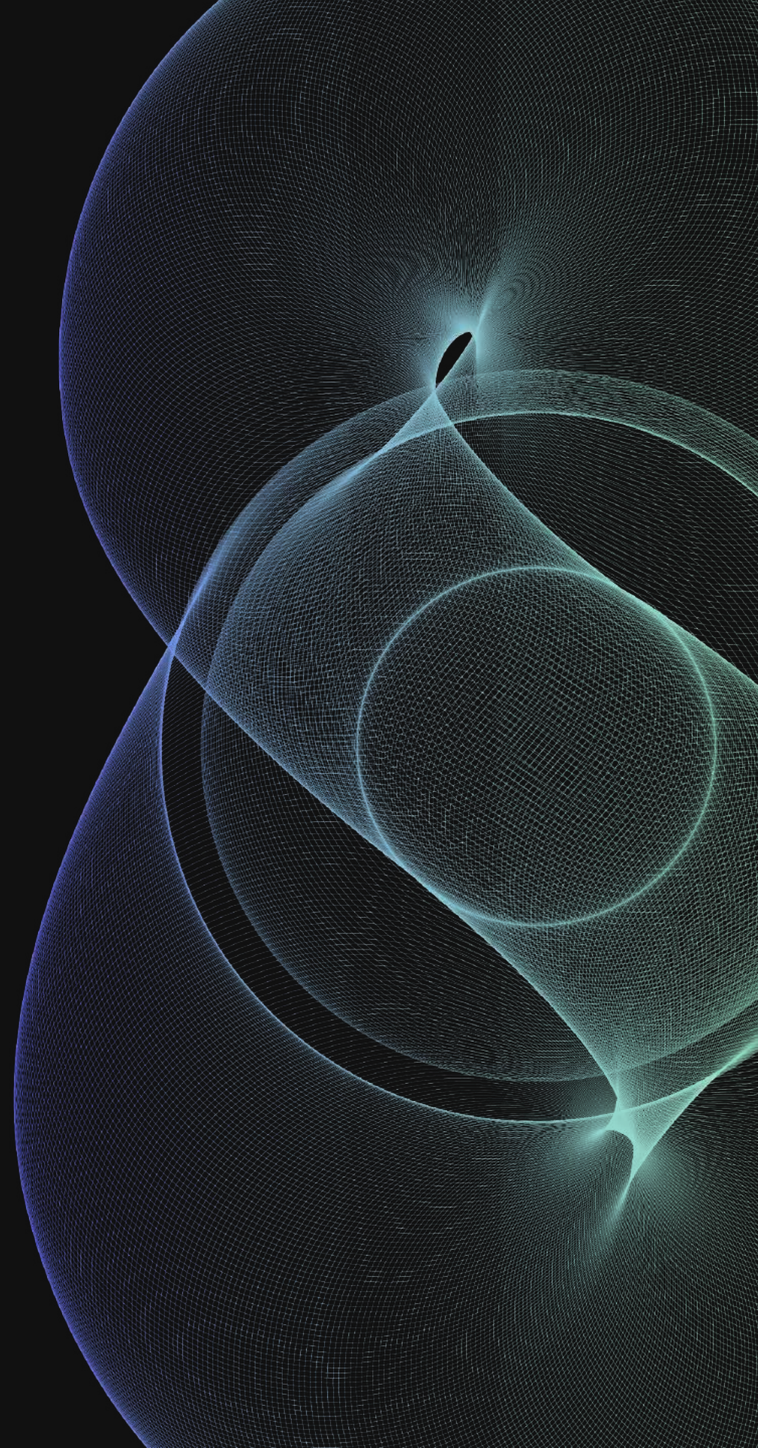
The Advantages of OpenSync Over EasyMesh

Why OpenSync is the future of home network management



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Executive summary

The proliferation of WiFi mesh networks—and multiple access points in the home—drives the need for better in-home network management. Communications Services Providers (CSPs) are considering new technologies that offer more sophisticated tools for managing networks, as well as the ability to efficiently roll out new services.

