

OpenSync: A Brand-Agnostic Delivery Framework for the Modern Connected Home

A comprehensive overview of the cloud-based, open-source framework and its benefits for all stakeholders.



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Executive summary

Connectivity is essential to the modern home. But consumers want more than reliable WiFi. They expect not only high-quality network performance but also personalized, rich services. And they want these services delivered quickly and seamlessly.

As the smart home transforms and the home network becomes more intelligent—and more congested—Original Design Manufacturers (ODMs) and Communications Services Providers (CSPs) need to be nimble when delivering new capabilities and services at scale.

OpenSync™, a silicon-to-cloud, open-source framework, enables the rapid service curation, delivery, scale, management, and support of the services platform for the evolving smart home. This whitepaper provides a comprehensive overview of OpenSync and its benefits for all stakeholders.



Introduction: The evolution of the smart home

The modern home is transforming. Just as businesses are adopting digital technology to modernize operations, consumers are embracing smart devices to make their home environments more convenient and enjoyable.

No longer a niche segment, the market for smart home devices is booming. The growth continued even during the pandemic when many consumers reduced spending on nonessential purchases. For example, sales of smart speakers reached record levels in 2020, with more than 150 million units sold globally, according to Strategy Analytics.¹

Overall, shipments of smart home devices grew to 801.5 million units in 2020, a 4.5% increase from 2019, International Data Corporation (IDC) reported.² By 2025, IDC expects that number to grow to 1.4 billion, a 12.2% compound annual growth rate (CAGR) over five years. Forecasts from Future Markets Insights are even more robust—showing an 18.7% CAGR between 2021 and 2031.³

Consumer habits are shifting to more online interaction and activities, making WiFi connectivity even more crucial. More people are turning to mesh networks for a high-quality connection, including improved coverage and better load balancing. The market for wireless mesh networks, estimated at around \$2 billion globally in 2019, will continue expanding at a CAGR of more than 15% through 2026, research firm Global Market Insights forecasts.⁴

14+ 

The average smart home powered by Plume has more than 14 connected devices.

¹ "Global Smart Speaker Sales Cross 150 Million Units for 2020 Following Robust Q4 Demand," Strategy Analytics, March 2021

² "IDC Forecasts Double-Digit Growth for Smart Home Devices as Consumers Embrace Home Automation and Ambient Computing," Business Wire (International Data Corporation), March 2021

³ "Smart Home Devices Market," Future Market Insights, April 2021

⁴ "Wireless Mesh Network Market Size By Component," Global Market Insights, 2019



But connectivity is no longer the sole expectation. Consumers want hyper-personalized services—and they want these services to be seamless and not constrained by the ecosystems of specific vendors. This evolution in consumer demands requires two things:

- More sophisticated, centralized, intelligent management of the WiFi home network.
- An interoperable, hardware- and vendor-agnostic platform that can deliver these services.

That's what OpenSync helps enable—and does so with simplicity, speed, and scale. The fastest-growing, open-source framework for the smart home, OpenSync enables rapid service curation, delivery, scale, management, and support of the services platform. Adopted by many industry players—including chipset makers, customer-premises equipment (CPE) manufacturers, ODMs, and CSPs—OpenSync has been deployed in more than 30 million access points (APs).

As smart homes continue to change—entering the Smart Home 2.0 era—the market will move farther away from disjointed hardware and services toward cloud-based platforms that facilitate the delivery of customer experiences and services. OpenSync is a critical strategic component for CSPs, device makers, software developers, and others who want to position themselves as leaders in this evolution.



Overview of OpenSync

OpenSync is a cloud-based, open-source software service platform for delivering and managing network services within a home. Silicon-, cloud- and CPE-agnostic, OpenSync software connects in-home hardware to the cloud, providing telemetry and controls that enable CSPs and consumers to intelligently manage the home network.

The framework provides a range of benefits for chipset suppliers, system integrators, and operators, including the ability to rapidly develop and easily deploy new services and products, often by simply making cloud-software changes.

OpenSync defines open and interoperable interfaces that work with multiple vendors and on multiple levels. Spanning several layers, it allows the flexibility to change the individual components in any of the layers. The framework solves the longstanding issues of interoperability by allowing consumers to mix and match CPEs—including those supporting different WiFi generations—while maintaining optimal connectivity.

OpenSync operates across residential gateways, modems, routers, access points, extenders, set-top boxes, IoT hubs, smart speakers, and other WiFi-enabled CPEs to form a common cloud-to-hardware abstraction layer with open interfaces to cloud controllers.



OPENSYNC AS THE SOLUTION TO THE SILICON SHORTAGE

The recent global shortage of semiconductors has created a ripple effect for the telecom sector, just as momentum was building for WiFi 6 adoption. OpenSync can alleviate the impact of the silicon scarcity on ODMs, CSPs, and consumers.

OpenSync extends the hardware lifecycle because updates and enhancements can simply be pushed to devices through the cloud. With OpenSync-enabled CPEs:

- Chip and device makers can enable massive scale on current and legacy chipsets.
- CSPs can deploy new capabilities and upgraded services at the software layer.
- Networking performance in the home can be increased without the need for new chipsets or hardware.
- Consumers can take advantage of new services and features without buying new devices.

While the chip famine will likely end eventually, it has highlighted the volatility of the supply chain. This type of disruption is bound to recur. The OpenSync delivery platform can help ODMs and CSPs not only weather this problem now but also mitigate potential impacts in the future.

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.

