



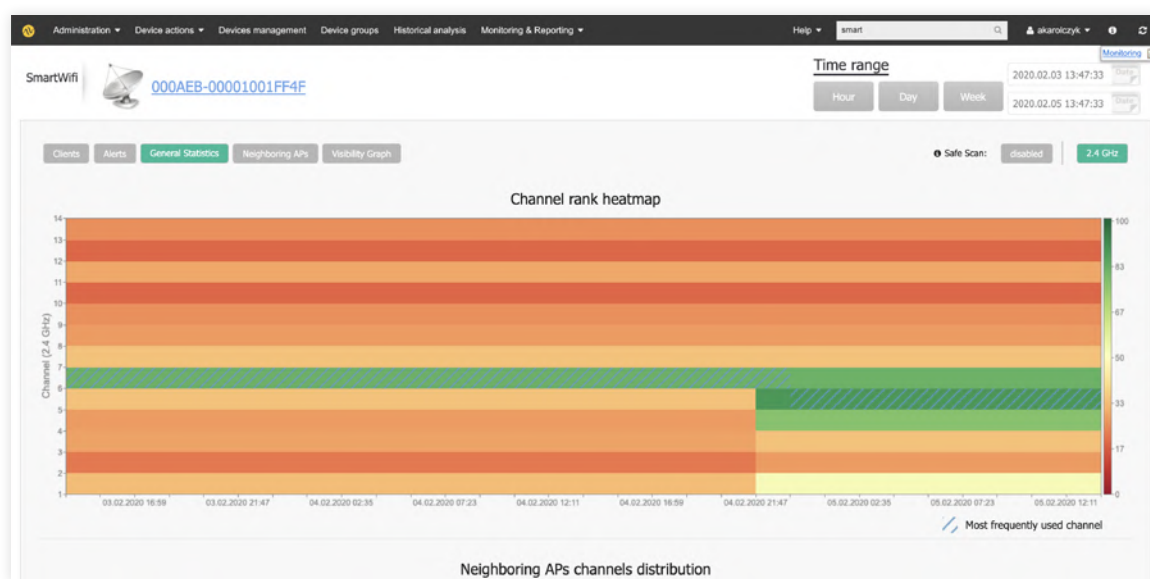
TAKE WIFI EXPERIENCE TO THE NEXT LEVEL with UMP WiFi Optimization



Unified Management Platform

Overview

Telcos provide end-users with the fastest possible Internet (investing a lot of money in infrastructure). Then media-services providers offer streaming services to these end-users over the Internet utilizing this already existing infrastructure. And usually, end-users pay more for these services than they do for Internet access. The question is: how can you monetize better after spending so much on the costs of infrastructure and customer acquisition? The traditional solution is OTT (over-the-top) services where ISPs bundle Internet access with new content such as television, streaming services and the like. Not only is the competition in this area very costly, but, at the end of the day, **customers will not appreciate any of the OTT services if they cannot watch them comfortably from their laptops or phones due to poor WiFi reception.** This is a huge focus of the telecom industry at the moment and an area of innovation with WiFi Mesh and WiFi 6 technologies. While this is the future, telecoms also need to answer the needs of their customers today—with the existing technology at hand. We are happy to announce our solution to make your Internet and WiFi access top-class with UMP WiFi Optimization!



The need for a dedicated WiFi optimization solution

Most popular WiFi band is overpopulated

WiFi 2.4 GHz is the most widely used WiFi frequency band. Unfortunately, it is not perfect—its main problem is signal quality suffering from the widespread use of this band. Whenever there are multiple transmitting (neighboring routers, bluetooth devices, microwaves) and receiving (phones and laptops) devices, the physical WiFi signal in the air gets distorted and loses both its range as well as data capacity. Imagine a room full of people talking all at the same time—there's no space for clear communication in a place like this.

