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Aruba, a Hewlett Packard Enterprise company, is the global leader in secure, intelligent edge-to-cloud networking solutions that use AI to automate the network, while harnessing data to drive powerful business outcomes. With Aruba ESP (Edge Services Platform) and as-a-service options, Aruba takes a cloud-native approach to helping customers meet their connectivity, security, and financial requirements across campus, branch, data center, and remote worker environments, covering all aspects of wired, wireless LAN, and wide area networking (WAN).

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AIOps For Dummies®, Aruba Special Edition

Published by
John Wiley & Sons, Inc.
111 River St.
Hoboken, NJ 07030-5774
www.wiley.com

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ISBN 978-1-119-76647-6 (pbk); ISBN 978-1-119-76648-3 (ebk)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

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Publisher's Acknowledgments

Some of the people who helped bring this book to market include the following:

Project Editor: Elizabeth Kuball

Acquisitions Editor: Ashley Coffey

Editorial Manager: Rev Mengle

Business Development Representative: Karen Hattan

Production Editor: Siddique Shaik

Special Help: Faithe Wempen, Trent Fierro, Larry Lunetta, Jackie Sandoval, Nancy Robbins, Sri Venkiteswaran, Robin Jellum, Jose Tellado, Ramya Shayini

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Introduction

If you're thinking the term *AIOps* sounds like the name of a sci-fi nemesis, think again. First, it's not a foe, but rather the new best friend of IT professionals. And second, it's not fiction, but real-life technology today.

Let's begin by breaking down the term, in case it's unfamiliar. The first part, *AI,* stands for *artificial intelligence,* an up-and-coming computer technology that enables computers to imitate some human brain functions, such as critical thinking, problem solving, and learning from experience. AI is everywhere you look today. It's in our phones for natural language processing, it recommends movies on Netflix, it predicts the weather, and it takes all that IT data and provides insights for managing IT operations.

More recently, network operations has taken advantage of the massive telemetry data sets to bring the power of AI to managing complex networks. That's where the second part of the acronym comes in. *Ops* is short for *IT operations,* all the activities and equipment that IT professionals use to create the networks businesses need to achieve their goals.

AIOps was first defined in 2019. Gartner defines it by saying it "combines big data and machine learning to automate IT operations processes, including event correlation, anomaly detection, and causality determination." With AIOps, IT departments can easily scale network capabilities, quickly spot anomalies and breaches, and continuously optimize operations without bogging down IT professionals in busywork.

About This Book

AIOps For Dummies, Aruba Special Edition, is your guide to using artificial intelligence to enhance business network performance, reliability, and ease of management. Don't let the compact size of this book fool you. It's loaded with information that can help

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you understand and capitalize on AIOps in your enterprise. In this book, we:

- Explain the challenges of modern IT management.
- Show you how you can use AIOps to modernize network operations.
- Highlight what to look for in an AIOps solution.
- Explain what makes Aruba AIOps a best-in-class solution.

Foolish Assumptions

In writing this book, we've gone out on a limb and made some assumptions about you, the reader:

- You're an IT professional or a manager who provides input into a company's IT strategic decisions.
- You have a basic familiarity with networking products and processes and are acutely aware of the problems with your company's current networking and IT operations.
- You're interested in learning about new ways to improve performance and streamline costs.

Icons Used in This Book

To make it easy to find the most useful information, we use the following icons in the margins:


REMEMBER

The Remember icon highlights key takeaways you'll want to remember.


TIP

Anything marked with the Tip icon can save you time and effort.

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WARNING

The Warning icon marks potential pitfalls on the road ahead.



TECHNICAL STUFF

We use this icon when we get into the weeds. Don't care for the techie details? You can safely skip this without missing the main point of the subject at hand.

Where to Go from Here

The book is a reference, so you can read it from cover to cover or jump straight to the topics you're most interested in. Whichever way you choose, you can't go wrong. Both paths lead to the same outcome — a better understanding of how AIOps is used in a modern IT environment and the steps and technologies you need to move forward.

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IN THIS CHAPTER

- Recognizing network management challenges
- Improving network visibility
- Surpassing human limitations
- Using network data to make business decisions

Chapter 1
Understanding the Challenges of Modern IT Management

Operating a network continues to become increasingly complex with the adoption of Internet of Things (IoT) devices, more remote workers, use of the cloud, distributed and clustered networks, software-defined wide area networks (SD-WANs), and more.

The growing reliance on the network brings greater expectations for improved network performance, increased resiliency, and more powerful security, which together create better user experiences. Recent advances in artificial intelligence (AI) technologies have made it possible for network operators to meet these challenges and deliver business-driven services across the organization.

In this chapter, we review some of the operational challenges that today's IT departments face in providing the network services that their users want and need. We also take a firsthand look at how the application of modern AI can help. By that, of course, we mean AI for IT Operations, or AIOps.

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Identifying the Challenges of Modern Network Management

Network management systems have improved through the years, but they still require manual interaction. They fall short of the requirements needed to operate a large-scale or even smaller infrastructure today, including wired, wireless, and SD-WAN solutions. Why the shortfall? Because the number of endpoints, topology complexity, volume of network data, and variety of business use cases have skyrocketed.

Amid this continued expansion of network requirements, IT departments have had to answer such important questions as the following:

- **Where do you invest your limited time?** Time is one of the determining factors in what any team can accomplish.
- **What issues are causing the most pain?** Perhaps you need to meet end-user performance and uptime agreements.
- **What issues are hiding under the surface?** Underlying problems may be creating bottlenecks or unnecessary obstacles that impact the user experience.