Some CSPs may be trying to decide between EasyMesh and OpenSync, two frameworks that help manage WiFi networks while providing interoperability. These two technologies have some crossover when it comes to WiFi layer management. But they solve completely different problems—and offer different benefits for CSPs.

Compared to OpenSync, EasyMesh has limited features for WiFi management. Additionally, EasyMesh lacks a variety of other functionalities that OpenSync offers for the delivery of cloud-managed home network services.

This paper explores the differences between the two approaches, as well as the advantages of OpenSync for CSPs.

Introduction

WiFi connectivity at home is a crucial requirement for the modern consumer. Over time, home WiFi networks have become more intelligent—and more congested, with an average of over 14 connected devices in smart homes powered by Plume.[1] As consumer habits shift to more online interaction and activities, more people are turning to mesh networks for a high-quality connection.

CSPs are responding to this evolution of the home network with more sophisticated, centralized WiFi management. Many deployments now include multiple access points (APs) per home, as well as advanced machine-learning technology to improve the customers' WiFi experience.

Attracted by benefits such as improved coverage and reduced latency, home WiFi customers are increasingly relying on mesh WiFi. The market for wireless mesh networks, estimated at around $2 billion globally in 2019, will continue expanding at a compound annual growth rate of more than 15% through 2026, according to a forecast by research firm Global Market Insights.[2]

As these trends develop, CSPs face different choices of technologies that can help improve home network management. One question that comes up frequently is whether they should adopt standardized or open source technology. Two emerging efforts in particular are EasyMesh and OpenSync.

EasyMesh and OpenSync take different approaches to ensuring interoperability between different vendors. While both these systems relate to WiFi mesh networks that have multiple APs, they are solving two very different problems. OpenSync creates a cloud-managed service delivery platform, while EasyMesh only applies to the WiFi mesh software layer.

For CSPs, OpenSync provides clear advantages over EasyMesh. Understanding the differences between the two frameworks will help CSPs better explore those advantages as they look to position themselves for a more competitive future.

[1] "Intelligence and insights for the smart-home industry," Plume IQ, Feb 2021
[2] "Wireless Mesh Network Market Size By Component," Global Market Insights, 2019

EasyMesh vs. OpenSync: an overview

EasyMesh

EasyMesh is a standards-based approach that creates interoperability for WiFi mesh devices.

In various instances, proprietary mesh technology limits consumers' WiFi coverage options within their homes, particularly when deploying multiple APs. Because a single vendor controls the software and the hardware, the vendor's offerings limit the customers' choices, including upgrades. That's where EasyMesh comes in.

EasyMesh defines the way the local, in-home, multi-AP controller interacts with the software agents inside the APs and configures them to form a mesh network. The main objective of the standard is to give consumers, as well as CSPs, more flexibility and prevent vendor lock-in by enabling different vendors' AP products to work together and form one in-home network.

The Wi-Fi Alliance, a nonprofit that sets standards and drives their adoption for the WiFi industry, created the EasyMesh standards. The alliance introduced EasyMesh certification in 2018. The standard underwent two revisions since then, with the latest version adding support for WiFi 6 in 2021.

EasyMesh adoption:

- As of February 2021, the Wi-Fi Alliance had certified 142 products, half of them for manufacturer Huawei Technologies Co.[3]
- About two dozen vendors in total have adopted the standard for products such as home gateways (e.g. Huawei Technologies), routers (e.g. ZTE Corp.), and WiFi extenders (e.g. Telstra).

The great majority of the certifications are for the first version of the specification. The second and third enhancements of the standard have received very few certifications.

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[3] Data aggregated from the Wi-Fi Alliance Product Finder, last accessed February 28, 2021

OpenSync

OpenSync is an open-source software service platform for delivering and managing network services within a home. A cloud-agnostic connection between the in-home devices' hardware and the cloud, OpenSync spans multiple layers, and allows the flexibility to change the individual components in any of the layers.