Existing channel management solutions are insufficient

The WiFi standard specifies multiple channels (frequency ranges), so it's important for a device to select the right channel to reduce channel congestion. While most of the routers offer auto-channel selection capabilities, there are various problems, such as the fact that vendor-specific implementation is not easy to verify and lacks information about neighboring routers configuration. The important aspect to keep in mind is that if one router changes its channel, the neighboring router might react and change its channel too, rendering the initial change of channel for the first router suboptimal. The environment where multiple routers detect each other is dynamic and algorithms located on CPE will not work correctly. They also offer little performance metrics and no analytics or historical data whatsoever.

A WiFi experience solution is critical for a Service Providers business

Once the customer calls with complaints about his recurring WiFi performance issues, there is not much that a customer care operator can do to improve the customer experience. Things would be different, however, if only the operator had access to AVSystem's solution!



UMP WiFi Optimization

The WiFi Optimization solution is a flagship UMP monitoring module aimed at improving customer WiFi experience. It offers crucial insight into end-user home WiFi performance over time and features an algorithm that accurately chooses the best WiFi channel at any moment. UMP WiFi Optimization stands apart from the competition in multiple ways.

Accurately visualize home WiFi experience with Key Performance Indicators

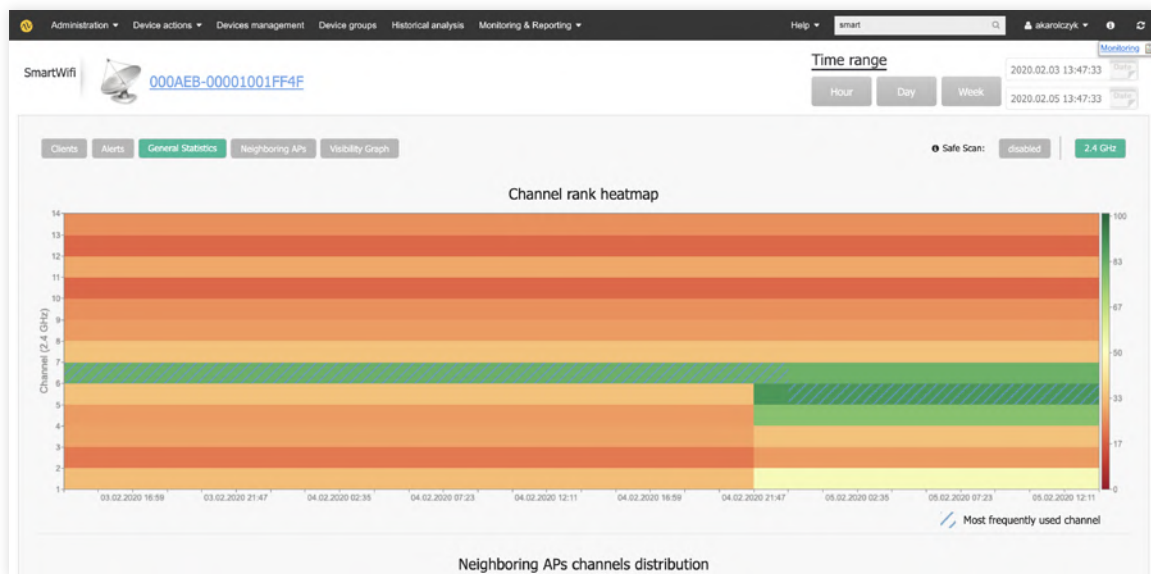
The WiFi Optimization analytics were designed not only to visualize one managed router, but the full network graph of all routers within one another's reach. It can group devices by signal strength and channel rank algorithm, as well as present Key Performance Indicators such as Signal to Noise Ratio (SNR) for both single devices and groups of them.

Gather insight directly from the device's hardware

While TR-069 (CWMP) is an industry standard for managing the devices, some of the information allowing for more advanced WiFi fine-tuning available on the WiFi hardware chip is simply not present in the CWMP data model. UMP WiFi Optimization offers game-changing per-device-vendor analytics insight with a library of ready-to-use device integrations based on years of industry experience.

