SIGMA
A PIVOT COMPANY

Sigma**Uptime**

ENABLING THE DIGITAL WORKPLACE

UPTIME

Mobile devices, cloud-based apps, the Interent of Things and more are changing the way we work. Emerging wireless technologies are key to tying it all together.

Technology services to help you streamline operations, reduce costs and improve business processes.

Companies today must align IT strategy with their corporate objectives, strategy and business model. Pivot has created a portfolio of operating companies and partners with a focus on helping you enhance and extend the capabilities of your technology assets.

Pivot provides technology services ranging from initial needs assessment and design, through procurement and implementation, to on-going support. As an adjunct to your IT team, we provide the resources that allow your team to offload some of the day-to-day operational challenges and focus on innovations that will drive business value and competitive advantage.

Contact us to learn more.

PIVOT
TECHNOLOGY SERVICES

www.pivotts.com   888-895-0495

Contents

4

Sigma Uptime

Business at the speed of mobile.

It used to just be about connectivity. Not anymore. The Aruba Mobile First Platform is the intelligent software layer that turns connectivity into a rich experience for mobile users and actionable insights for business and IT. It's designed to accelerate your adoption of mobile and IoT initiatives and separate your business from the crowd.

The Mobile First Platform uses application programming interfaces to provide third-party developers and business leaders with network insights to improve applications and services. The platform accelerates integration and innovation of mobile and IoT at the speed of the developer ecosystem, rather than the pace of a single vendor.

Contact your Sigma representative to learn more.

www.sigmasol.com   888.895.0495

Mobile, cloud and collaborative technologies have dramatically changed both the way we work and the workplace itself. Untethered from traditional desktop workstations, today's workers increasingly require the ability to use a multitude of devices to get things done from just about any location at any time.

Emerging wireless technologies play a key role in this transition to the digital workplace. Enhanced networking designs are delivering remarkable bandwidth improvements, enabling a new wave of devices capable of performing an array of data-intensive tasks. Improved infrastructure is opening the door to location-based services that are gaining momentum in many industries, including manufacturing, retail and hospitality.

Particularly notable is the role of wireless in the booming Internet of Things. Beyond moving data among billions of connected "things," wireless networks are also vital for imposing security and management standards that protect the enterprise network from outside exposure.

Aruba is a leader in enabling the new style of working. In the following pages, we'll take a closer look at some of the technologies needed to support the digital workplace.

BAGGAGE CLAIM

TAKE ESCALATOR
TO LEVEL B
IN 20 METERS

Where Am I?

Beacons combine with mobile apps to enable location-aware services.

"Location, location, location" has long been the mantra in real estate, but the concept is becoming equally compelling in a wide range of industries. From hospitality and healthcare to retail and manufacturing, organizations are using location-based services to track people and objects as they move about a facility.

The ability to remotely pinpoint the location and movement of an object is as old as radar, which works by sending out radio signals and measuring the reflected energy. The global positioning system (GPS) works similarly except the object itself is the source of the signals — smartphones, for example, contain GPS receivers that determine where they are by communicating with an array of satellites.

But while GPS navigation services are extremely valuable, they're not particularly precise. Many GPS receivers can only determine their location within 100 meters, and GPS accuracy diminishes significantly inside buildings. That makes GPS impractical for indoor location-based services.

Enter the beacon. Beacons are hockey puck-size gadgets that use a wireless protocol called Bluetooth Low Energy (BLE) to transmit messages to nearby mobile devices. When installed throughout a facility, beacons can be used in a variety of applications, such as wayfinding, asset tracking and location-based marketing.

Beacon technology was first introduced in 2013 amid much industry hype, but has been slower to take off than expected. Nevertheless, beacon adoption continues to grow steadily, and ABI Research has forecast that more than 400 million units will be deployed by 2020.

"BLE beacons have become the leading proximity/indoor location technology in the market today, just as the market is gathering significant momentum across a range of retail and non-retail verticals," said Patrick Connolly, senior analyst at ABI Research.

