



Airties

Wi-Fi

Management:

How a Hybrid

Cloud-Edge

Architecture

lowers latency

and drives down

costs

About Airties

Airties is a leading provider of managed Wi-Fi solutions to operators around the globe. The Smart Wi-Fi portfolio from Airties includes Airties Edge, smart Wi-Fi software for gateways; Airties Cloud management platform and its companion app, Airties App as well as Wi-Fi mesh extenders. Operators turn to Airties for the design, implementation, and ongoing optimization of their customers' broadband experience. Airties' customers include AT&T, Deutsche Telekom, Singtel, Sky, Telia, Telstra, Vodafone, and many others. More information is available at www.airties.com.

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Introduction

Broadband operators today face a continuously evolving business and technology landscape. Rising consumer expectations are driving operators to innovate with their services and ensure a seamless quality of experience when it comes to Wi-Fi. For consumers, internet in the home *is* Wi-Fi. A buffering video or Zoom call can trigger frustration and lead to calls to customer care, lower NPS and even churn.

Given the ever-changing patterns of Wi-Fi usage within each home, operators need a managed Wi-Fi solution that optimizes the end-to-end experience and dynamically adapts to the conditions for each person and every device. With the unique hybrid cloud-edge architecture, Airties can do just that.

Not only does this architecture enable better business performance in terms of cost efficiency, security and sustainability, it also significantly reduces latency, saving precious milliseconds to allow a smooth connectivity experience for every home.

Smarter approach to Wi-Fi management: Hybrid cloud-edge architecture

A hybrid cloud-edge architecture brings lower latency, higher performance and reduced costs compared to a cloud-only approach

The benefits of Wi-Fi management in the cloud are well known. It brings flexibility and scalability. But to overcome the drawbacks of relying solely on cloud, Airties has chosen a hybrid cloud-edge architecture for network management.

Airties' approach is to split the functionality in a kind of virtuous feedback loop between the cloud and edge, using Airties Cloud analytics to monitor and optimize the overall Wi-Fi experience, and the Airties Edge software integrated on 3rd party home gateways and/or mesh extenders to manage the real-time Wi-Fi adjustments as a centralized controller for the home-wide network. This edge controller can then be used for real-time steering, mesh topology optimization, and for data collection to feed back to the cloud for tailored recommendations per home.

Sharing the computational load across cloud and edge has significant benefits in latency reduction for a better user experience, eliminating the need for all of the hundreds and thousands of Wi-Fi decisions to go through the cloud. This also means that hosting costs are optimized due to lower dependency on cloud for all data processing.

The benefits of a hybrid cloud-edge architecture

Real-time optimization for the best user experience:

Deploying intelligent software to the edge device – typically the home gateway– allows real-time adjustment to the conditions in the home. Each home is dynamically optimized according to its own individual connectivity needs at every moment of the day. This includes band and device steering, mesh topology optimization, emergency channel changes and prioritizing specific application sessions. This ensures your customers get a great Wi-Fi experience throughout their homes, on all devices, all applications, at all times.

Scalability and cost-effectiveness:

As Wi-Fi optimization is based on processing massive amounts of data on real-time usage patterns, connection quality and the physical environment in the home, a cloud-only architecture can drive up operational costs. With the hybrid architecture, all of the processing need not be done in the cloud. Cloud computing is used for long-term and population-wide analytics and learning, while the intelligence in edge software executes the instant actions that keep the connection strong and glitch-free for the best user experience in each individual home.

Improved latency management:

The hybrid-cloud edge architecture significantly improves latency issues since local conditions in each home are managed in real-time by the edge software on the gateways and extenders installed within the home. The Wi-Fi in each home is dynamically optimized according to the individual needs of