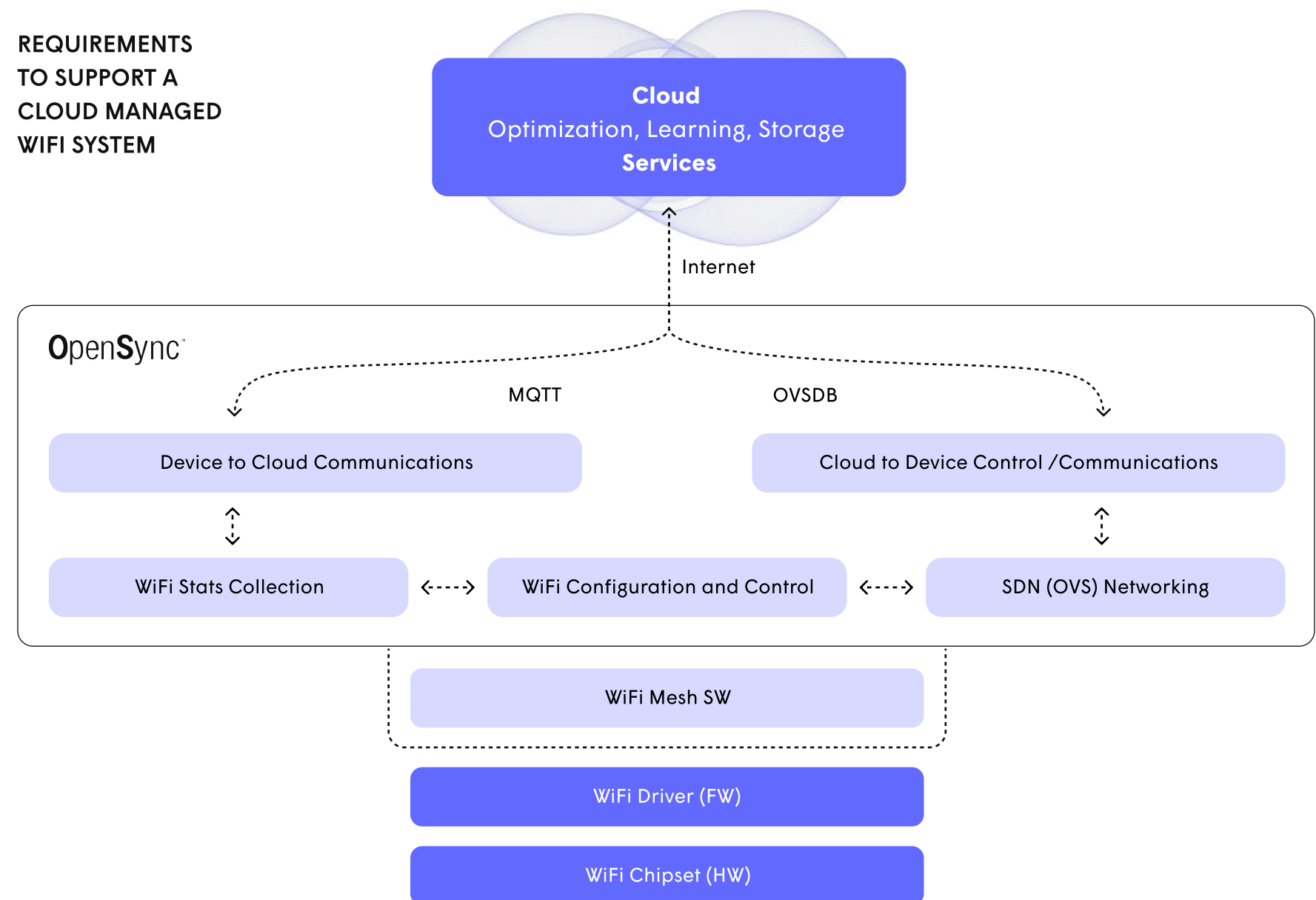
This layer collects measurements and statistics from the consumer devices and the network management components in the WiFi network and moves the data to the cloud. The platform also translates the cloud management commands to the hardware driver, pushing down controls and configurations that modify the behavior of a device. These functions are beneficial in homes with a single AP or multiple APs configured into a mesh.

Additionally, OpenSync includes software-defined networking (SDN) capability, which helps gather information and statistics about the network traffic in the home, and allows the cloud to take action by flexibly applying networking rules. SDN also enables the deployment of new services over time.