REMEMBER

The number-one goal is end-user satisfaction. One way IT departments are addressing this goal is with network management systems incorporating AI to augment and enhance the network team's efforts. AI is a bit of real-life technological magic creating "smart" software solutions that learn from experience and become better over time.

In fact, AI has become pervasive in everything from smart-home devices and appliances to self-driving cars. AI is also being applied to the challenges faced by network operators, with great results in finding and fixing problems, anticipating issues, and optimizing network operations (see Chapter 4 for more on how this works).

Gaining Network Visibility

Network visibility means being able to see what the network is doing and how well it's performing. In the past, visibility was pretty simple, because you only had a few tools and issues to look

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for. A dashboard provided a pretty good idea if any node on the network was experiencing problems. Simple ping testing could alert you to end-to-end problems.

Modern networks, on the other hand, require much more sophisticated tools. For example, today network administrators may have to deal with many different scenarios, not all of which will be under their direct control — from solving problems with work-from-home networks, to WAN connections, to cloud applications.

Manually maintaining and operating these networks is manpower intensive and prone to errors. Beyond that, the reliance on the network has increased the pressure on IT to deliver 24/7 service, with the best experience possible.


REMEMBER

One way many networking vendors are dealing with the growing reliance for always-on networking is to automatically collect data from clients, wireless access points, switches, and WAN gateways, and send it to a cloud-based data lake. This approach provides the insights to streamline the management of diverse networks from a central point.

Overcoming the Human Factor

The goal of AI in networking is to augment the capabilities of humans. Using AI offers 24/7 visibility and the continuous monitoring of an environment that is well beyond the scale and complexity of purely manual techniques. This allows IT professionals to troubleshoot and optimize networks at a level that goes far beyond what they can handle alone.


REMEMBER

Networking is a foundational technology that underlies businesses of almost every size. The larger the business, the more complex the networks are. For a business to grow, the foundation must be flexible enough to adapt to rapidly changing requirements.

AI is essential because it recognizes patterns and deviations that are impossible to spot using manual processes. For example, a network operator may see network congestion and not completely understand what's causing the slowdown.

AI makes it possible to spot patterns that an operator may miss. It combines large amounts of data with advanced mathematical

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models to recognize abnormalities, similarities, and other insights that help manage, diagnose, and maintain modern networks.

The ability to automatically understand normal and acceptable behaviors, or baselining, offers a new level of visibility on how well the network is operating. That, then, allows insights to be gleaned from constant data gathering and analysis. The result: Alerts are sent to the IT team and issues flagged, along with recommendations for taking action. In some cases, changes are made automatically.


TIP

Networks have a large number of parameters that can be tuned to optimize their efficiency. AI gives you greater and faster visibility into how your networks operate and what's needed to fix an issue or optimize the performance of a network.

Improving the efficiency of your networks allows for a better user experience and can even enable you to do this without adding costly hardware. This can also allow your IT department to achieve goals or contractual service-level obligations with other departments by reducing or eliminating network interruptions.

Gaining New Abilities from Network Analytics

AI generates new possibilities that go far beyond network troubleshooting, administration, and optimization. When you consider the amount of data that the network and clients can provide, you can create all sorts of new business outcomes and use cases.

For example, later in this book, we also show you how AI has enabled vendors to create contact-tracing applications. These applications deliver a very accurate snapshot of where users are spending time using network data, enabling companies to create safer and healthier workplaces for people.

Businesses using AI throughout their IT departments are enjoying cutting-edge applications that allow them to be more competitive and meet the growing demands of technological complexity. Freed from day-to-day and reactive network management tasks,

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network engineers can work on new and innovative initiatives that use their existing hardware and data, such as location services and IoT projects.



WARNING

IT teams that fail to keep up with the adoption of AI-based solutions will not remain competitive. Combining analytics with action is part of a revolution designed to improve how large and small networks are managed, with as little strain on IT resources as possible.

This revolution has the power to improve uptimes, free network engineers from countless hours of manual labor, and save organizations large amounts of money. They can even create new ways of using the infrastructure and data they already have.

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IN THIS CHAPTER

- Creating actions using data
- Determining the root cause of an issue
- Proactively addressing problems
- Enabling a continuous cycle

Chapter 2
Modernizing Networking Operations with AIOps

In Chapter 1, we introduce you to artificial intelligence (AI) at a high level, along with some general concepts. In this chapter, we show you how AIOps is being used specifically in the network sector. We also spell out some of the benefits IT teams and organizations should expect.

Using Data and Analytics to Create Actions

A single network device can generate numerous data points or telemetry, which include throughput, latency, and resource efficiency. Together, these things tell you how your network is operating. When this data is stored in a data lake, it's used to build and train machine learning models that AIOps solutions rely on.

Think of a data lake as a consolidated repository of historic and current operations information. Models, meanwhile, are software designed to recognize when a network is performing well — and when it's not.

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When AIOps is introduced, it enables the network to continually learn what is normal, identify when there are deviations, and figure out what's needed to optimize the performance of the network. AIOps can simultaneously track many more parameters than humans can do on their own.