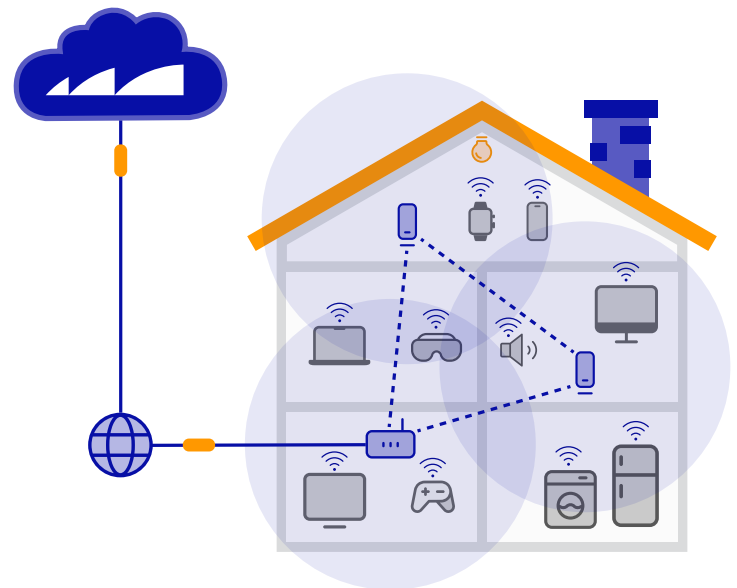
every device at every moment of the day. It saves precious milliseconds that add up if all decision-making would be driven only through the cloud – easily perceived by users through interruptions in video streaming or lags in video calls and gaming experiences.

Additional security and sustainability:

The energy efficiency gained from offloading some of the processing from the cloud to the edge devices enables a more sustainable approach than a cloud-only management system. The hybrid cloud-edge model also allows for a better balance in where sensitive user data can be processed, thereby diminishing a major pain point for operators whose subscribers are wary of having all their data stored in the cloud.

Resilient operations and continuity:

Even in the event of the cloud connection being lost, the Wi-Fi home network continues to function with the Airties solution thanks to the local intelligence with the edge software.



Airties Cloud and Edge: How they work together

Instead of having every single Wi-Fi related decision processed through the cloud, the Airties hybrid architecture functions on a kind of optimized feedback loop where the cloud determines the best options and correct configuration for each home, which are then implemented and adapted as necessary by the edge software to the real-time, evolving conditions of every home network. The edge software then periodically shares input to refresh the cloud's understanding of each home's requirements.

This feedback loop varies for different technical parameters, but typically covers channel planning, topology management, steering, device white-/black-listing, application prioritization, emergency channel management, interference mitigation, etc.

This ability to take the right decision swiftly on the edge avoids having to stream continuously to the cloud in order to make all decisions there. The cloud powerhouse is used for analytics, but as we use the edge software to decide locally, we don't need to stream the real-time data all at once. This builds a more efficient process, helping cost and scalability.

Improving Quality of Experience through real-time decision making in the edge

Subscribers expect Wi-Fi to cater to their diverse needs, such as streaming, gaming, or moving about during a video call. Airties Edge software addresses this by constantly optimizing links for different devices in changing home Wi-Fi environments, using a sophisticated band and channel steering algorithm designed to resolve and prevent Wi-Fi problems.

The software includes mechanisms like analysis of device capabilities and white/blacklisting for specific situations. It continuously analyzes the home network context to optimize Wi-Fi links for each device, relaying information to the cloud to determine the best settings over time. Integrated into home gateways/routers and mesh extenders, Airties Edge enables the latest devices to leverage high-speed 5 GHz (or 6 GHz for tri-band devices) bands while supporting legacy devices on 2.4 GHz.

Built on the Wi-Fi CERTIFIED EasyMesh™ standard, Airties Edge simplifies integration and interoperability, reducing time to market. The software ensures fair capacity sharing among connected devices and efficiently manages dedicated backhauls for tri-band networks, enhancing the overall Wi-Fi experience for homes.

Edge connectivity statistics are sent to Airties Cloud for remote monitoring and optimization across the subscriber base. Airties Cloud provides operators with visibility to pinpoint and resolve connectivity issues through the CareView Customer Support Suite, and the Insights Dashboard helps track KPIs and identify usage trends. By combining advanced techniques and algorithms, Airties Edge software delivers an optimized Wi-Fi experience for subscribers.

Cloud computing for optimized performance and improved visibility

Airties Cloud is an advanced monitoring and Wi-Fi management platform that crunches millions of Wi-Fi data points to fine-tune connectivity across the entire installed base. It gathers data on Wi-Fi performance and usage, applying advanced learning algorithms to dynamically determine the best settings for each home, while also presenting diagnostic and performance data through a KPI monitoring dashboard and a series of multi-level customer support interfaces.