1 billion+

The number of connected devices that OpenSync has managed

REQUIREMENTS TO SUPPORT A CLOUD MANAGED WIFI SYSTEM



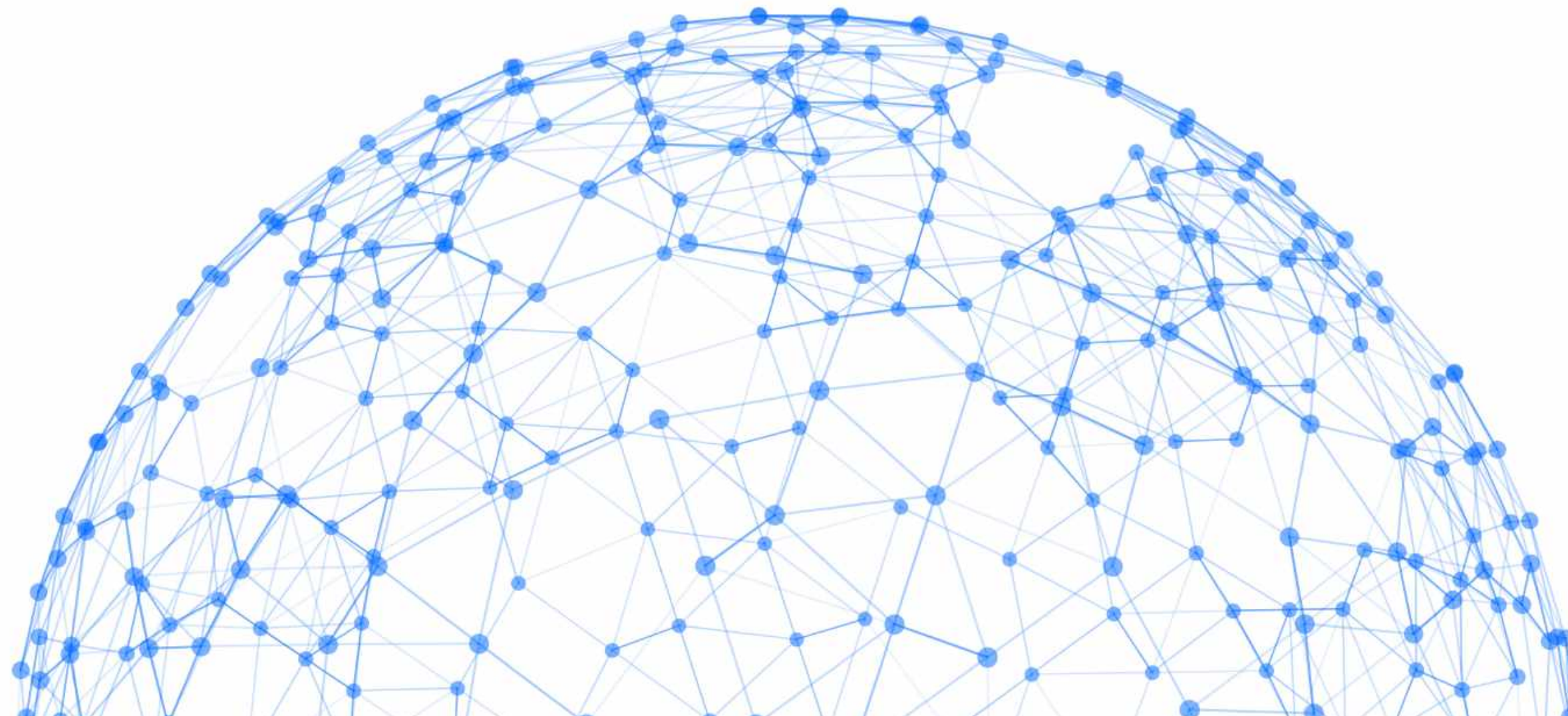
The advantages of open source

Open source is 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 work collaboratively to make contributions and 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.

Many high-profile standardization projects have been open source rather than defined by an industry standards body—from Linux and MySQL to Kubernetes and Apache.

Open source is different from standardization, even though both models are designed to ensure vendor interoperability and to prevent vendor lock-in. 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, whereas the open-source process tends to move faster because the use of the same code reduces the testing needs for interoperability.



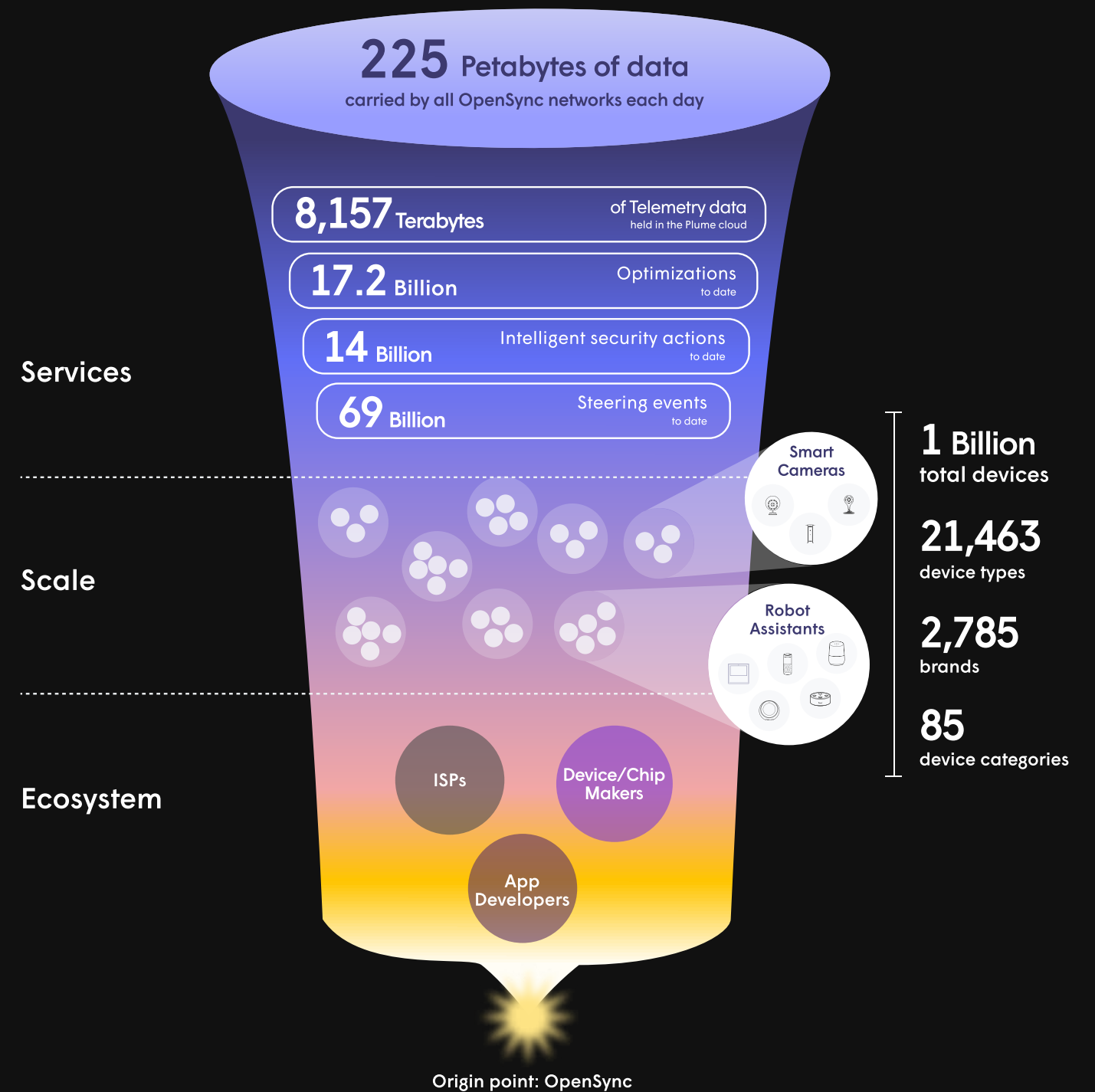
Framework development and adoption

Samsung, Comcast, Bell Canada, Liberty Global, and Plume began developing the OpenSync silicon-to-cloud framework in 2015. In 2018, OpenSync was open-sourced as a hardware-agnostic initiative to improve cloud interconnection to networking devices.

The software has evolved significantly over the years, receiving contributions from numerous industry players. There are no membership requirements for organizations to contribute to or adopt OpenSync.

Today, OpenSync is seeing explosive growth. The platform is present in over 30 million APs and devices and has had over 1 billion clients connect to it. With the software ported onto so many different gateways and extended devices, OpenSync now provides a complete management and service-enabling solution for all network devices.

The rapidly expanding OpenSync universe



CASE STUDY

SAMSUNG

Samsung Electronics uses the OpenSync Framework for SmartThings WiFi, its tightly integrated mesh WiFi router and smart home hub that manages home security and smart home solutions.