The benefits are twofold:

- A network that self-diagnoses problems and offers stable network connectivity, which is the number-one goal of any IT team
- The ability to identify performance issues and provide recommended optimization changes that deliver the highest quality of service at the lowest cost, guaranteeing the best end-user experience

An additional advantage is that AIOps solutions continually learn and provide insights as an environment evolves. Proactive changes can be made, instead of waiting for help-desk calls. In some cases, AI-powered insights have increased network throughput by as much as 25 percent.



REMEMBER

AIOps involves a deep understanding of how networks and clients work together. Make sure your AIOps solution provider has the required experience across a varied install base. That's the best way to ensure you'll receive trusted recommendations that match your network scale and configuration.

AIOps should not only keep your network performing when there are issues. It should also continuously learn and provide recommendations to optimize network performance as environments change.

Getting to the Root Cause

Stresses on a network can come from any number of factors that may introduce inadvertent and unexpected problems. For example, in times of crisis, the holiday season, or a large sporting event, people turn to the network for immediate information. When everyone does this at the same time, it can strain a network.

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The number of things that can degrade or cause a network to fail are innumerable. The search for the reason is known as *finding the root cause*, and it's typically the job of a network operations team.

AIOps in a traditional IT role assists engineers in finding problems and offers insights into how those issues can be quickly resolved. The engineer can then review the information provided by the AIOps solution and decide how best to correct the problem.

Suppose that a switch in a remote location is experiencing a problem that intermittently causes client issues. Manually pinpointing a degrading Ethernet port would be difficult, but if an AIOps solution were continuously capturing port statistics, it could do exactly that. The underlying models identify a deviation, allowing a network engineer to quickly resolve the issue.



REMEMBER

AIOps works in partnership with network engineers. The goal is to provide them with the data and recommended actions they need to perform their roles more efficiently.

Resolving Problems Before They Happen

The true power of AI is the ability to forecast and predict possible problems that aren't immediately apparent, perhaps because they happen over time, or maybe they haven't impacted users yet. Recognizing these hidden faults is exactly where IT teams can benefit most.

As described earlier, AIOps solutions will generate insights by spotting anomalies based on key performance indicators (KPIs). For instance, if a radio in an access point (AP) is slowly degrading over time, the AIOps solution would spot a deviation, pointing to issues clients are having when connecting to this specific AP.

Insights would alert the IT team to the fact that the AP is not operating within a normal range. Insights would also point out possible reasons, one of which could be that the AP may be experiencing a hardware failure. This avoids having the radio simply fail. At that point, of course, you'll start hearing from end users, but wouldn't you rather resolve the problem even before they report it?

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Not all issues involve hardware failure. Wireless networks are subject to interference, latency, and a variety of other issues not directly related to the network. Those issues could involve authorization, authentication, and accounting (AAA); Dynamic Host Configuration Protocol (DHCP); and Domain Name System (DNS) problems. This means more and more training for your IT teams, more time away from the office, and costly certifications.

Instead, AIOps will examine telemetry data to quickly identify an issue and provide a recommended action, with over 90 percent efficacy. This, in turn, reduces the number of trouble tickets that network administrators are required to deal with and ensures that service-level agreements (SLAs) are met. The end result: the highest level of user satisfaction.

Nothing Stays the Same

Just like the environment around you, a network is prone to constant change. One day it can be a wide area network (WAN) link that goes down, or a floor plan is altered that causes your wireless coverage to degrade. An increasing number of devices or a change in roaming patterns can also impact the performance of a network if a default configuration is being used.

AIOps solutions are designed to continuously offer insights that adjust to your changing network environment and needs. In fact, the optimal solution also provides a learning opportunity for new IT members joining the team. They can see what changes were made in the past and who on the team was responsible.


TIP

Look for a solution that dynamically baselines an environment and automatically adjusts SLAs or expectations. Otherwise, static thresholds will require you to manually make changes as an environment evolves over time.

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IN THIS CHAPTER

- Recognizing the role of the cloud
- Building large data sets for machine learning
- Seeing the benefits of continuous learning
- Staying away from smoke-and-mirrors AIOps systems

Chapter 3
Knowing What to Look for in an AIOps Solution

Not all AIOps solutions are created equal. Each of the companies behind these applications has different capabilities, strengths, and weaknesses.

When determining which AIOps solution to deploy, consider more than simply the look and feel of the user interface (UI). You also need to understand the value of the cloud, the depth of artificial intelligence (AI) expertise, and the domain knowledge of the company building the application. An AI solution for general business intelligence is not the same as one designed to improve IT efficiency. This, in addition to the quality and variety of data collected, is key to understanding the capabilities of the application, how it operates, and the trustworthiness of the insights provided.

In this chapter, we provide you with criteria for evaluating various AIOps solutions. We also cover how machine learning works, why continuous learning is vital, and how troublesome it is when you tap into a system that reaches erroneous conclusions.

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Understanding Why the Cloud Is Important

The cloud serves many valuable functions in today's network environments. One is to provide a centralized location for telemetry that's collected from each network and client device. Storing this data in the cloud gives you the ability to pull data from thousands of installations. (You can find more about the quantity and quality of data in the next section.)



REMEMBER

The cloud also ensures that data scientists from the company delivering the AIOps solution have faster access to the data that's used to train and retrain machine learning models. This makes it easier to updates models as well as the UI, search patterns, and underlying software.

From a user perspective, the cloud also makes it easy for network administrators to quickly gain access to new features and associated benefits.