Airties' patented Wi-Fi Experience Index algorithm measures multiple factors to provide an accurate indication of in-home Wi-Fi performance. It can be used for the entire installed base or for individual homes, where it can be viewed through the Airties CareView Customer Support Suite - an easy-to-use overview of diagnostics, with single-click prompts for care agents to resolve connectivity issues, multi-level access for first level or expert views of the deployed network with drill down visibility to individual connected devices and access points.

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Careview

Dashboard

Client info

Recent sessions

Follow-up homes

Search client

Client nr X237200ZF

Overview Recommendations Network map Devices Speed test Hotspots History Expert

Wi-Fi Experience Index Recommendations Last updated: 6 hours ago

80
GOOD

LOSS

- Coverage 40 points
- Interference 9 points

Refresh overview

- 1** Improve coverage for Macbook Eric

You've lost **27** pts

Buy an extender to increase the coverage area, or use device "Macbook Erik" closer to AP "Hallway".

Solve this →
- 2** Improve coverage for iPhone Sam

You've lost **10** pts

Buy an extender to increase the coverage area, or use device "iPhone Sam" closer to AP "Hallway".

Solve this →
- 3** Set 2.4GHz channel to Auto to mitigate interference affecting "Macbook Erik" and "iPhone Sam"

You've lost **5** pts

Selecting a fixed channel prevents Airties channel management from mitigating interference automatically.

Solve this →

8

Cost savings through remote troubleshooting


As Wi-Fi can be a leading cause of customer support calls, Airties' CareView Customer Support Suite offers a range of diagnostics and recommendation menus for first, second and even expert level customer care teams to positively impact FCR (first call resolution) and customer satisfaction rates as well as save costs through fewer technician call-outs and unnecessary equipment swap outs.


CareView Customer Support Suite offers:


- One-click fix recommendations for first level care agents to instantly improve Wi-Fi performance
- Live data view for real-time diagnostics
- Full view on the home network with drill down visibility to individual connected devices and nodes
- Easy-to-use interface for operator teams with basic to advanced levels of technical proficiency to diagnose and fix Wi-Fi problems
- Easy integration with existing customer care systems through Airties Cloud's secure APIs

This holistic overview and the ability for simple, effective troubleshooting results in significant cost savings for operators through remote Wi-Fi problem resolution and decreased technician callouts or unnecessary equipment swaps.

Top recommendations

 Improve coverage for Laptop Anna

 Enable band steering

 Set 2.4GHz channel to Auto to mitigate interference affecting "Laptop Anna" and...




 Summary



Well done! You've improved the Wi-Fi score to 88.