By providing plug-and-play compatibility between Samsung's SmartThings WiFi with third-party IoT devices offered by CSPs, OpenSync enables Samsung to offer customers flexibility, as well as the ability to upgrade services more easier.

"Consumers today demand choice when bringing products and services into their home that work best for their lifestyle, without being locked into any one ecosystem. Interoperability is central to our connected living strategy and extends to our smart home devices. The plug-and-play compatibility of our solution with other partners adopting OpenSync delivers the best experience for consumers."

—Chanwoo Park, vice president and Head of IoT Product and Service, Samsung Electronics



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.

30 million

OpenSync is present in over 30 million APs and devices.

Those adopting OpenSync include:

- ODMs (e.g. Technicolor, Samsung, Sagemcom).
- Application developers and service providers (e.g. Symantec, Cognitive Systems).
- CSPs (e.g. Charter Communications, Comcast, Vodafone).
- Chipset makers (e.g. Qualcomm, Broadcom, Quantenna).
- Cloud providers (e.g. Plume, Tanaza, NetExperience, Indio Networks).

TIP AND OPENSYNC

Founded by Facebook in 2016, TIP is a global community that includes more than 500 member companies working together to develop and deploy standards-based connectivity solutions. One of TIP's projects, Open WiFi, seeks to create disaggregated solutions that reduce vendor lock-in and accelerate deployment of advances in WiFi technology.

TIP's WiFi Project Group is developing infrastructure and systems, including core elements of WiFi APs and cloud-native controller infrastructure. Choosing from a variety of options including EasyMesh and TR-369, TIP adopted OpenSync as part of its AP WiFi software stack.

TIP selected OpenSync as a field-proven technology that:

- Provides consistent metrics across a wide variety of devices.
- Unifies the cloud-to-device interface including configuration and control.
- Enables the deployment of a wide range of services through a software defined networking architecture.



TELECOM INFRA PROJECT

TIP Open WiFi has been contributing to the evolution of OpenSync, adding high-level functionality and creating an open-source, cloud-management platform for controlling networking devices with OpenSync capabilities. With TIP's leadership, the enhancement of the technology will accelerate, meeting the needs of CSPs, businesses, and public WiFi providers.

Among other things, TIP will create test labs that will provide development, performance, interoperability, and certification testing. Plume has pledged to support the community effort for creating a new class of AP software stack that will facilitate ubiquitous interoperability across devices, operating systems, software, and services.



Core technical components

OpenSync is not a standalone piece of software, nor does it replace software on a device. To provide functionality, it relies on certain prerequisites and sits on top of a software development kit (SDK), which is provided from the chipset vendor for the specific device.

OpenSync has three core components:

Telemetry

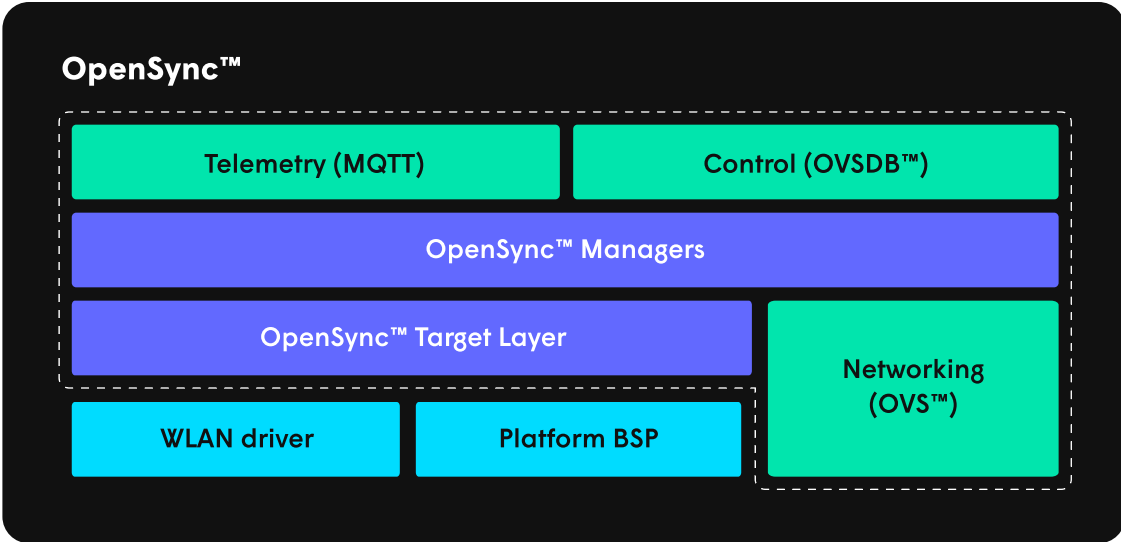
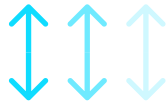
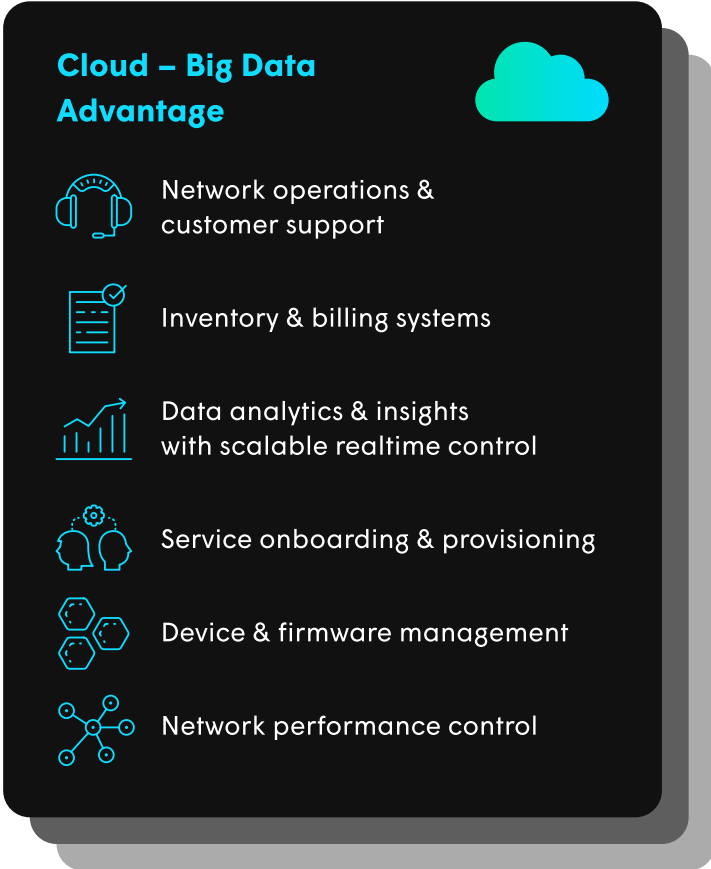
- Collects measurements reported by the low-level drivers.
- Compiles and preprocesses the measurements into statistics that are uniform across different devices.
- Presents the statistics using standardized formats.
- Prepares the formatted statistics for transfer to the cloud using serialization and packetizing.
- Communicates the statistics to the cloud using standardized and efficient telemetry.