TYPES OF MACHINE LEARNING

Supervised learning teaches a machine algorithm by example using labeled, structured data that already exists. You train the algorithm by providing thousands of records from past events, giving it both the input and the expected output. In time, the algorithm learns what outcome is expected from various combinations of inputs.

Supervised learning is used when a wide variety of data inputs can lead to well-defined outcomes, such as the ones commonly seen in analyzing network parameters or in the natural language translation used in neuro-linguistic programming (NLP) applications.

AI does not return a "yes" or "no" answer. The results are characterized by the probability that the answer is accurate. The higher the probability, the greater the chance that the conclusion is correct.

Here's how that works: Inside the algorithm is a model containing a set of mathematical expressions that will determine a result and a probability that the result is actionable. Each of the variables in the model is assigned a *weight* (an importance level). The algorithm

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adjusts the weights of the different variables until it finds a combination of weights that enable it to analyze the training data input and accurately match the training data's known output.

The more data you have, the better your algorithm learns and the higher the probability the answer reflects reality. Also, learning isn't done once and for all. These algorithms continue to learn as new data is introduced. For this reason, having a steady stream of high-quality data is critical for an application to provide trustworthy insights.

For example, an image-processing model designed to identify pictures of dogs from a group of four-legged creatures may be correct 50 percent of the time after being trained on a million images, but its accuracy may increase to 90 percent after seeing a billion images.

Not all learning requires training data. *Unsupervised learning* algorithms find patterns and features in data without the help of known inputs and outputs. This type of learning is most often used for finding similar network configurations and anomaly detection in AIOps systems.

Reinforcement learning systems are algorithms that operate a bit like dog training. They reward "good" behavior in the algorithm (that is, getting the right answer) and punish "bad" behavior (getting the wrong answer). The algorithm trains by trial and error. It's built for sequential decision-making, and its goal is always to "win," whatever the programmer defines winning as. This type of algorithm is commonly used in game play, such as chess applications.

Getting Reliable Data

When it comes to choosing an AIOps solution, a larger customer base is a wise choice. Bigger really is better, because the larger the provider's training data set, the more accurate and more actionable the insights become.


TIP

A large variety of customers across many market verticals gives the AIOps provider a wide range of data from which to deliver insights. If you're an administrator for a university, models specifically designed to solve grocery store or corporate headquarters issues won't work for your needs. To ensure results match your specific environment, you want a solution that collects data from

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many industries, including stadiums, higher education and primary schools, retail, health care, large global corporations, and small businesses.

Collecting the right data over a long period of time is also important. Getting into the AIOps business requires a company to have spent years, not weeks or months, collecting network and client data. If data has only been collected from a narrow set of industries, it's more likely that the AI insights and analytical results will be unreliable.

The data collected should also include telemetry from a large variety of infrastructure, such as wireless access points (everything from early Wi-Fi to Wi-Fi 6/6E), access to data center switches, and wide area network (WAN) gateways. This is important because, like many organizations, yours may be running a mixture of new and older infrastructure across your environment. The same is true for endpoints, especially now that more Internet of Things (IoT) devices are being connected to networks.



REMEMBER

Reliable data has all three of these qualities: volume, variety, and value.

Benefiting from Continuous Learning

There are to two aspects to consider regarding continuous learning:

- The ability to update the AIOps solution to identify how changes to the infrastructure or endpoints are affecting the user experience
- The ability to ensure that an individual customer can quickly gauge how the network performs versus similar (or peer) networks over time (see Chapter 4)



REMEMBER

The only constant in life is change. This is definitely true if you're a network administrator. Software updates to existing infrastructure, as well as to client devices or endpoints, can impact the performance of a network. Or it may be something as simple as seeing more traffic one day versus your normal baseline.

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The same is true for environments in which new infrastructure is being deployed. For example, as organizations install Wi-Fi 6 access points or a new family of switches, it's important for the solution to dynamically learn and spot anomalies related to these new devices. This will result in vastly more reliable insights.

Avoiding Systems That Reach Untrustworthy Conclusions

Nothing is more frustrating than relying on a tool to provide insights and then being steered in the wrong direction. Systems that rely on weak data science or a rebranding of common data analytics techniques do just that. The industry refers to this situation as *AI washing.*

Some companies offering AI solutions may not be able to identify problems and recommend true fixes. This may be due to a lack of experience, limited time in business, or insufficient data resources to train their models. You'll get probable root causes that force you to spend time manually troubleshooting, rather than recommendations based on a higher confidence level.



REMEMBER

When AI washing comes into play, no matter how good an AI front end looks during a demo, it's the long-term results that matter. AIOps solutions need to provide more value than just reporting anomalies. They need to recommend actual fixes. It's these recommendations that really save IT time.

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IN THIS CHAPTER

- Looking into Aruba ESP
- Finding the power of Aruba's "sixth sense"
- Seeing how it all fits together
- Taking a deeper dive
- Setting IT efficiency as the ultimate goal

Chapter 4
Introducing Aruba AIOps

In this chapter, we briefly explain Aruba ESP and how AIOps fits into its overall architecture and NetOps offering. This chapter shows you how Aruba ESP can deliver the services and information that network professionals need — with AIOps offering insights that allow network administrators to build and operate today's wireless, wide area networks (WANs) and wired networks with confidence.

Understanding Aruba ESP

Aruba Edge Services Platform (ESP) is the industry's first AI-powered, cloud-native platform that lets you build a network architecture based on automation, unified infrastructure, and protection from the edge to the cloud. Built-in AIOps features let you identify network problems and fix them before users even notice.