 Tue. 27/02/2023  5min. 03 sec

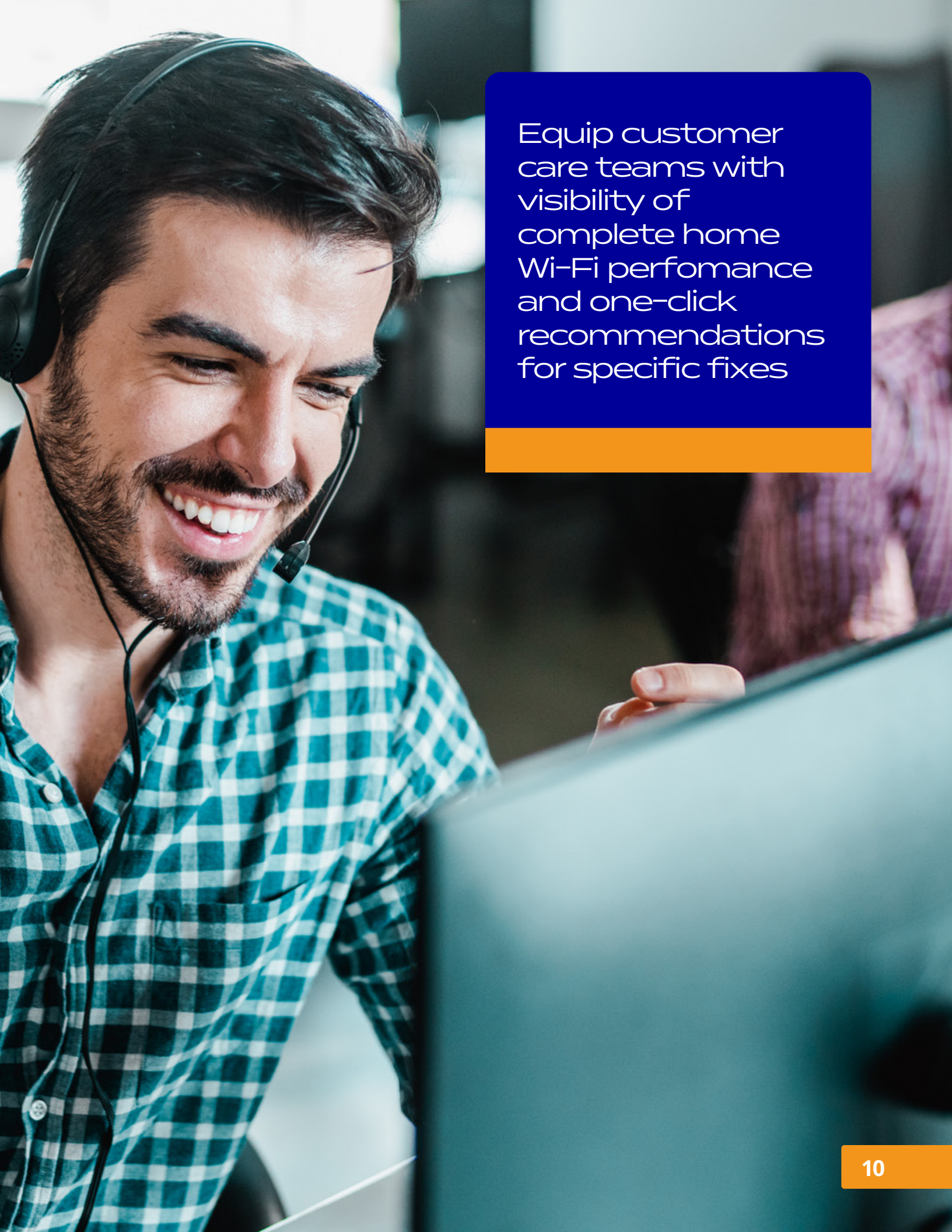
Actions taken

-  Buy an extender to increase the coverage area, or use device "Laptop Anna" closer to AP "Hallway".
-  Check if a 5 Ghz profile for the station can be added.
-  Selecting a fixed channel prevents Airties channel management from mitigating interference automatically.

Additional information

Follow-up this client





Equip customer care teams with visibility of complete home Wi-Fi performance and one-click recommendations for specific fixes

Customer insights for data-driven decision making and better targeting

Airties Cloud includes an Insights Dashboard that provides a single interface for operational KPIs and customers' broadband usage statistics, ranging from frequency and intensity of use to user experience indicators as well as numbers and types of connected devices. Operators can get a 360-degree view of exactly how their offers are performing and correlate data around usage, billing, call rates, and more to predict and avoid churn, boost NPS and ARPU by correctly identifying upsell and cross-sell opportunities.

The Insights Dashboard offers:

- KPI dashboards to track broadband consumption in the home to benefit everyone from senior management and customer strategy to network operations teams
- Insights into subscribers' evolving habits and in-home Wi-Fi requirements to leverage for targeted marketing strategies and ARPU generation by identifying upsell and cross-sell opportunities
- Global view of Wi-Fi network performance for the entire subscriber base with ability to filter by geography or gateway model to benchmark performance
- KPI tracking from overall Wi-Fi performance and impact of optimization techniques such as steering and channel management to the average data consumption and number of connected devices per home
- Easy access to cloud analytics and ability to generate real-time, on-demand or customized reports when necessary

Understand
user
consumption
patterns for
smarter
decision-
making
through
data-driven
insights

For an example of how the Insights Dashboard supports strategic decision making, let's look at identifying which homes may need mesh extenders. Many homes can be served adequately by the integration of Airties Edge software into the broadband router or gateway. But some homes will also need mesh extenders for full coverage. How can operators get that visibility to deploy extra hardware only where it is necessary?