Plume began developing the OpenSync silicon-to-cloud framework in 2015 and open-sourced it in 2018. The software has received contributions from numerous industry players. The Telecom Infra Project (TIP), a nonprofit foundation developing infrastructure for a global telecommunications network, adopted OpenSync in February 2020 as a key component of the TIP OpenWiFi project.

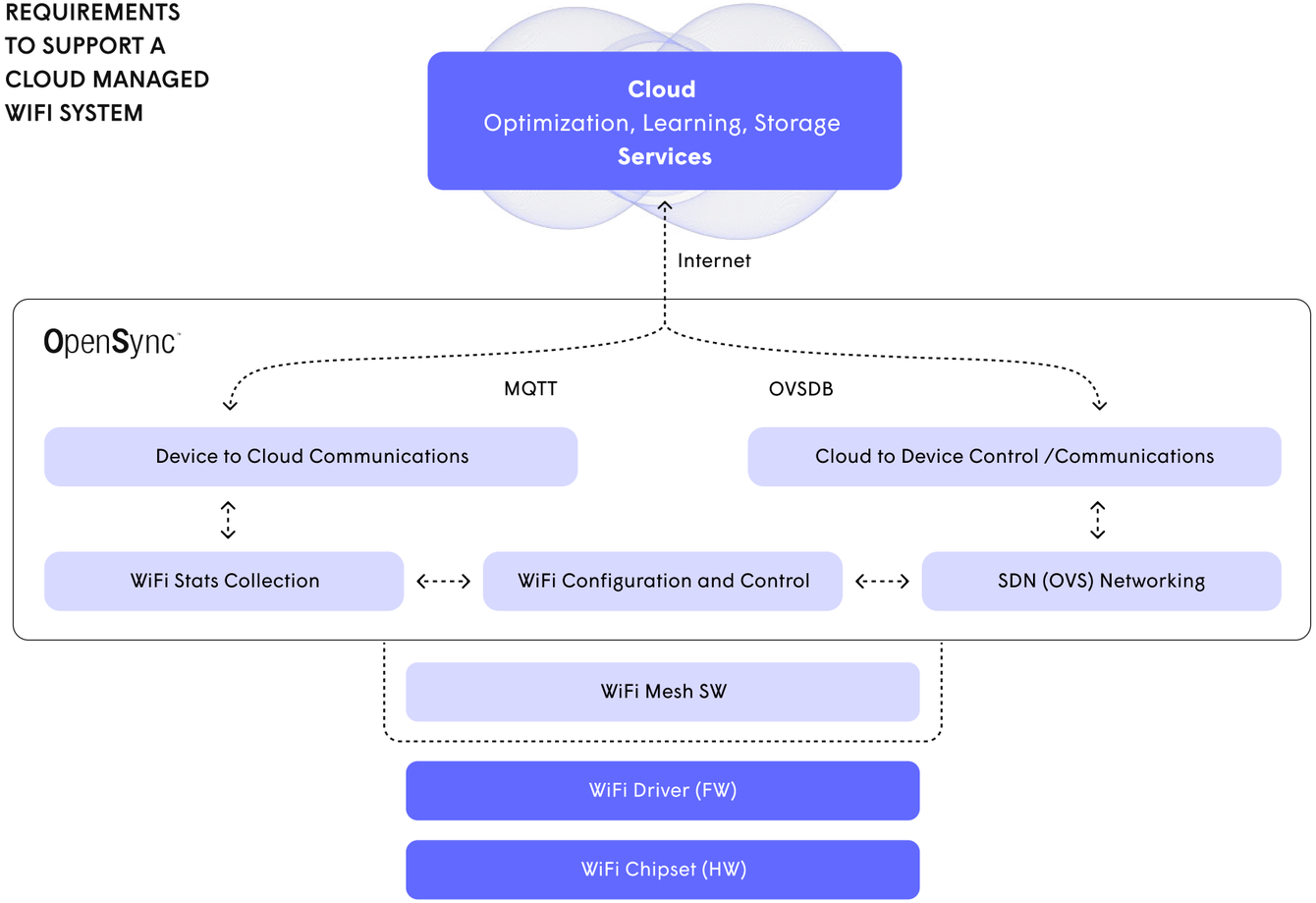
Founded by Facebook in 2016, TIP includes more than 500 member companies working together to develop and deploy standards-based connectivity solutions. The TIP OpenWifi project chose OpenSync from a variety of options, including EasyMesh. TIP OpenWiFi has been contributing to the evolution of OpenSync, adding high-level functionality and creating an open-source cloud-management platform for controlling OpenSync-based networking devices.