Instantly react to WiFi alerts using UMP Smart Workflows

Not only are alerts raised when the performance metric threshold is reached, but also the operator can immediately perform repair action due to the UMP [Smart Workflows](#) integration. The WiFi repair actions can also be executed automatically—dramatically optimizing the costs of the ISP’s customer care center.



Sign up for the future with us

Answering the market need, the WiFi Optimization solution is being actively improved. It recently started to feature a WiFi channel selection algorithm calculating the best channel for a whole population of all routers managed by the platform instead of industry-standard single device algorithm only. The future versions are also going to take into consideration the WiFi Mesh and WiFi 6 innovation.

Key Features

Analytics presented as timelines of important WiFi Key Performance Indicators (KPIs) such as signal strength, signal to noise ratio (SNR), downlink retransmissions and failures, downlink/uplink bandwidth availability and consumption, channel swaps, channel rank score and many more.

Channel ranking algorithm based on extensive research and WiFi transmission physical signal studies calculating the best channel for a whole population of all routers managed by the platform instead of industry-standard single device algorithm only.

Several ways of visualizing the home WiFi experience: all devices grouped by signal strength or channel rank algorithm score and a graph of all SSIDs visible by routers connected to the UMP system.

Alerting—both historical and ongoing (when performance metric threshold is reached) along with an ability to instantly solve them using the UMP Smart Workflows integration.

Brand new monitoring streaming engine integration allowing for very frequent (every few minutes) data sampling and featuring Machine Learning and Artificial Intelligence for fault prediction.

Ability to distinguish routers used in residential / business scenarios based on their type of use.

Ability to gather parameters directly from a device (with no CWMP data model limitations) for a game-changing per-device-vendor analytics insight with a library of ready-to-use device integrations based on years of industry experience.

Full integration with AVSystem's UMP platform—one platform for an Auto-Configuration Server (ACS) for all of your services across all access technologies and protocols

Want to know more? Below you can find **two in-depth use-case chapters**. The first one gives you insight into **how the workflow-monitoring integration can help you transition your customer care to a fully automated future**. The second chapter gives you **a full grasp on WiFi Optimization mechanics and its capabilities in dealing with channel congestion issues**.