The visualization below from the Insights Dashboard can help operators pinpoint exactly which homes need extenders. This mock-up example compares different homes (with Air4920 or Air4960 or legacy gateway...) to identify the additional coverage needs for each group.

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Insights Dashboard

- Home
- My favourites
- Quality
 - WFEI Score
 - Recommendations
- Impact
- Subscriptions
- Usage

Switch to Remote Manager

Switch to Wi-Fi doctor

Export data

Development - API

Settings

Quality

SHOW DATA FOR

Population* California, Texas

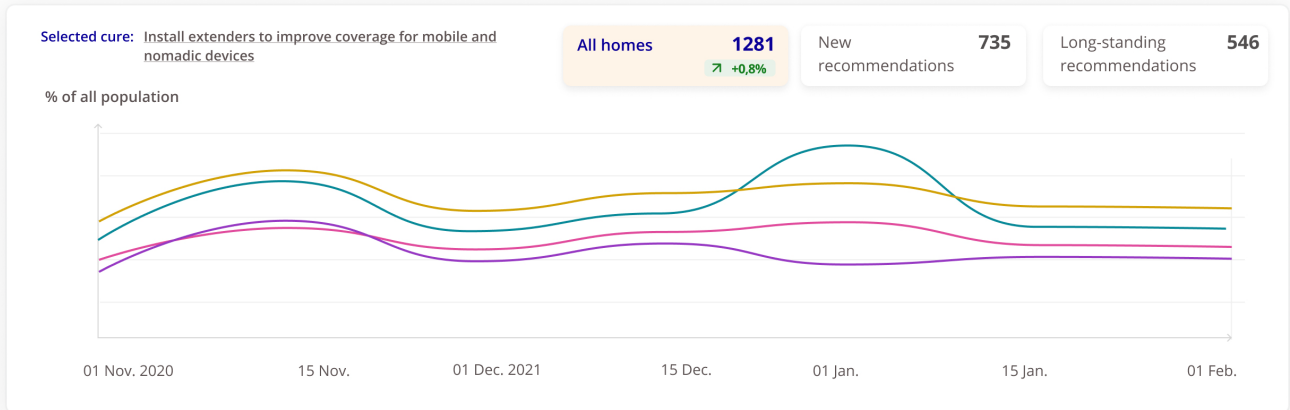
AND COMPARE BY

Homes with products Extender 4920, Extender 4960, Legacy Gateway, ...

Last 3 months
01/11/2020 - 01/02/2021

*This is the sum of the selected States

Homes with a specific recommendation per product



All recommendations

*Categories: Interference Saturation Radio path Network

RANKING	POPULATION	RECOMMENDATIONS	PREVIOUS RANKING	CATEGORY	NEW HOMES
1. ↑	12% (+10%)	Install extenders to improve coverage for mobile and nomadic devices	2	Interference	
2. New	8%	Change ACS configuration to use known good channels	-	Interference	
3. →	3%	Move AP or install extender	3	Interference	
4. ↓	2% (-5,2%)	Upgrade station with support for the latest Wi-Fi standards	1	Radio path	
5. ↓	0,8%	Add 2.4 GhZ profile to a station	4	Interference	

Show more



Conclusion

Airties' approach to distribute functionality between the cloud and edge platforms can effectively address the limitations of relying solely on the cloud to provide improved latency management, cost-effectiveness, security, and resilience. The hybrid cloud-edge approach helps operators achieve their key business objectives - to deliver customer satisfaction while maintaining costs and gaining visibility on operations and performance.

This approach utilizes the advantages of both cloud and edge which work in tandem to create an end-to-end Wi-Fi management solution. Built upon Wi-Fi CERTIFIED EasyMesh™, Airties Edge software provides the real-time dynamic optimization while simplifying integration and ensuring interoperability. Airties Cloud provides remote monitoring and optimization of parameters for each home, enabling operators to resolve connectivity issues and track KPIs. The hybrid cloud-edge architecture facilitates a more sustainable and secure approach that shares the load more efficiently, reducing dependency on the cloud's computational resources and limits storage of sensitive user data on the cloud.

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