The AIOps capabilities within Aruba ESP include the ability to analyze massive amounts of network data, provide visibility and insights, and augment human skills.

Aruba ESP includes not only AIOps, but also Edge To Cloud Security (Zero Trust and SASE) and Unified Infrastructure, managed by a single pane of glass via a modern microservices application

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called Aruba Central. AI Insights is a feature within Central that helps network administrators identify and solve problems, as well as optimize the performance of their networks, where needed. Getting started is also easy because Aruba ESP supports flexible deployment options — which include Aruba ESP as a service, network as a service (NaaS), financing, and more.



REMEMBER

The AIOps within Aruba ESP operates on years of data that includes telemetry from each access point, switch, and gateway to provide the following functions:

- **Creating a baseline:** Machine learning uses the data to provide a dynamic baseline for each customer site, so it can identify where a network may be exhibiting a deviation from normal.
- **Classifying networks:** Aruba also groups networks into their appropriate class of peers during the baselining. This allows for recommendations based on similar characteristics instead of trying to fix problems using dissimilar network and customer characteristics. A peer or class baseline then shows how your network compares to others.
- **Providing insights and recommendations:** When networks begin operating outside of the baseline and predicted outcomes, Aruba AIOps detects the variance and provides descriptions and recommended fixes.
- **Continuous learning:** This ensures that baselines are dynamically adjusted, which eliminates the need to manually set up thresholds and revisit them as your networks evolve. Auto-adjustments are based on new clients and network devices, software updates, and even environmental changes.

Aruba's AIOps uses peer comparisons to continuously look for ways to help optimize the performance of your network. Recommendations are provided only if you'll see a 15 percent or greater improvement when compared to others.

Peer comparisons is possible because of the billions of records collected from networks of all sizes and types and the ability to use class baselines to compare your network's performance to that of similar networks.

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Recognizing the Value of Historical Data

The biggest differentiator between Aruba AIOps and many other solutions is the data on which it's trained. As explained in Chapter 3, the more data and the greater diversity, the better the insights and overall IT experience. Aruba already has access to data from more than 75,000 customers, more than 1 million network devices, and 55 million client devices.

All this data is used to train the machine learning models to recognize good versus poor network behavior. And as the customer base grows, so does Aruba's ability to learn and enhance the value of the insights provided.

Having a large customer base and this much data allows for a powerful ability to train machine learning models, solve site-specific customer problems, and offer optimization recommendations based on peer group analytics.



REMEMBER

As telemetry has been collected over the years from many different industries — such as education, health care, enterprises, retail, hospitality, and large public venues such as stadiums and libraries — the insights provided are based on apples-to-apples comparisons. This is important, because a machine learning model that recognizes how a university operates will differ from that of a convenience store or office environment.

Another important aspect is the variety of network infrastructure that live within these venues. Your organization may be using combinations of older and newer Wi-Fi standards, or switch series, so it's important to understand how they work together. Aruba has data for all versions of certified Wi-Fi access points, as well as WAN gateways, switches, and clients. Insights are then derived from the characteristics of a real-world infrastructure.

As previously mentioned, the variety of clients should also be a determining factor when choosing an AIOps solution. Immature AI solutions will not have access to the variety of mobile and Internet of Things (IoT) devices — building systems, laptops, gaming devices, medical instruments, and sensors — that can affect the performance of your network.

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Putting It All Together

Because Aruba has a large install base of network infrastructure, security, and user experience application performance sensors that use AI, it can offer a comprehensive AIOps solution. At the core is Aruba Central, a cloud-based operations and management interface.

Central offers wide-scale wireless, switching and software-defined wide area network (SD-WAN) deployment, management, and visibility. AIOps for enhanced automation and troubleshooting functionality is built in and called AI Insights. All customers using Central gain access to AIOps capabilities.

AI Insights pulls from Aruba's data lake of telemetry to automatically identify and pinpoint problems, and provide next steps to quickly resolve issues. Think of it as always-on IT assistance.

In addition to AI Insights, a natural language processing (NLP) feature called AI Search is built in and lets IT and help-desk staff use common phrases such as *show me network issues* for users or specific devices and sites. AI Search also enables searches for help-related content and specific configuration assistance.

To aid in the troubleshooting of hard-to-solve problems, AI Assist automatically initiates log and packet captures based on a sequence of events, which triggers engagement with a customer's IT team, as well as with Aruba's Technical Assistance Center (TAC). This is especially useful for intermittent problems and those happening in remote locations where no on-site staff is present. Both the customer's IT team and Aruba TAC have access to the log information.

Going Beyond the Basics



REMEMBER

A network is only as good as its security and ability to support the applications that users need most. Aruba AIOps includes the ability for ClearPass Device Insight to automatically and accurately profile the devices that connect to wireless and switching networks.

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This ensures that as users connect smartphones, laptops, and IoT devices, IT teams have a clear understanding of what these devices are so that they can create appropriate access privileges. For example, AI is a smart and automated way to accurately identify an approved surveillance camera versus a device set up to mimic one using its fingerprint data and behavioral patterns — data such as which devices an approved surveillance camera normally communicates with regularly and the type of traffic that it sends are taken into consideration.

Incident Detection is an AIOps feature within Aruba User Experience Insight that monitors the behavior of your applications. AI models are used to monitor Aruba's on-site sensors and synthetic tests to look for dramatic changes in behavior. Alerts are then consolidated and IT is notified if latency, outages, and other problems truly impact the user experience.