UMP WIFI OPTIMIZATION USE CASES

WIFI OPTIMIZATION USE CASE #1

WiFi monitoring performing automatic repairs with the UMP Smart Workflows

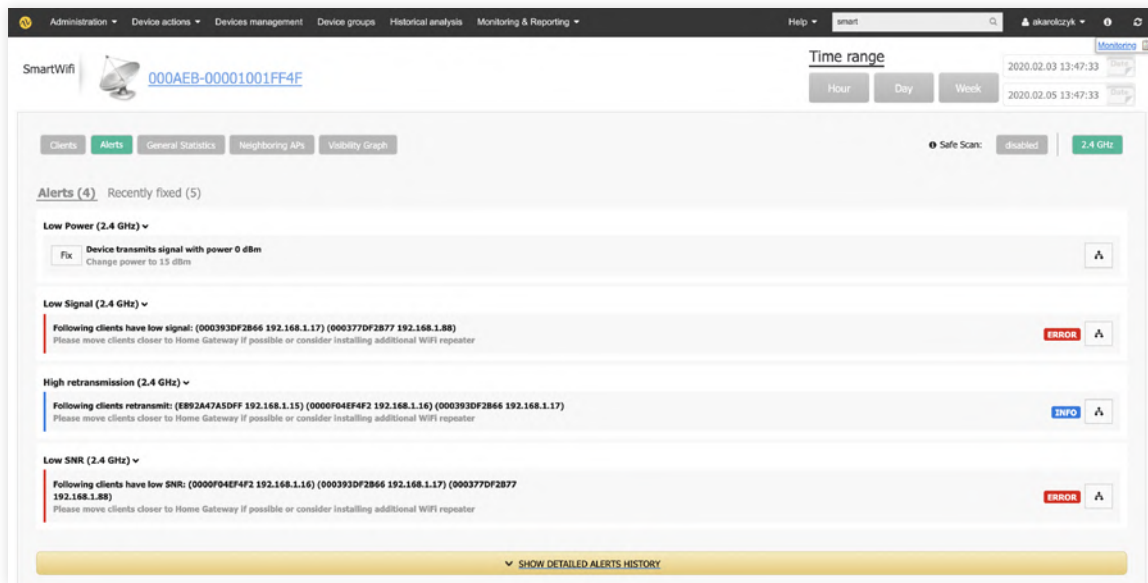
Problem statement

Let's consider a basic customer care story to explore how monitoring and workflows can automate customer care. Let's say an operator receives a call from a frustrated customer claiming that his WiFi has been working very slow since the beginning of last week. If the operator doesn't use a management platform with WiFi monitoring, he lacks historical context and has less solutions to choose from. The issues might range from poor signal to particular device or overpopulated WiFi network to channel automatically chosen by the device being overused by neighboring routers. Diagnosing the issue can not only be a lengthy process, but there's a fairly good chance that the operator will not be able to propose any working solution at all.

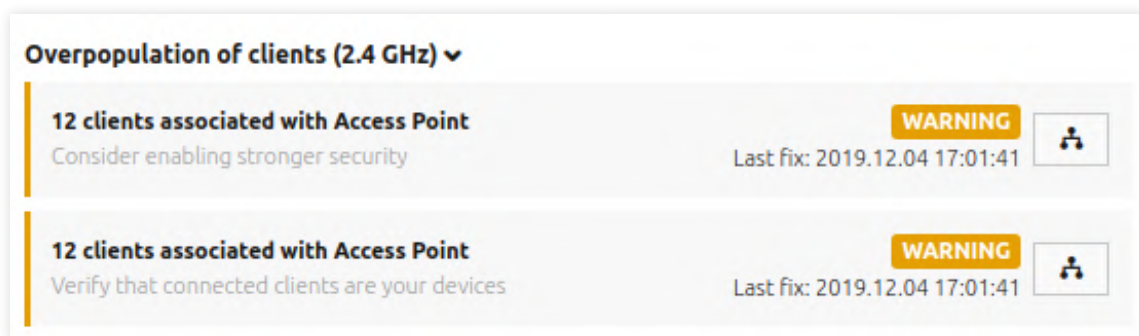
Standard solution

Over the years, UMP has gathered a really large amount of insightful monitoring operations, providing historical trends, reporting and alerts of key parameters for devices using various access technologies. But no matter how insightful the analytics, after receiving an alert from either the monitoring or the call from the end-customer, often the actual repair action must be performed. In the case of customer issues with slow WiFi an operator can usually see frequent WiFi channel switches and multiple connected clients from analyzing multiple monitoring charts, but the troubleshooting process is slow and inconvenient. It also requires a well-designed and tedious staff onboarding process. What if there was a better way?