OpenSync is seeing explosive growth. The platform is present in 25 million APs and devices, helping manage more than 708 million clients.

OpenSync adoption includes:

- Original equipment manufacturers (e.g. Technicolor, Samsung)
- CSPs (e.g. Charter Communications, Comcast)
- Chipset makers (e.g. Qualcomm, Broadcom)
- Cloud providers (e.g. Plume, Tanaza, NetExperience)

REQUIREMENTS TO SUPPORT A CLOUD MANAGED WIFI SYSTEM



Core differences

Although there's some overlap between the two frameworks, EasyMesh and OpenSync solve two different problems and have different capabilities. The main differentiator is that EasyMesh has a very narrow use case: helping create a multi-AP network with a local controller and multiple APs.

While EasyMesh can optimize the mesh network as well as add new features, the standard only addresses the WiFi mesh software layer. It does not define any messaging, transport, or connection methods for communicating with the cloud—which are all necessary for more sophisticated network management and optimization. The EasyMesh certification doesn't even test for cloud communication.

OpenSync, on the other hand, creates an entire platform for service delivery, managed from the cloud. The system architecture comprises several layers, which enable WiFi optimization, control, intelligent learning, and data collection. The types of services that can be supported by OpenSync include WiFi management, cyber security, parental controls, access control, and WiFi motion detection.

EASYMESH VS. OPENSYNC: TOP DIFFERENCES

	EasyMesh	OpenSync
Framework	• Industry standard	• Open source
Main purpose	• Provide interoperability for WiFi mesh devices • Create a multi-AP network with a local controller	• Create a cloud-based, silicon-to-service platform that is cloud-, CPE-, and silicon-agnostic • Enable the delivery, curation, and management of a wide variety of services
Components	• WiFi mesh software	• WiFi configuration and control (with built-in WiFi mesh software) • Cloud-device control and communication • Software-Defined Networking (SDN)
Capabilities (select examples)	• Configuration of connections between multiple APs • Client steering controls • WiFi 6 support • Traffic prioritization	• Configuration of connections between multiple APs • Client steering controls • WiFi 6 support • Traffic prioritization • Network management (e.g., cloud connection for statistics and optimized control) • Device management (e.g., WAN/broadband connection management) • Security controls (e.g., application blocking, unique passwords per client)
Supported features	• WiFi management	• WiFi management • Cybersecurity • Parental controls • WiFi-based motion detection • IoT device control

Open source vs. standardization: two ways to solve a problem

Both open source and standardization (also known as open standards) are designed to ensure vendor interoperability and to prevent vendor lock-in. Both are somewhat similar in that there's stakeholder community collaboration, but they take fundamentally different approaches to how they achieve interoperability.

Traditionally used for hardware like connectors and proprietary systems that need to interoperate, open standards are, essentially, a set of rules that organizations can freely adopt. Developing standards tends to take longer than open source. One reason is the long and thorough interoperability testing required before the adoption of the standards.

WiFi standards are a common example of a standardized approach. The Wi-Fi Alliance maintains the standards, such as Wi-Fi CERTIFIED 6, and certifies vendors who want to adopt them.