This eliminates the need for setting up static alerts and the burden of troubleshooting false positives and negatives.

Recognizing Operating Efficiency



REMEMBER

All the tools within the Aruba AIOps solution are designed to save IT teams' time and keep networks performing at their best. Each tool helps to solve real-world problems and cut down on the manual tasks of continuously tackling problems as they arise. Instead, Aruba AIOps provides the opportunity to solve problems before they impact your users and business.

Finding answers is simpler than ever. AI Insights points you to problems and offers advice to solve them. AI Search provides natural language queries of the system and a library of content. No special language or keyword tricks to learn. Simply type your question the way you would normally ask it, and you're on your way!

What's more, Aruba's AIOps architecture can easily be expanded on to provide security and application insights as needed.

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IN THIS CHAPTER

- Spotting and correcting network problems using AIOps
- Dealing with wireless performance trouble
- Handling complex issues using AI Assist
- Using AIOps to do pandemic contact tracing

Chapter 5
Exploring AIOps Use Cases

AIOps has many powerful benefits, which you'll discover as you begin using it to manage your network. As previously mentioned, AI-powered solutions enable you to identify and preempt issues before they disrupt the business, find intermittent problems faster, and even use peer comparisons to optimize your network.

Although AIOps was originally intended to keep a network performing at its best and to identify security anomalies and application-level issues, additional use cases have emerged. For instance, because AI is so accurate in correlating users' devices to a specific Wi-Fi access point, it's now being used in contact-tracing applications.

In this chapter, we describe how Aruba is using AIOps to solve some very real use cases that network administrators must deal with on a daily basis.

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Identifying and Fixing Problems

Not every problem is difficult to solve, but if enough problems occur simultaneously, they can monopolize a network administrator's time. This is where AIOps and underlying automation can help. AIOps solutions are designed to automatically provide insight for each identified problem, whether this issue is singular or tied to other troubles.

For example, if a new switch is installed to replace an older one, and a previously defined virtual local area network (VLAN) is missing, the mistake is quickly identified and a recommended action is provided.

The same is true if switches are replaced in multiple locations. The missing VLAN would be identified for each instance and insights provided via the AI Insights feature within Aruba Central. The network administrator can then quickly drill down to a specific location and to a specific switch to make the required change.

Depending on the number of switches affected, this can save anywhere from minutes to days of an administrator's time, while also minimizing the impact to users. If users have been impacted, the help-desk staff or an administrator can see which clients were affected by the missing VLAN, as opposed to those calling for other reasons.

In Figure 5-1, AI Insights displays users who are having Wi-Fi connectivity issues. In this example, you see that they're having problems acquiring an IP address from the Dynamic Host Configuration Protocol (DHCP) server. When drilling down further, you see that the issue is DHCP timeouts related to a missing VLAN.



REMEMBER

AIOps solutions are designed to identify problems based on deviations in behavior. Imagine a solution that helps you find the root cause of an issue as much as 75 percent to 90 percent more quickly and also recommends a fix.

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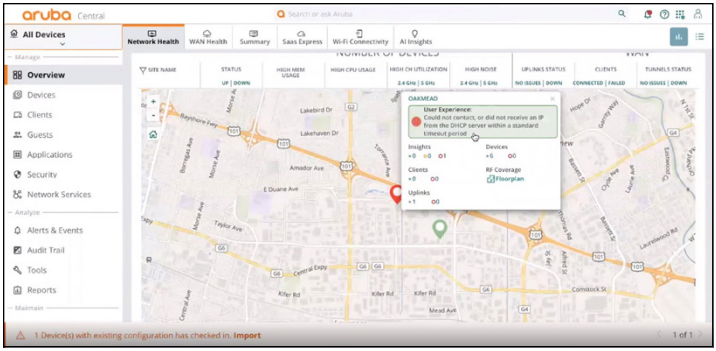


FIGURE 5-1: AI Insights shows you specific client issues.

Solving for Wireless Performance Issues

The use case in the preceding section is specific to switching, but it illustrates how a missing VLAN can affect wireless users. In this section, we take a look at a common radio-frequency (RF) problem that affects many organizations and the wireless users within retail, education, and office environments in highly dense areas.

As people walk past a store or office, their mobile devices try to connect to that location's Wi-Fi network, which can create a huge drain on the network. Although this issue may not seem like a big deal, when too many people are passing by (for example, on a busy street or in a mall), the network is continually probed by their devices.

Because these devices connect on the periphery, they have slower connections due to a poor signal-to-noise ratio (SNR), which puts a load on the access points. This can then impact the performance of the entire network, which leads to unwanted help-desk calls.

For one real-life example, Aruba AIOps recognized that some stores within a large retail chain were exceeding expected service levels. AI Insights pointed to the baselines related to SNR for those specific stores and provided reasons for failed network connection attempts. The solution also recommended the exact probe threshold settings to use for those stores.

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This replaced weeks and even months of work by an administrator and offered exact configuration changes with far greater accuracy. Some AIOps solutions identify problems but don't offer exact recommendations. Aruba's approach is to provide exact recommendations that eliminate the need for trial and error that may be required with other solutions.


TECHNICAL STUFF

Aruba's AI Insights determines outdoor clients versus indoor devices by using various types of data that are constantly collected. For example, it collects the type of access point being connected to, the SNR of the connection, and the type of clients, to name a few of the more than 15 different parameters.