Control

- Defines a standard interface for controlling messaging from the cloud.
- Provides operations necessary to manage the services, such as onboarding and provisioning.
- Provides rules-based networking configurations to block, filter, forward, and prioritize messages.
- Implements software to manage the device maintenance functions, including logging, firmware upgrades, and debugging.

Networking

- Monitors traffic-flow statistics and controls traffic to detect and block malware and viruses.
- Intercepts DNS queries to provide parental controls.
- Controls device traffic to enforce network access settings.
- Enables software-defined networking (SDN).
- Provides whole-home WiFi management.



OPENSYNC MANAGERS

The OpenSync managers are various processes that perform a specific group of tasks. The most important managers are:

- **Stats:** gathering statistics and preparing them for transmission to the cloud.
- **Wireless:** SSID/AP config, associated client reporting, radio configuration.
- **Network:** IPv4/IPv6 addresses, DNS, firewall, GRE tunnels, DHCP reservations.
- **Connection:** establishes backhaul connection and maintains connection with the cloud.

Other managers include:

- **Diagnostics:** spawns the rest of the OpenSync managers and monitors their operation.
- **Steering:** responsible for band steering and client steering of WiFi clients.
- **Queue:** responsible for sending messages to the cloud using Protobuf and MQTT.
- **Log:** collecting and uploading logs on demand for debugging and monitoring.
- **OpenFlow:** manages packet flow rules configured in OVS.
- **Platform:** naming and device typing, cloud managed device parental control/device freeze.

Telemetry, measurements, and statistics

The telemetry portion is based on Message Queuing Telemetry Transport (MQTT). Based on an OASIS standard messaging protocol, MQTT is a proven, efficient IoT framework that has been deployed successfully across the industry. An extremely lightweight messaging transport, MQTT is designed to connect remote devices, for frequent reports, with minimal bandwidth and a small code footprint.

OpenSync also supports Protocol Buffers (Protobuf), a language- and platform-neutral data interchange format developed by Google. Protobuf is especially useful because of its flexible and simple format that can be easily parsed.

Control and management

The control interface is based on Open vSwitch Database Management Protocol (OVSDB™), a method that provides synchronized, distributed database semantics with callbacks on transactions. Robust, highly reliable, and industry-tested, OVSDB can be used uniformly in devices and in the cloud.

The OVSDB tables control the networking functions and all the parameters in a device, including WiFi functions. Editing entries in the OVSDB tables enables the cloud and OpenSync to exchange system information and instructions.

OVSDB has a number of properties that make it an effective control interface for a home networking system:

- It has both cloud-side and device-side open source implementations readily available.
- As a database, it naturally persists the state of a device.
- It has built-in capabilities to maintain consistency between the state on the device and the state in the cloud.
- The database can be read and written from different sources, so there can be multiple points of control that are consistent within the cloud and device.

Networking

The networking element works jointly with OVSDB and OpenFlow, and leverages Open Virtual Switch (OVS™). The flexibility that OVS provides allows the deployment of new services without having to update the firmware on customer devices. What would once have been a firmware update is now a reconfiguration of the parameters in the OVS system.

This capability is noteworthy because firmware updates are fraught with problems. While containers can help this challenge and are an option to consider, deploying new firmware onto devices in the field is generally avoided.



Many modern networking chipsets have built-in support for OVS. However, OVS can also be ported onto chipsets that don't explicitly support it. Additionally, OpenSync does not require a complete implementation of OVS, and also uses OVS in a way that allows only the first few packets of each new flow to require detailed processing.

One of the advantages of OVS is that it enables software-defined networking (SDN) capabilities. 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.

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 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 capabilities

When deployed by a CSP, OpenSync connects all networking devices to the cloud to enable a variety of services. While OpenSync continues to evolve, in its current form it can enable:

- Cloud-based WiFi management.
- Cyber-security.
- Parental controls.
- Access control.
- WiFi motion detection.