Open source is a software code that's freely available under a license, such as the 3-Clause BSD License approved by the Open Source Initiative that OpenSync is licensed under. Vendors can use, modify, and redistribute any open-source software as long as they meet certain conditions. The conditions are straightforward, such as retaining copyright notices and disclaimers that include "as-is" and other provisions.

In an open source approach, vendors work collaboratively to make contributions. This process tends to move faster than standardization because the use of the same code reduces the testing needs for interoperability.

It's worth noting that many high-profile standardization projects have been open source rather than open standard—from Linux and MySQL to Kubernetes and Apache.

EasyMesh and OpenSync capabilities: a comparison

As mentioned previously, the WiFi layer that EasyMesh controls is also a component of OpenSync. Therefore, the two technologies have several shared capabilities for WiFi management.

Although most of these features were available in OpenSync with its initial launch in 2018, EasyMesh introduced them in three different iterations (the Wi-Fi Alliance announced certification for the latest version in February 2021).

SHARED CAPABILITIES

	EasyMesh	OpenSync
Configuration of inter-AP connections	●	●
Propagation of SSID and password	●	●
Control for client steering	●	●
Enhanced (non-pushbutton) onboarding	●	●
Off-channel scanning and reports	●	●
QoS throughout network	●	●
Support for guest network	●	●
Control of DFS (radar detection) functions	●	●
Access control (individual passwords and network permissions)		●
Rapid network optimization and reconfiguration		●
Parental controls with screen time limits and content blocking		●
Cyber-security including virus and malware detection, with device quarantine		●
WiFi-based motion detection		●
Guest networks with individualized passwords		●

Some of the shared capabilities include:

- Configuration of connections between multiple APs—enabling easy and seamless setup.
- Client steering controls—improving the user experience when a device moves around the home.
- WiFi 6 support—providing benefits such as higher network capacity.
- Traffic prioritization—guiding low-latency devices and applications to best the APs.

In addition to the above, OpenSync has several other WiFi management capabilities. They are grouped into three main categories:

Network management

- Cloud connection for statistics and optimized control.
- Inherent elimination of conflicting controllers.
- Zero wait and multi-AP coordinated dynamic frequency selection.
- Rapid network optimization reconfiguration.

Device management

- WAN/broadband connection management.
- Cloud controlled software agent upgrades.
- Device thermal management with cloud coordination.

Support for mixed private and public networks

- Captive portal.
- Application and domain monitoring and blocking.
- Unique passwords per client device.
- Traffic isolation on WiFi and on Ethernet.

Capabilities beyond WiFi management

The differences between EasyMesh and OpenSync don't stop at the WiFi management gaps. As a multi-services platform, OpenSync enables a variety of other services, often without the need to update the firmware on the in-home networking devices.

Besides WiFi management, applications that OpenSync supports include:

Cyber-security: OpenSync enables the monitoring and control of traffic that flows in, out, and within the home. Cyber-criminals have learned to limit internet traffic for viruses and malware, which makes them harder to detect. Observing traffic flowing to and from the internet, as well as within the home, makes it easier to detect these threats. By using networking control, OpenSync can also help detect and block denial of service (DoS) attacks.

Parental controls: OpenSync makes it possible to protect children from unsafe internet content and activities while allowing the rest of the household members to maintain their browsing freedom. Customers can configure the controls at the person and device level.

WiFi motion detection: WiFi devices and nodes enabled by OpenSync can form a "web" that turns the hardware into motion detectors. With just a software update and no new hardware, these devices sense disruption in WiFi waves and accurately identify not only the level of motion but where the motion is occurring within the home.

Why this matters to CSPs

The additional features that OpenSync enables create new opportunities for CSPs. Today's consumers want more from their providers than simply reliable, quality connectivity. Innovative CSPs can offer value-added services such as cyber-security, parental controls, and WiFi motion detection to differentiate themselves. These types of services not only boost customer loyalty and help minimize churn, but also provide CSPs new avenues for additional revenue.