AVSystem solution using workflows

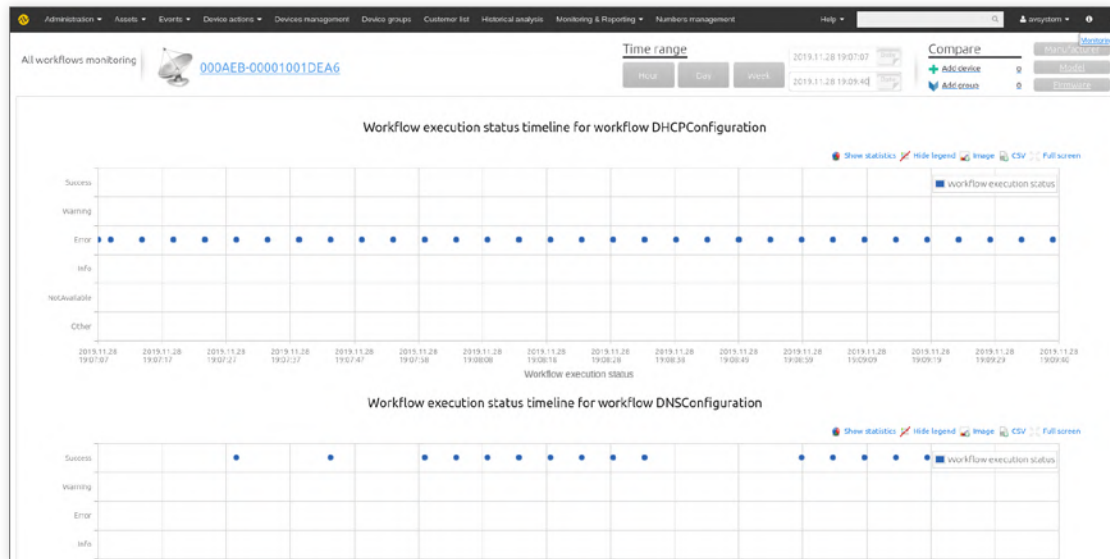


UMP WiFi Optimization solution is the answer thanks to the use of workflows! WiFi Optimization is not only a flagship UMP monitoring offering crucial insight into end-user home WiFi performance but also an algorithm allowing to choose the best WiFi channel, and now it even makes alert repair actions easier than ever. After seeing the diagnostics, the operator can apply the solution right away, right in the same graphical panel.



In the aforementioned use case of slow WiFi, sometimes the solution is to let the customer know that his home network has a suspiciously high amount of connected devices, which might be caused by WiFi security turned off, resulting in neighbor devices being illegally connected to his network.

Since the workflows are configurable in the GUI—operators can easily extend monitoring repair actions with their own custom scripting. But as great as it sounds, some technical actions (in this case a low transmit power setting on a device) still require a manual action by an operator. Can we do better?



AVSystem is proud to answer with a resounding “yes”—workflows themselves can be run as a monitoring task! This way the operator can follow historical trends of initial step workflow diagnostics—either his custom ones or multiple default ones provided using AVSystem’s expertise in device management. And once the workflows for operator’s use case are battle-proven during numerous manual interventions, all that’s left to do is to mark them as automatically executed monitoring workflows. Now, the operator only needs to check the historical reports from time to time to witness how his tool solves his end-customer issues. Lack of manual errors, full historical introspection with analytics and repair actions happening before the customer even notices his issue—simply rock-solid automation.

What we’re describing is unprecedented on the market and we believe that you need the absolute best tools for your business: UMP WiFi Optimization and UMP Smart Workflows are the best answer to the needs of your customer care.