How Beacons Work

Beacon technology is based upon the fact that radio signals get weaker over distance. By measuring the received signal strength indicator (RSSI) it is possible to calculate the distance between a radio transmitter and receiver. Of course, walls and other objects impede

radio signals, making the RSSI appear weaker than it actually is. But by taking enough measurements and rejecting any anomalies, it's possible to track the location of a radio receiver inside a building with a fair degree of accuracy.

Wi-Fi networks can be used for indoor positioning by measuring the RSSI between the object being tracked and a wireless access point (AP). In many cases, however, APs would have to be added to get the desired level of precision. Beacons are much less expensive, easy to deploy and require little maintenance beyond changing their batteries.

Each beacon has a unique identifier that can be associated with the beacon's location and an application installed on wireless devices. By continually transmitting its ID, a beacon announces its presence so that devices with the appropriate app can respond.

Probably the best known beacon technology is Apple's iBeacon, which is a protocol for using BLE to communicate with iOS and Android mobile devices. Google's Eddystone is an open source framework for BLE beacons.

Aruba offers BLE beacons and the Meridian mobile app platform to facilitate the development of location-based services. Meridian includes design templates for building apps from scratch as well as software development kits for adding location features to existing apps. These tools combine with Aruba Beacons to enhance mobile engagement with location-aware services.

A Home Run

When first introduced, beacons were expected to revolutionize brick-and-mortar retail by enabling the delivery of advertising, promotions and personalized messages to shoppers' smartphones based upon their location within a store. The technology was somewhat ahead of its time. In 2013, few retailers had the necessary infrastructure to support beacons, and bea-

con-aware smartphones weren't ubiquitous. There were also security and privacy concerns to overcome. Simply put, many consumers did not want their phones to be tracked.

Now, however, retailers are beginning to adopt beacons in earnest. According to Unacast's Proxbook report, which tracks location targeting, one-third of the top 50 U.S. retailers were planning major beacon projects as of mid-2016.

Meanwhile, the hospitality industry has been using beacons in a big way. The Q22016 Proxbook report found that many North American sports stadiums — including a whopping 93 percent of Major League Baseball stadiums — have deployed beacons. According to the report, "teams that have deployed beacons and proximity technologies have seen an ROI as big as 40X from incremental merchant revenues alone within the first season."

Levi's Stadium is a shining example. The home of the San Francisco 49ers and one of the world's most advanced open-air sports and entertainment venues, Levi's Stadium seats 68,500 spectators inside a 1.85-million-square-foot facility. The stadium's state-of-the-art network was built on Brocade switching and Aruba mobility technology to deliver exclusive content, venue information and services to fans.

"Fans can now watch instant replays, receive precise turn-by-turn navigation and order food directly from their mobile devices," said Dan Williams, Vice President of Technology for the San Francisco 49ers. "Visitors get to experience the facility and game like never before by greatly enhancing their onsite experience."

Flying High

Beacons are also gaining prominence in the transportation sector. According to the Q32016 Proxbook report, almost 90 percent of airports

globally "are undertaking either a commercial deployment or a trial project related to proximity sensors." In the U.S., eight of the top 20 airports have deployed beacons, including San Francisco, Los Angeles, San Diego, New York, New Jersey, Miami, Dallas and Orlando.

Orlando International Airport (MCO), which hosts nearly 38 million travelers annually, is another Aruba success story. Its MCO mobile app leverages more than 1,200 Aruba Beacons to direct travelers to airline check-in, gates, baggage claim and hundreds of other locations.

"It also helps drive sales for our concessionaires and retailers by providing both their location as well as links to their own websites for more in-depth information on their offerings," said John Newsome, Director of Information Technology for Greater Orlando Airport Authority.

Restaurants are using beacons to enable promotions based upon real-time inventory, seating capacity and other factors. Property management firms can use location-aware apps to greet tenants with personalized messages and alert interested passersby about available units. The financial services sector is banking on beacons to provide enhanced ATM services and attract Millennials to brick-and-mortar locations. The possibilities are virtually endless.