Cloud-based WiFi management

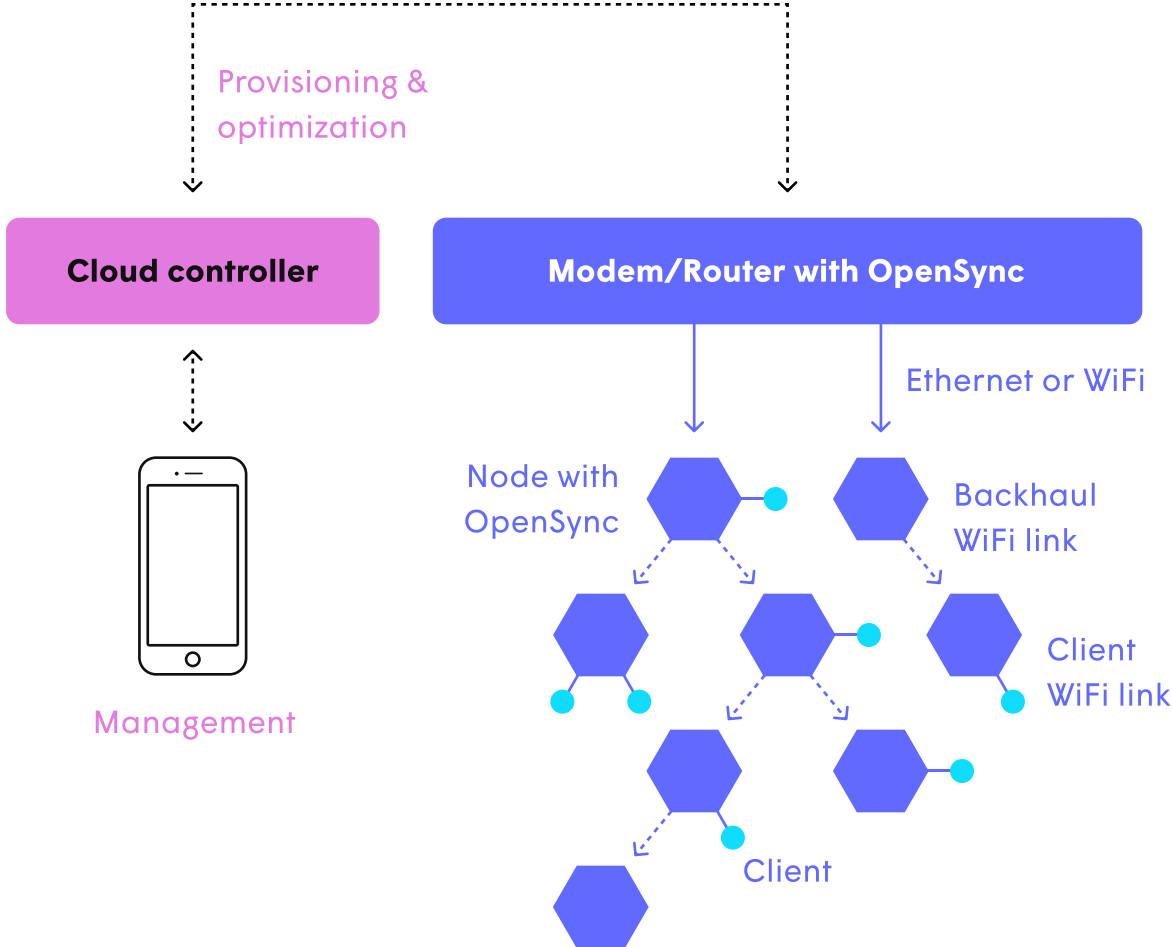
OpenSync harnesses the power of the cloud's infinite memory and computing power. The compute power allows for much more sophisticated algorithms for optimization, while the storage capacity allows machine learning to take place over longer periods of time. Both of these cloud features play an essential role in OpenSync's WiFi management capabilities.

Centralized, cloud-based WiFi management delivers sophisticated controls, coordination, and optimization that will become especially critical as smart home adoption picks up pace, putting further pressure on connectivity and performance.

WiFi management functionalities that OpenSync supports 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.
- Network and traffic separation for guest WiFi—enhancing privacy and security.
- WiFi 6 support—providing benefits such as higher network capacity.
- Traffic prioritization—protecting streaming data flows that require low-latency from interruption by lower priority data flows.

OPENSYNC CLOUD REQUIREMENTS



Other capabilities can be 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.

OPENSYNC AND WIFI 6: DELIVERING A FULLY OPTIMIZED EXPERIENCE

WiFi 6 promises to bring transformative improvements to the home network, including personalized services and improved quality for bandwidth-hungry applications. Capable of more than doubling speeds, supporting more devices, and improving power efficiency, WiFi 6 will enhance consumers' experience in all connected spaces.

But to unlock the full power of the advancements and to capitalize on the benefits of the technology, the complex, congested WiFi home network requires sophisticated management and optimization. OpenSync, together with a massively scalable cloud platform, enables CPEs to take full advantage of WiFi 6 features.

For example, the marquee WiFi 6 feature, uplink and downlink orthogonal frequency-division multiple access (OFDMA), allows for a single transmission to communicate with a large number of devices, greatly improving efficiency and capacity. But OFDMA operation requires OFDMA-aware client steering. An intelligent controller must trade the benefits of minimizing the distance from each client to the nearest AP, or aggregating the clients onto fewer APs, allowing OFDMA to operate efficiently. OpenSync enables a centralized, intelligent network controller that provides rigorous optimization and maximizes efficiency.



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's members to maintain their browsing freedom. Customers can configure the controls at person and device level.

Device control

Device-specific access control provides additional security by restricting internet connection for devices that don't need it. For example, a printer or a storage device can be configured to be off limits by regulating the traffic flowing through each AP in the home.

WiFi motion detection

WiFi devices and nodes that are compatible with 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. Such motion detection can be used for several services, including home security systems, and eldercare health monitoring.



OPENSYNC-ENABLED WIFI 6 CPES

More than 20 WiFi 6 CPEs from 10 providers, such as ADTRAN, Sagemcom, and Technicolor, fully support OpenSync. These devices feature the latest WiFi 6 chipsets from major silicon providers including Broadcom, MaxLinear, and Qualcomm.

In fully optimizing the latest specification updates and enhancements, OpenSync has become the most broadly supported open-source silicon-to-cloud framework for WiFi 6 globally.

"Our integration of OpenSync across ADTRAN solutions vastly improves the broadband experience while helping operators achieve faster time-to-market and time-to-revenue, improved analytics and performance capabilities, and fostering the creation of new and expanded high-value services."

—Robert Conger, CTO, ADTRAN

Advantages for stakeholders

Consumers want not only superior connectivity but also more choices for personalized services and seamless experiences. They also want greater control of their smart homes—including the ability to mix and match devices and APs without worrying about vendor lock-in.

But while they expect vendors and providers to be nimble and offer more services and updates faster, customers don't necessarily want to pay for new hardware each time they upgrade services.