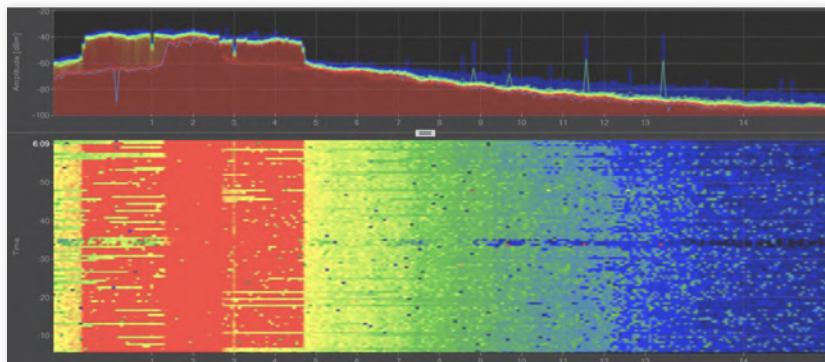
WIFI OPTIMIZATION USE CASE #2

Analysis of WiFi channels used in a population of routers

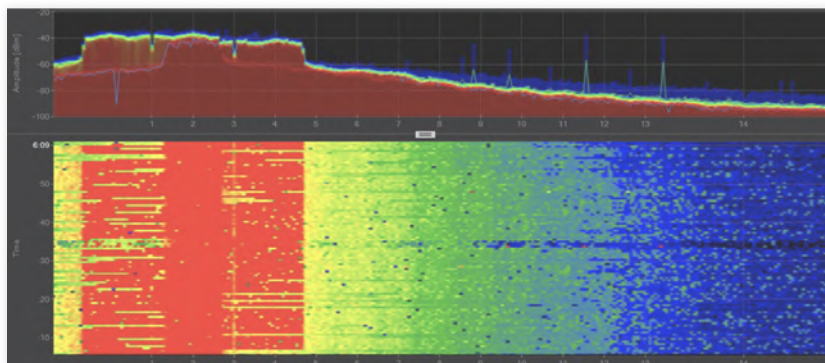
Problem statement

Due to a growing number of WiFi Access Points in households, many of them interfere with one another which results in poor quality of Internet on the WiFi end-devices such as laptops, computers or smartphones. The purpose of a WiFi management system is to find an optimal channel configuration among Access Points placed in direct neighborhood.

There are two types of interference—Co-channel interference and Adjacent-channel interference. The below screenshots are from WiFi Spectrum Analyzer and present congested environment and optimized environment

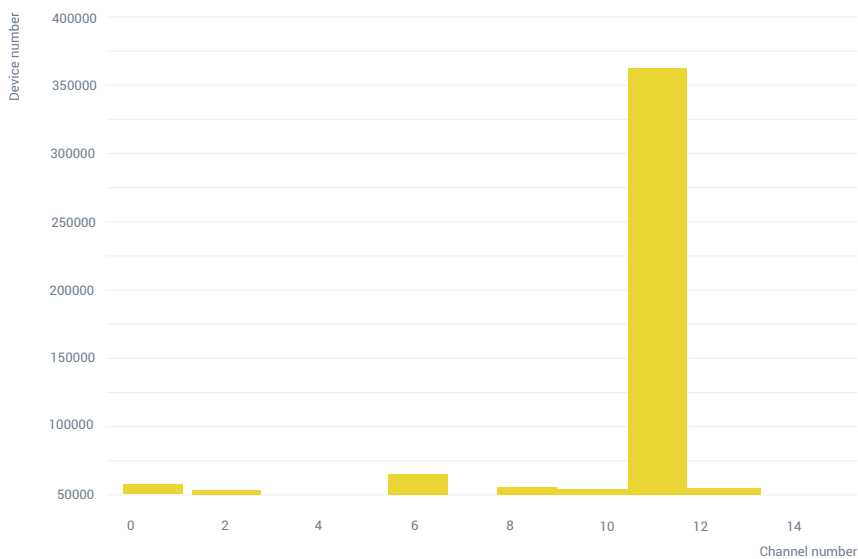


Channels interfering with one other



Channels in optimal state

Without WiFi monitoring, the environment is usually not optimized. The below screenshot presents channel distribution on the network with 764k devices which doesn't have WiFi channel management enabled (not all devices are taken into account as some of them do not report a current WiFi channel):



Channels distribution

Infrastructure components

Infrastructure consists of:

- AVSystem Unified Management Platform with WiFi Optimization module—enabling provisioning, monitoring and reporting
- Access Points installed at customer's premises.

Environments description

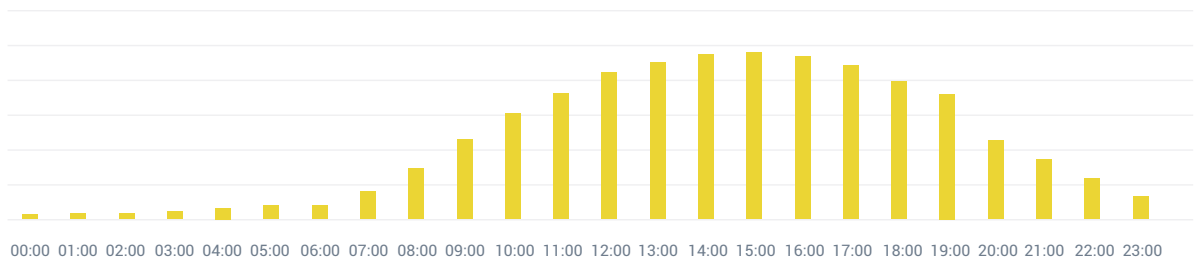
There are two main working environments for WiFi management described below. They differ in the amount of information the system can retrieve which affects final optimization results.