Beacon adoption may not have met initial expectations but by all accounts the market should continue to see dramatic growth. Unacast's Proxbook estimates that more than 8 million proximity sensors had been deployed as of Q22016, putting beacons on track to hit 400 million by 2020.

"Despite some media commentators questioning when beacons will really take off, we now have definitive proof that this is happening right now," said Thomas Walle, Unacast co-founder and CEO.

GAINING VISIBILITY INTO THE INTERNET OF THINGS

New solutions from Aruba help organizations identify IoT devices and remediate common vulnerabilities.

The Internet of Things (IoT) continues to grow by leaps and bounds as more organizations seek to reap the competitive advantages of this game-changing technology. Network-connected devices are literally transforming industries such as manufacturing, healthcare, energy and transportation. Smart cities, smart buildings and the smart grid are enabling efficiencies never before imagined.

When the final count is tallied for 2016, Gartner projects that 6.4 billion "things" will be in use worldwide, up 30 percent from 2015. By 2020, that number is expected to reach 20.8 billion, with more than half of major new business processes and systems incorporating some element of the IoT.

"The IoT is relevant in virtually every industry, although not in every application. There will be no purely 'IoT applications.' Rather, there will be many applications that leverage the IoT in some small or large aspect of their work," said W. Roy Schulte, vice president and distinguished analyst at Gartner.

Despite all its promise, the IoT has a dark side. Many of those network-connected things — from sensors and digital controllers to video cameras, health monitors and a host of other devices — have only rudimentary security. In fact, an HP Security Research study found that 70 percent of commonly used IoT devices had significant

vulnerabilities, with an average of 25 vulnerabilities per device.

In its 2017 Predictions report, Forrester Research has forecast that more than 500,000 IoT devices will be compromised in 2017 as security threats escalate. The report notes that the IoT "represents a two-pronged threat in 2017 — potentially exposing businesses to security breaches and IoT devices themselves being turned into DDoS weapons."

Taking Inventory

Part of the challenge of securing the IoT is the sheer enormity of it — how do you remediate vulnerabilities on billions of things and keep them patched and maintained? On top of that, many IoT devices are deployed at the network edge, putting them out of reach of network monitoring and management tools.

In a November 2016, research report, Gartner notes: "Lack of network and device visibility is a top concern of security and risk management leaders, both in consumer and industrial IoT verticals, as they don't know what assets they have and if protection is required. Discovery is a prerequisite to IoT security."

To address these challenges, Aruba has introduced new software that helps organizations identify all mobile and IoT devices at the network edge. The new Aruba ClearPass Universal Profiler automatically discovers and fingerprints all IP-enabled devices on multivendor wired and wireless networks. This gives IT organizations the ability to see how many devices in total and per category are connected at any one time. IT departments no longer have to guess or use disparate tools to see what devices are connecting to their networks.

Comprehensive information about device type, operating system, status and location are displayed in an easy-to-read graphical user interface. This information can then be used for performance and security tuning across infrastructure components, and then shared with ClearPass Exchange partners to deliver user behavior analytics, deception intelligence and firewall security.

For organizations that require policy management, there's a simple migration path to Aruba ClearPass Policy Manager to enable automatic authentication and policy enforcement after devices are identified and fingerprinted. Devices that are exhibiting unwanted behavior can then be automatically remediated using data from Aruba's partners to minimize the risk to networks.

Addressing Vulnerabilities

Authentication and access control weaknesses top the list of IoT vulnerabilities identified by the OWASP Internet of Things Project. Many devices use a default username and password, have insecure password recovery mechanisms, and have no mechanism for account lockout. IoT data typically is sent as clear text because encryption is unavailable or improperly configured.