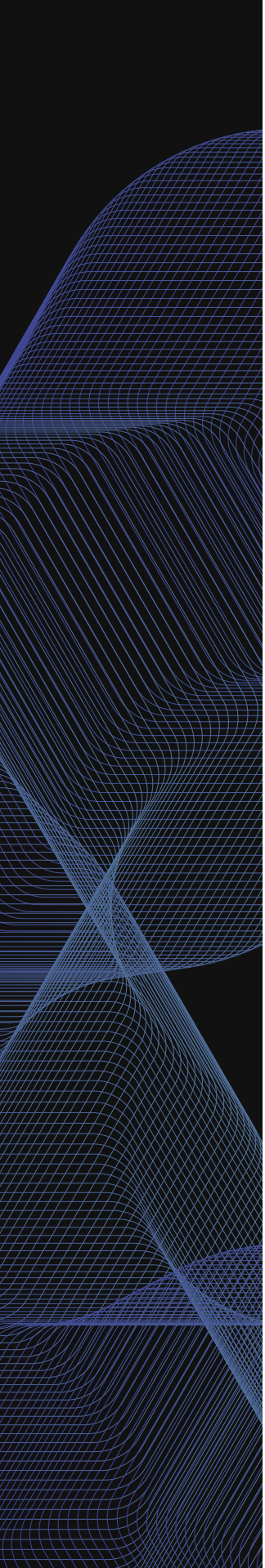
OpenSync helps solve for these consumer needs while enabling ODMs, CSPs, and software developers to change their business models and deliver next-generation products and services at scale. This silicon-to-cloud framework provides stakeholders with a variety of benefits that help them maintain competitiveness and cater to fast-changing customer needs.

\$263 billion

Frost & Sullivan forecasts "exponential growth in the smart home market, with yearly revenues from connected devices and associated services reaching nearly \$263 billion by 2025."

Source: "[Smart Home Leader Plume Reaches 20 Million Active Households](#)," PRNewswire (Plume), December 2020





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 control, 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.

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.



OpenSync is integrated with Reference Design Kit (RDK) and is compatible with OpenWRT and prpl Foundation open-source standards.

ODMs, chipset makers, and software developers:

OpenSync's main benefits for CPE providers and software developers are accelerated time to market and scalability. They can quickly and easily push updates and deploy cloud-enabled devices that have rich, personalized features for the next generation of the smart home.

Examples of how chip and device makers are using OpenSync:

- Qualcomm uses OpenSync-enabled devices as the cornerstone for its new Immersive Home platforms. These high-capacity mesh networking platforms rely on OpenSync to ensure capacity and control for flawless connectivity in the home. The combination of Qualcomm's new platforms and OpenSync cloud-based service provisioning enables CSPs to deliver customized service offers with support for seamless roaming, band/client steering, and advanced security across multiple WiFi standards.
- Sagemcom, an early adopter of OpenSync, preloads the software on many of its gateway and repeater products, upstreaming its Netfilter capabilities to make its delivery process simpler and accelerate implementation of functionalities such as firewalls. Sagemcom continues to leverage OpenSync's cloud technology, integrating it into its new WiFi 6 home gateways and WiFi extenders that the company newly launched in 2020 and 2021.

- Quantenna Communications integrates OpenSync into its mainstream WiFi 6 chipset, the QSR5GU-AX Plus, which is well suited for in-home extenders and repeaters, with increased throughput, better coverage, and the seamless capability to find the cleanest WiFi channels. Quantenna's Qdock software platform is fully supported by OpenSync, allowing ODMs, CSPs, and software developers to quickly and easily deploy cloud-capable CPE devices with a rich set of modern home services on Quantenna's advanced WiFi 6 silicon platforms.

"Our long collaboration with Plume has added tremendous value to customers of our cutting-edge networking platforms, and has helped service providers deploy differentiated capabilities for the smart home. Our work related to OpenSync has provided our customers a framework to rapidly deploy services from the cloud."

—Nick Kucharewski, vice president and general manager,
Wireless Infrastructure and Networking, Qualcomm
Technologies, Inc.

OPENSYNC VS. EASYMESH

OpenSync is fundamentally different from EasyMesh, another framework that provides interoperability. While the two technologies have some crossover in WiFi layer management, they solve completely different problems.

Compared to OpenSync, EasyMesh:

- Has more limited features for WiFi management.
- Lacks any other functionalities beyond the WiFi mesh layer, such as defining messaging, transport, or connection methods that enable CPEs to communicate with the cloud.

EasyMesh defines the way a 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, ODMs, and CSPs more flexibility and prevent vendor lock-in by enabling different vendors' AP products to work together and form one in-home network. However, these networks lack the cloud connection capability and added services provided by OpenSync.

The Wi-Fi Alliance, a nonprofit that sets standards and drives their adoption for the WiFi industry, created the EasyMesh standards and certifies products.

	EasyMesh	OpenSync
Framework	<ul style="list-style-type: none"> • Industry standard 	<ul style="list-style-type: none"> • Open source
Main purpose	<ul style="list-style-type: none"> • Provide interoperability for WiFi mesh devices • Create a multi-AP network with a local controller 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • WiFi mesh software 	<ul style="list-style-type: none"> • WiFi configuration and control (with built-in WiFi mesh software) • Cloud-device control and communication • Software-Defined Networking (SDN)
Capabilities (select examples)	<ul style="list-style-type: none"> • Configuration of connections between multiple APs • Client steering controls • WiFi 6 support • Traffic prioritization 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • WiFi management 	<ul style="list-style-type: none"> • WiFi management • Cybersecurity • Parental controls • WiFi-based motion detection • IoT device control

CASE STUDY



Technicolor pre-integrated OpenSync in its existing and new WiFi 6-based open CPEs, including cable-, xDSL, and xPON-gateways and WiFi access points. In partnership with Plume, Technicolor Connected Home has enriched its broadband CPE portfolio with Plume's Consumer Experience Management (CEM) Platform, which combines highly personalized, front-end consumer services with intelligent, data-driven, back-end support tools.

The broadband open CPE platforms, offered by Technicolor Connected Home, enable CSPs to prioritize bespoke experience for customers and offer subscribers innovative services—such as advanced access and parental controls, cyber-security, and motion detection—quickly, reliably, and at scale. With broadband speeds no longer a material differentiator, Technicolor's offering enables CSPs to retain and gain new customers.

"This new partnership will revolutionize the subscriber's experience across every broadband delivery platform, whether its cable, DSL, or fiber and will further cement Technicolor's position as No. 1 in the broadband CPE space. This is key as the relationship between operators and subscribers rises in importance. Consumers are counting on network service providers to help manage the growing complexity of their connected home environments."