Fully managed environment	Mixed managed environment
<p>All APs in the neighborhood are managed by the WiFi Management system (usually from a single telco carrier).</p>	<p>One part of APs in the neighborhood is managed by the WiFi Management system. The second part of APs is provided by other telco carriers, making data retrieval impossible.</p>
<p>Much more possibilities available due to monitoring data available from all APs—not only the ones which are being optimized in a given algorithm step.</p>	<p>Possibilities of data acquisition are limited only to devices to which the system has remote access. This limits monitoring data available for the channel selection algorithm.</p>
<p>Lower scan frequency required due to the “sandbox” environment (no external interferences).</p>	<p>WiFi neighborhood scan is required to check for possible environmental changes. Usually scanning WiFi neighborhoods means disconnection of WiFi clients for 10-15 seconds. What is more, it cannot be executed on a regular basis. However, the system has built-in mechanisms for checking WiFi hosts activity to avoid scanning when they are active.</p>
<p>Access to bandwidth consumption monitoring data allowing you to create a more accurate access profile.</p>	<p>Access to bandwidth consumption monitoring only on managed devices.</p>
<p>Low probability of having such a setup environment for residential customers—usually applicable only for bigger business installation e.g. shopping malls, company buildings.</p>	<p>The most common case for residential customers due to a variety of Internet providers.</p>

Fully managed environment algorithm scenario

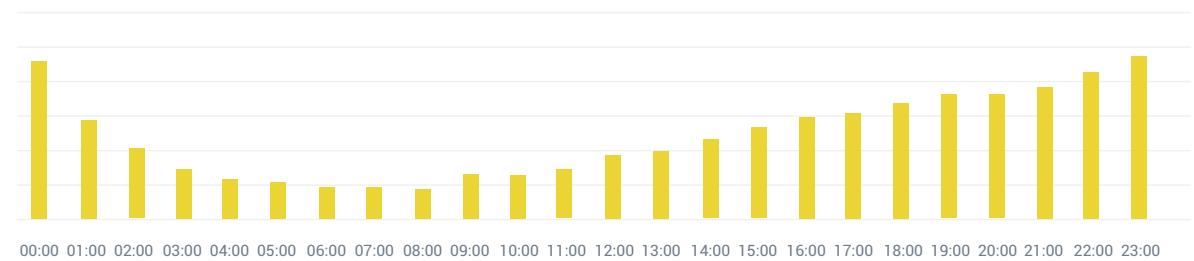
In this scenario the system manages all Access Points within a single environment having access to their parameters remotely.

4x APs used within a nearby restaurant (R1, R2, R3, R4) with following bandwidth consumption statistics:



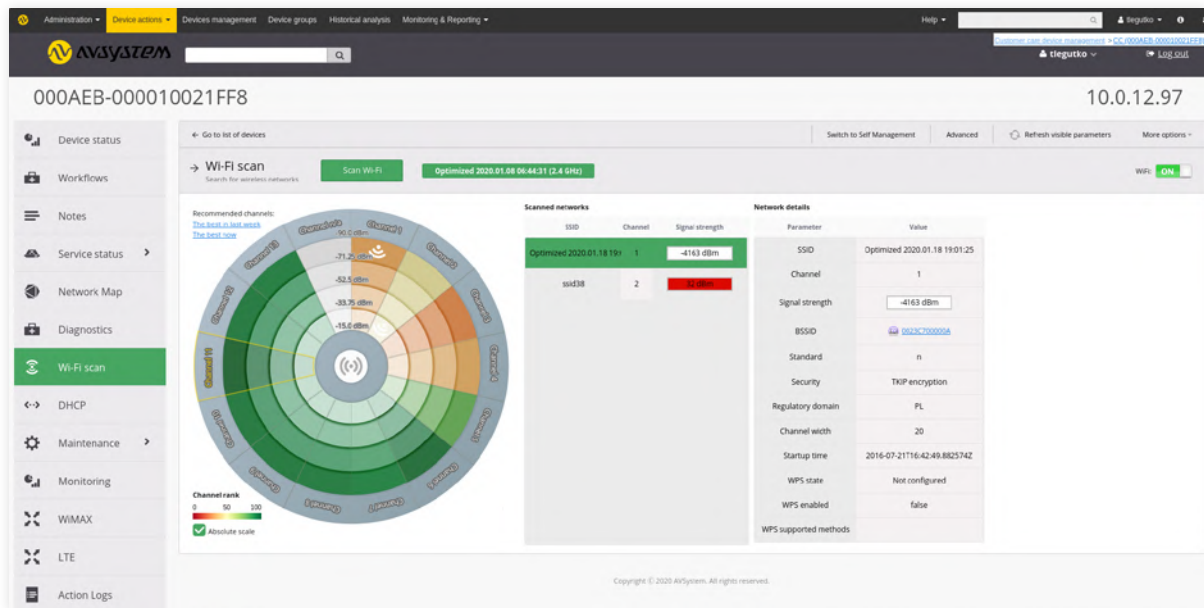
Real Average Consumption in AVSystem's Unified Management Platform © for small/medium business owners of restaurants, shopping malls (1514 APs)–profile for Business AP assumed