In the retail example discussed, the AIOps platform used parameters such as SNR, dwell time, and the number of bytes transferred to figure out which of the connection attempts were legitimate and which were simply people passing by.

Further analysis via site comparisons determined that this problem was occurring in more than 75 percent of its stores. Increasing the threshold value allowed the network to ignore client connection requests that were likely from people just passing by.

Making the recommended changes eliminated 95 percent of the interference caused by illegitimate users and increased the performance of the Wi-Fi network by 25 percent, all without requiring any additional or more advanced hardware.


REMEMBER

This problem is not unique to retail locations. It can occur wherever there is high foot traffic, such as schools and universities, downtown office buildings, sporting facilities, and transportation hubs. Aruba AIOps has helped to determine that the problem exists in at least 30 percent of all of Aruba's customers' networks.

Fixing Critical Problems with Automated Assistance

Sometimes diagnosing and fixing network problems can be incredibly complex due to the nature of the problem. The issue may be intermittent or happen when no one is around, which leads to a lot of wasted time troubleshooting because very little data exists.

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A feature within Aruba AIOps called AI Assist automatically initiates a multistage process that helps solve network problems requiring a little more assistance than normal.

The AI Assist process begins when a critical event triggers an automatic *action plan* (a set of actions that need to be performed) and data collection begins. An action plan is based on many years of networking expertise that the Aruba team has pulled together to create a variety of recipes for solving specific problems. It's based on what is known to have worked in different scenarios.


TECHNICAL STUFF

As more IT teams are solving problems remotely, AI Assist will automatically initiate a packet capture (PCAP), alert your IT team, and even initiate making Aruba's TAC aware of the situation. The PCAP process is keenly important, as the most common networking issues include identifying DHCP server issues, Domain Name System (DNS) resolution, and incident response, and these are difficult for someone to manually monitor.

The data collected is then visible in Aruba Central, where further analysis can be performed. The IT team has access to a command-line interface (CLI), downloading of logs, application programming interface (API) calls, ping, tracert, live events, the PCAP file, and formatted stats.


REMEMBER

If AI Assist engages an Aruba network engineer, that engineer would have access to the data needed to start troubleshooting the problem — sometimes even before the customer knows a problem exists. This also bypasses engaging with Tier 1 and Tier 2 TAC personnel for a more streamlined experience.

Using AI in Contact Tracing

During the COVID-19 pandemic, businesses and universities learned just how important it is to reassure workers and students that their safety is a central focus. Everyone heard of the importance of social distancing, for example, but how could organizations enforce and monitor distancing as millions of people returned to physical locations?

Basic methods, of course, include using plexiglass partitions, limiting lunchroom and conference room access, and in many cases restricting the number of people allowed within a building

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simultaneously. It turns out, though, that AIOps offers sophisticated insights in this realm, too.

Aruba used its expertise in networking and AI to create a powerful contact-tracing solution that pinpoints the whereabouts of people throughout a location. If a person becomes infected, access-point connectivity data and AI can more accurately tell you who they may have come into contact with.

For example, if an infected person has visited the lunchroom, you can determine his length of stay, with whom he shared the same proximity based on Wi-Fi connectivity, and for how long he was in contact with each person. The same logic applies to retail, health care, education and manufacturing environments.

Figure 5-2 shows the Floors Dashboard, giving you an overview of a building.

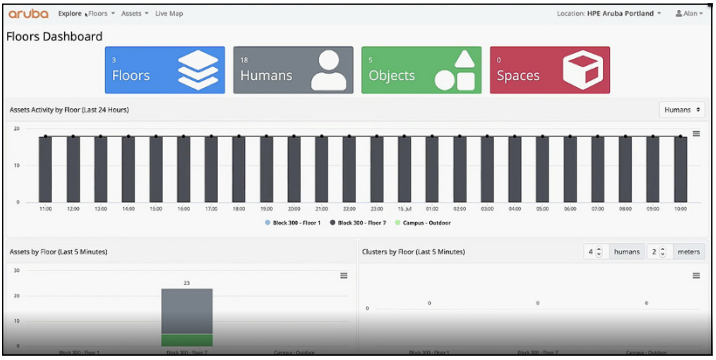


FIGURE 5-2: Contact tracing can save lives by bringing automation and location accuracy within a location.

Using Aruba access points and AIOps allows the IT team to play a role that directly helps distinguish people from Internet of Things (IoT) devices (because the IoT devices never move).

When building a contact-tracing application, here are some of the goals:

- Determining how accurately someone needs to be tracked to meet the Centers for Disease Control and Prevention (CDC) guideline of 6 feet of social distancing

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- Identifying areas within a building that are high use and may need additional disinfection
- Determining which areas of the building have people gathering in greater numbers so that a safer workplace can be engineered
- Creating an alert system for when social distancing is being violated by groups of people so they can be told to disperse
- Informing people when they've been in contact with a person who has been infected with COVID-19



REMEMBER

Note that some of these goals go well beyond tracing the contacts of individual people. Knowing which areas are high use by paying attention to how many people visit, and when, helps you create safer spaces.

And it's more than just determining when additional cleaning is required. These insights can guide efforts to modify spaces or traffic flows to limit risk. For example, an underused meeting room may be repurposed into a second break room.

A heat map of the room, like the one shown in Figure 5-3, clarifies how a space is being used.