> "The ability to run cloud augmented services such as WiFi mesh, parental controls, and security on broadband gateways is becoming an integral part of service provider offerings. The standardization of the interface between the gateway and the cloud is an important step to accelerate and scale the deployment of these services into the home network."
>
> *—Greg Fischer, senior vice president and general manager, Broadband Carrier Access at Broadcom*

HOW DOES OPENSYNC WORK?

In a cloud services architecture, the bottom layers comprise the WiFi chipset (hardware and firmware), usually supplied by the chipset manufacturer. CSPs often control the top layer—the cloud. OpenSync, the middle layer, is the software that connects the in-home hardware devices and the cloud.

OpenSync collects measurements and statistics from the consumer devices and the network management components, as well as configures the WiFi system. As such, it is beneficial in homes with a single AP, where a mesh layer may not be used at all.

The platform moves the gathered measurements and statistics to the cloud using MQTT, a protocol specifically designed for frequent reports from lightweight Internet of Things (IoT) devices. The control interface is based on OVSDB, a method that automatically synchronizes and maintains the state in the device and in the cloud.

Finally, OpenSync includes software-defined networking (SDN) capability, based on the open source solution Open Virtual Switch (OVS). SDN helps gather information and statistics about the network traffic in the home, and allows the cloud to take action by flexibly applying networking rules.

OpenSync advantages for CSPs

One of the biggest benefits of OpenSync for CSPs is the cloud-based WiFi management. As home networks continue to become more complex and congested, they require more sophisticated controls, coordination, and optimization. With the proliferation of consumer IoT devices in the home and the healthy pace of smart home adoption, CSPs can harness the power of the cloud to offer new capabilities and maintain quality service.

Main benefits of the cloud:

- More compute power, which enables more sophisticated algorithms for machine learning and optimization.
- Increased storage, allowing machine learning to take place over longer periods of time and across huge numbers of homes.
- Joint optimization and control of dense deployments (e.g. apartment buildings), where WiFi network interference is a common problem.
- Centralized, organized control and visibility, eliminating the whims and instabilities of localized distributed control.

For CSPs, rolling out an array of services quickly and efficiently is typically a challenge. If a CSP were to build each service from scratch, the total investment would be large. By adopting a cloud-services architecture, the CSP can deploy these new services—as well as the future progression of additional services—rapidly and with minimum effort.

In addition to the interoperability and the fast development and deployment of new services, the robust OpenSync system provides benefits such as:

- Efficient methods for telemetry and control.
- Support for a broad range of existing connectivity services.
- Scalability of services, often with only cloud software changes.