10x APs used for Internet access in nearby households (e.g. on floor above restaurant) (H1, ..., H10):



Real Average Consumption in AVSystem's Unified Management Platform © for residential customers (764k CPEs connected)–profile for Home AP assumed

As you can see, residential and business Access Points have different link consumption profiles and this can be used for better WiFi channel optimization. Automatic channel selection available on devices does not take into account such sophisticated monitoring data. Take a look at the following setup:



In such a case, WiFi setup is the worst possible as residential devices are in the same channels and business APs also interfere with one another in the same activity hours.

Mixed managed environment scenario

This scenario assumes a limited level of control over Access Points i.e. not all monitoring data is available as part of devices. Its algorithm is basically the same as in fully managed environment algorithm scenario, but the system has limited access to device bandwidth consumption information and the algorithm must rely only on some average assumptions. It also has to adapt to e.g. retransmission count after initial setup and run a few iterations of WiFi Optimization.

Summary of use case #2

After execution of the WiFi Optimization algorithm in big telco networks, wireless service quality is significantly improved, no matter which one of 2 scenarios presented in this use case is used. Improvements reach up to 30% better WiFi throughput and stabilized WiFi connection which is very important for online computer gaming and comfortable Internet browsing. These factors directly affect the CHURN rate and overall service reception among customers.

UMP

Unified Management Platform (UMP) is a highly scalable and flexible multi-protocol system for provisioning, management and monitoring of various types of devices. As an industry-proven device management platform UMP offers many powerful mechanisms that allow efficient management of any type of devices via various protocols. Some of the platform's features are:

- Single and group device automated management
- Flexible modelling of customer business processes and provisioning workflows
- Customer Care with configurable Graphical User Interface
- Quality of Experience with diagnostics, monitoring and comprehensive reporting for devices and groups
- Scalable architecture, high availability, capable of handling millions of devices
- SLA guarantees with 24/7 premium support
- Easy integration with OSS/BSS systems
- Devices auto-discovery
- Multi-tenancy
- Mobile Self-Management

About us

No IoT deployment is successful without proper device management—this is what AVSystem stands for. AVSystem is an expert in its field. We help companies around the world deliver better quality of service thanks to our top-class device management solutions. We also focus on WiFi VAS & indoor location as well as other systems for SDN and NFV. Apart from creating software, we actively participate in the standardization process of the LwM2M standard to enable secure device management and service orchestration in the IoT ecosystem. 100+ large companies worldwide prove the superiority of AVSystem's technology. If you want to know how you can benefit today by using the Coiote IoT suite please contact us:

E-mail: sales@avsystem.com

Homepage: www.avsystem.com





www.avsystem.com

sales@avsystem.com

+48 12 619 47 00

ul. Radzikowskiego 47d

31-315 Kraków