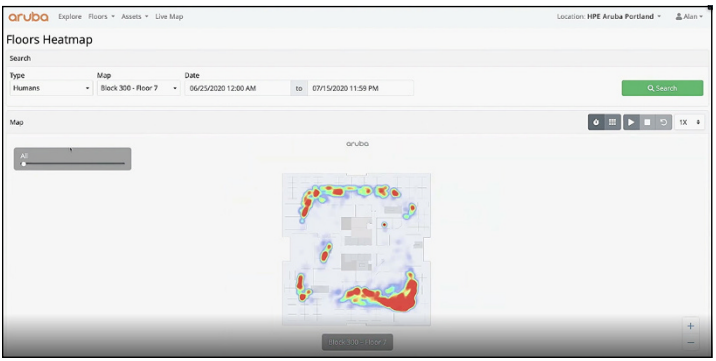


FIGURE 5-3: The contact-tracing heat map shows how a space is being used.

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IN THIS CHAPTER

- Fixing problems before they occur, and in less time
- Increasing capacity while reducing costs
- Boosting end-user satisfaction
- Understanding how your network and its apps are operating

Chapter 6
Ten Benefits of Aruba AIOps

Throughout this book, we show you how artificial intelligence (AI) in general — and artificial intelligence for IT operations (AIOps) in particular — can help network administrators provide a superior networking environment for users by giving them more visibility and automating more processes.

Here are the top ten benefits and advantages you can expect Aruba AIOps to do for your organization:

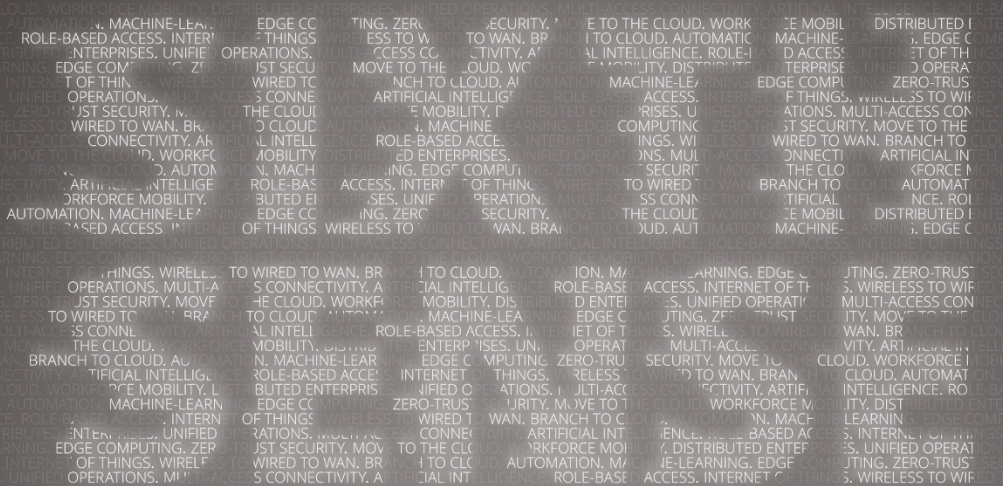
- **Solve problems before they occur.** One of the great advantages of Aruba ESP is that AIOps is integral to spotting problems that are beginning to develop. That enables you to correct those problems before they build into bigger issues.
- **Reduce resolution time.** Resolving problems has never been easier than with AIOps. Instead of hunting for the root cause of the problem, AIOps identifies a root cause for you and provides insights on how to fix the problem.

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- **Increase capacity without adding hardware.** When you optimize your network to run at peak efficiency, your network will be able to operate far beyond its previous capacity, all without adding new hardware or upgrades to existing infrastructure.
- **Reduce costs.** AIOps saves you money by reducing the amount of manpower required to maintain your network and resolving problems when they arise. When your network is operating at peak efficiency, your employees, business, and customers are more productive.
- **Increase end-user satisfaction.** Users expect high-speed throughput from today's networks. AIOps helps continuously optimize your network so it's operating at its highest efficiency, providing maximum end-user satisfaction.
- **Free up your network team.** Skilled network administrators shouldn't be bogged down doing the work that AI can do for them. Handing tasks off to AI lets them be a more creative and more productive part of the business.
- **Build scalability into the network.** AIOps delivers network efficiency and allows you to maintain operating metrics across any-size network. This creates a network that easily scales to changing demands.
- **Easily learn how your network compares to peers.** Comparing the operating parameters of your network against thousands of similar networks allows you to gain insights that you may not have considered. That's how you properly optimize your network.
- **Understand the performance of your apps.** In today's environment, it's critically important to understand how well your apps are operating. AIOps can provide insight into app performance to take out the guesswork.
- **Respond to new business requirements.** The flexibility and power of AIOps has allowed for the creation of new business solutions, such as those brought about by the COVID-19 pandemic. You can respond quickly by using the power of data and AI.

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AIOps revolutionizes how networks are managed

AIOps gives you the ability to self-optimize even the largest networks, increasing customer satisfaction by improving the throughput of your network without additional hardware. Using AI, spot problems before they happen and correct them using actions developed by one of the top networking companies in the world. Aruba AIOps makes use of data collected from tens of thousands of customers to create the optimal way to manage a network using machine learning.

Inside...

- Find networking problems before they happen
- Learn how AI and machine learning help manage your network
- Improve customer satisfaction with increased uptime and network speed
- Use peer comparisons for ongoing optimization tips

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