—Girish Naganathan, CTO, Technicolor Connected Home

OpenSync in action

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

In essence, OpenSync is the foundation behind Plume's cloud-based, consumer experience management (CEM) platform, enabling features such as IoT device management, parental controls, antivirus protection, WiFi motion detection, and more.

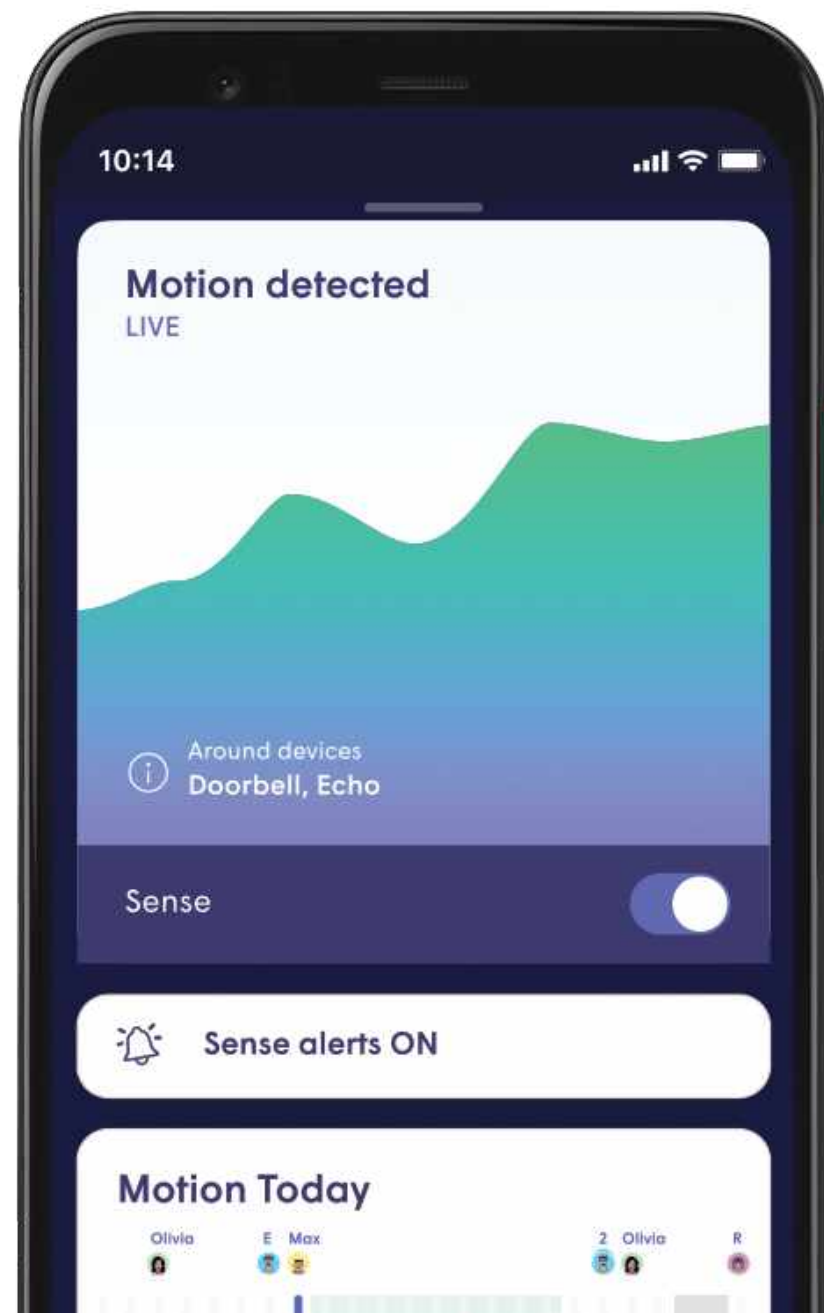


In 2020, Frost & Sullivan named Plume the Entrepreneurial Company of the Year in the Smart-Home-as-a-Service market. According to Frost & Sullivan, Plume's cloud-based, AI-driven CEM platform helps CSPs:

- Reduce customer churn by up to **30%**.
- Increase customer lifetime value by up to **70%**.
- Increase customer lifetime by as much as **2.9 years**.
- Grow revenue per user by up to **\$15** a month for customers with whole-home WiFi services.
- Decrease the cost for their customers by up to **22.4%** per year.

Source: "[Frost & Sullivan Awards Plume Global Entrepreneurial Company of the Year](#)," PRNewswire (Frost & Sullivan), November 2020

The Plume HomePass® Smart Home Services Suite, which includes Adapt™, Guard™, Control™, and Sense™, is managed by the Plume Cloud, a data- and AI-driven cloud controller currently running the largest SDN in the world. OpenSync comes pre-integrated and supported on the leading silicon and platform SDKs for coordination by the Plume Cloud.



“The broadband market is evolving rapidly and we are constantly looking to meet changing consumer needs and expectations by enhancing our state-of-the-art CPE through software. While WiFi 6 presents an evolutionary step forward in terms of features and functionality, OpenSync integration ensures that we can benefit from an open-source ecosystem that—together with Plume’s CEM Platform—among many benefits, harnesses the power of the cloud to carry out sophisticated WiFi optimizations, and deliver the best possible experiences to consumers based on their individual needs.”

—Greg Fisher, President, Hitron Technologies Americas



PLUME BY THE NUMBERS

25 million

Powers more than 25 million homes globally.

200

Adopted by more than 200 CSPs.

1 million

Saw an average of 1 million new home activations per month from 5/1/2020 to 5/1/2021.

The Future of Smart Home Service delivery

The growing trend of the modern home as the hub for work, education, and entertainment puts more pressure on home networking capacity demands. But it also creates new opportunities for CSPs, ODMs, and other industry stakeholders to differentiate by rapidly scaling new, feature-rich products and services.

The timing is especially fortuitous as WiFi 6 adoption brings renewed consumer interest in home WiFi—and exciting new possibilities in the evolution of the smart home. OpenSync provides a proven model for innovating and delivering cutting-edge products that offer value to consumers.

By providing faster time to market and scalability for vendors and operators while enabling them to offer customers the flexibility and personalization they want, OpenSync is a win-win for all stakeholders.

To learn more about Plume, visit our [website](#) or [contact us](#) today.