Aruba is addressing these concerns with the introduction of the 2540 Switch Series, along with enhancements to the ArubaOS-Switch operating system, both of which are designed to power and secure the intelligent edge. These enhancements enable unified, role-based access across wireless and wired networks, with the ability to assign roles to connected IoT devices in order to prioritize business-critical applications and secure the network. In addition, the Aruba layer 3 switches (29xx/3810/5400) are capable of user-based and port-based wired traffic tunneling to an Aruba Mobility Controller so that policies can be applied, advanced services can be extended, and traffic can be encrypted to further reduce risk.

The cost-effective Aruba 2540 Switch Series meets the demand for the rapid growth in connected devices in distributed enterprises. Zero-touch provisioning and optional cloud-based management allow organizations to reduce network deployment and management costs. ClearPass REST-based APIs, Syslog messaging and a ClearPass Extensions capability deliver end-to-end threat remediation and endpoint correction.

The explosion of IoT devices connecting to enterprise networks is making it critical to identify and protect all mobile and IoT devices at the network edge. The new Aruba ClearPass Universal Profiler and the 2540 Switch Series can help address the security concerns associated with IoT initiatives.

Modernizing the WLAN

Aruba boosts capacity and improves performance for 'mobile-first' networks.

The transition to the digital workplace is characterized by a workforce that now prefers wireless over all other forms of connectivity. That means Wi-Fi has transformed from a "nice-to-have" technology to the essential enabler of the connected enterprise. However, rising demand for wireless bandwidth puts a strain on legacy networks that weren't designed to handle some of today's requirements.

Many organizations with older wireless LANs find that their Wi-Fi connectivity is becoming slower and less reliable with an increasing number of dead zones. Wi-Fi is the root issue in 40 percent of network connectivity problems, according to a recent survey by ZK Research. Because of this, the firm reports, network administrators are spending more than a quarter of their time troubleshooting Wi-Fi issues, and it takes more than 30 minutes to diagnose and resolve most of these issues.

"The digital workplace is placing crushing capacity demands on wireless networks, and these demands will only continue to rise with the introduction of new 802.11ac Wave 2 devices," said Rob Jezek, Sigma Solutions Regional Vice President. "The proliferation of mobile devices using bandwidth-intensive multimedia and collaboration tools increases the likelihood of performance bottlenecks that frustrate users and diminish productivity."

Improving Capacity

To correct these issues, organizations must rethink wireless LAN design. Today's WLANs not only must support more users, devices and traffic than ever before, they must be designed to handle continued growth for the foreseeable future. Industry analysts anticipate that wireless data traffic will soon surpass that moving over wired networks.

"These new demands require a subtle but fundamental shift in how we deploy Wi-Fi," said Jezek. "Until recently, Wi-Fi has been deployed with an eye toward coverage of a physical space. We now need a stronger focus on capacity requirements."

Aruba is addressing these new requirements with WLAN gear that supports greater numbers of client devices while also significantly boosting data rates and throughput.

ClientMatch, Aruba's patented wireless traffic management technology, allows access points (APs) to transmit data to multiple devices simultaneously in order to increase overall network capacity. Since becoming a subsidiary of Hewlett Packard Enterprise in 2015, Aruba has also outfitted its latest switches and APs with HPE Smart Rate, a multi-gigabit Ethernet interface that boosts data rates.

"As more organizations transition to mobile-first workplaces, the WLAN must deliver predictable performance," said Jezek. "The recent enhancements to its portfolio show Aruba understands that this requires a marked departure from legacy networking models."

More is Less

Traditional coverage-based WLAN design principles focused on placing a sufficient number of APs in the right spots to provide adequate signal strength for a limited numbers of people using a limited number of devices. Those limits have vanished, however. Simply providing basic coverage in a defined service area is no longer sufficient.

It might seem like improving coverage would be as simple as adding more APs — after all, the closer a client device is to an AP, the better the data rate. However, too many APs will actually degrade WLAN performance by creating over-saturation. Wireless clients can become confused trying to access multiple APs with similar signal strength. The effect is similar to when a car radio picks up signals from multiple radio stations broadcasting on similar frequencies.