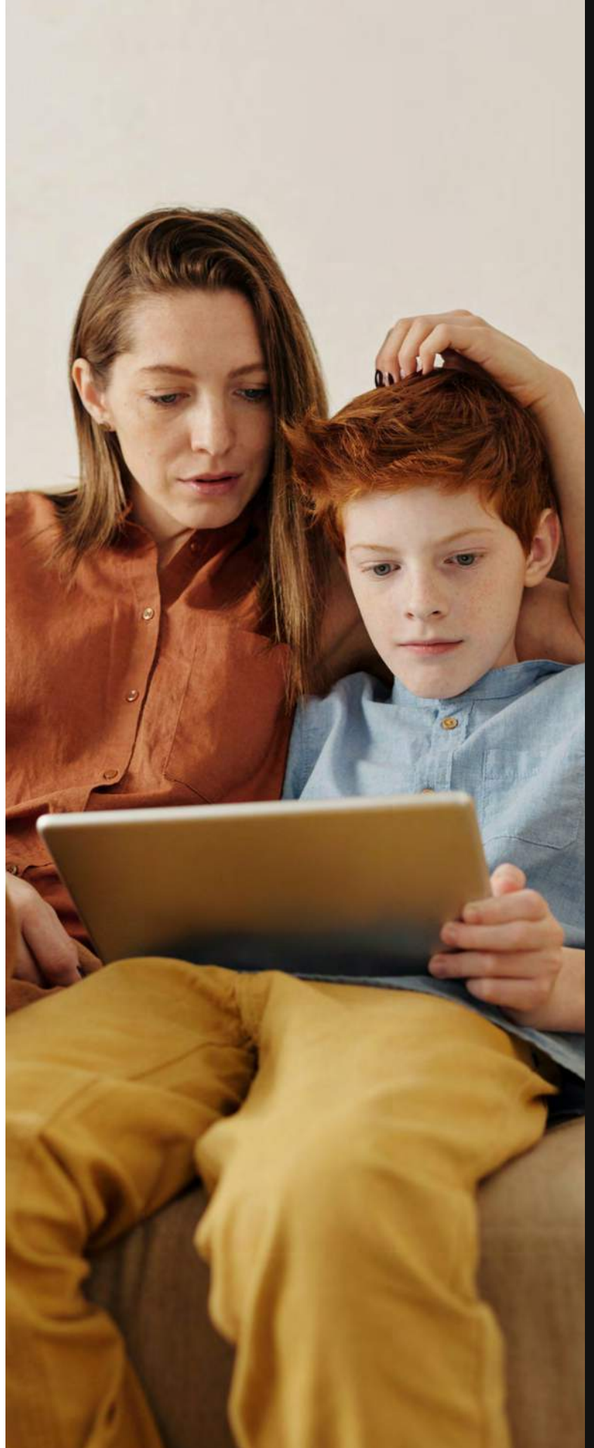
How Plume uses OpenSync

OpenSync is a key component of the services Plume provides. The flexible, cloud-agnostic architecture of OpenSync enables Plume to rapidly deliver, scale, manage, and support Smart Home Services. With OpenSync, Plume also brings software-defined networking (SDN) into consumer homes to quickly roll out new services—reprogramming network behavior on the fly.

In essence, OpenSync is the foundation behind the Plume cloud-management platform, enabling features such as IoT device management, parental controls, antivirus protection, WiFi motion detection, and more.

SDN uses Open Virtual Switch (OVS) as the networking framework for customer-premises equipment (CPE). OVS provides the flexibility to deploy the new services without having to update the firmware on the customer devices.

What would be a new firmware update becomes a reconfiguration of the parameters in the OVS system. From a CSP perspective, this capability is noteworthy because firmware updates are fraught with problems. While containers can help this problem and are an option to consider, CSPs generally will want to avoid deploying new firmware onto devices in the field.



SOFTWARE-DEFINED NETWORKING IN THE HOME

Software-defined networking (SDN) has become a core component of many modern enterprises' data centers. In the home network, however, SDN applications are only just emerging.

For CSPs, software-driven technology presents the opportunity to accelerate the launch of new services to thousands or millions of customers and meet the rapidly changing consumer demands.

The SDN's traffic control capabilities also help maintain service quality. By automatically identifying and measuring the traffic, SDN can not only detect and fix issues but also provide a better experience for high-bandwidth, low-latency applications such as video streaming. Additionally, the ability to monitor and control traffic flows within the home enables CSPs to offer value-added services such as cyber-security.

OpenSync: opportunity for CSPs to innovate

Many leading CSPs and other companies in the industry have already adopted OpenSync, and the momentum will continue. The support of major silicon providers also indicates that this open-source framework is the future of Smart Home Services delivery. CSPs who want a proven model that increases the velocity and the scale of their services can use OpenSync to innovate and deliver cutting-edge products.

In a competitive market where customers are looking for more value, improving the quality of experience, security, and customers' control of the home network will become an expectation in the future. Agile CSPs that take advantage of all that OpenSync has to offer will redefine their customer experience—and prove themselves as market leaders.

To learn more about Plume, visit our website or contact us today.