One way to avoid this issue is with band-steering technologies that reduce traffic on the crowded 2.4GHz band by shifting capable devices to the less-congested 5GHz band. This technique, in combination with directional antennas, high minimum bit rates and low power settings, boosts capacity while limiting interference.

With ClientMatch technology, Aruba's new 330 series APs provide ongoing band steering and load balancing for

roaming clients. Additionally, ClientMatch technology ensures that Wave 2-capable devices can take advantage of the multi-antenna communications enabled by the MU-MIMO standard. This improves WLAN capacity by allowing access points to transmit data to multiple client devices simultaneously. Aruba says this results in better than 40 percent performance improvement over competing solutions.

The 330 series APs also deliver best-in-class data speeds thanks to the integration of HPE Smart Rate. With integrated HPE Smart Rate ports that scale up to 5Gbps Ethernet over existing copper cabling, the 330 series allows enterprises to leverage their multi-gigabit Ethernet wired network infrastructures to eliminate bottlenecks.

Predictable Performance

While switching to new, high-speed APs can deliver an immediate increase in WLAN capacity, one remaining bottleneck could offset these advancements — the existing cabling infrastructure and the speed of the switch ports to which the APs are connected. Most of the Ethernet cabling deployed worldwide today is limited to 1Gbps at 100 meters. Until now, adding bandwidth has meant major new cabling investments.
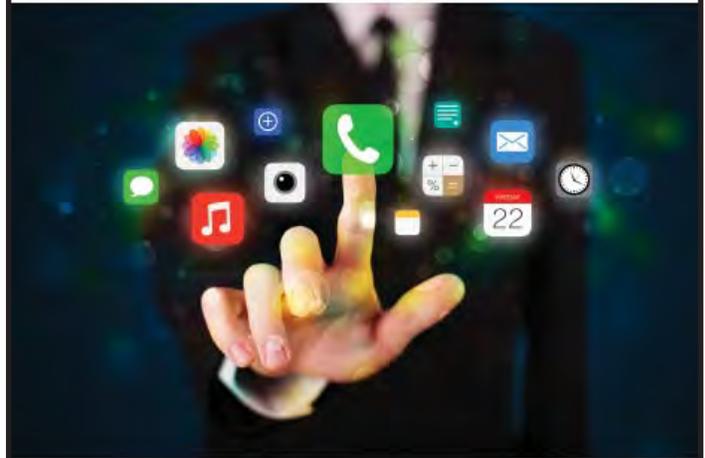
Smart Rate ports in Aruba's new 3810 Series Switches meet the performance demands of 802.11ac Wave 2 devices over existing cabling. These switches allow organizations to right-size deployment and backhaul capacity with modular 10GbE and 40GbE uplinks, far surpassing the typical 1Gbps Wi-Fi backhaul limit.

With more devices operating at higher speeds, Aruba is also introducing technology to ensure predictable performance levels. Aruba Clarity is a new software module that delivers powerful and intuitive forensics so that IT teams can anticipate and quickly resolve connectivity problems before a user is affected.

Security also becomes an issue when increasing the numbers of devices and applications connecting to the corporate network. IT teams must be able to modify their security policies quickly and enforce underlying infrastructure changes on demand. Aruba ClearPass Policy Manager enables custom profiling for any connected device, multifactor authentication and deeper forensics into security incidents. ClearPass also seamlessly integrates with next-generation firewalls.

Coverage-based WLAN designs were meant to accommodate the occasional wireless user, but they no longer meet modern demands. There are now more mobile devices in the world than there are people, and wireless networks carry more than 100,000 times the traffic they did just eight years ago. Wireless directly impacts economic growth and productivity, and businesses now rely upon devices and services that didn't even exist 10 years ago. Aruba's portfolio of WLAN gear based on modern design principles help ensure that organizations aren't stuck with archaic WLAN performance.