
WHITE PAPER

THE MINE WITHIN

EXTRACTING BUSINESS INTELLIGENCE FROM
MOBILITY NETWORKS

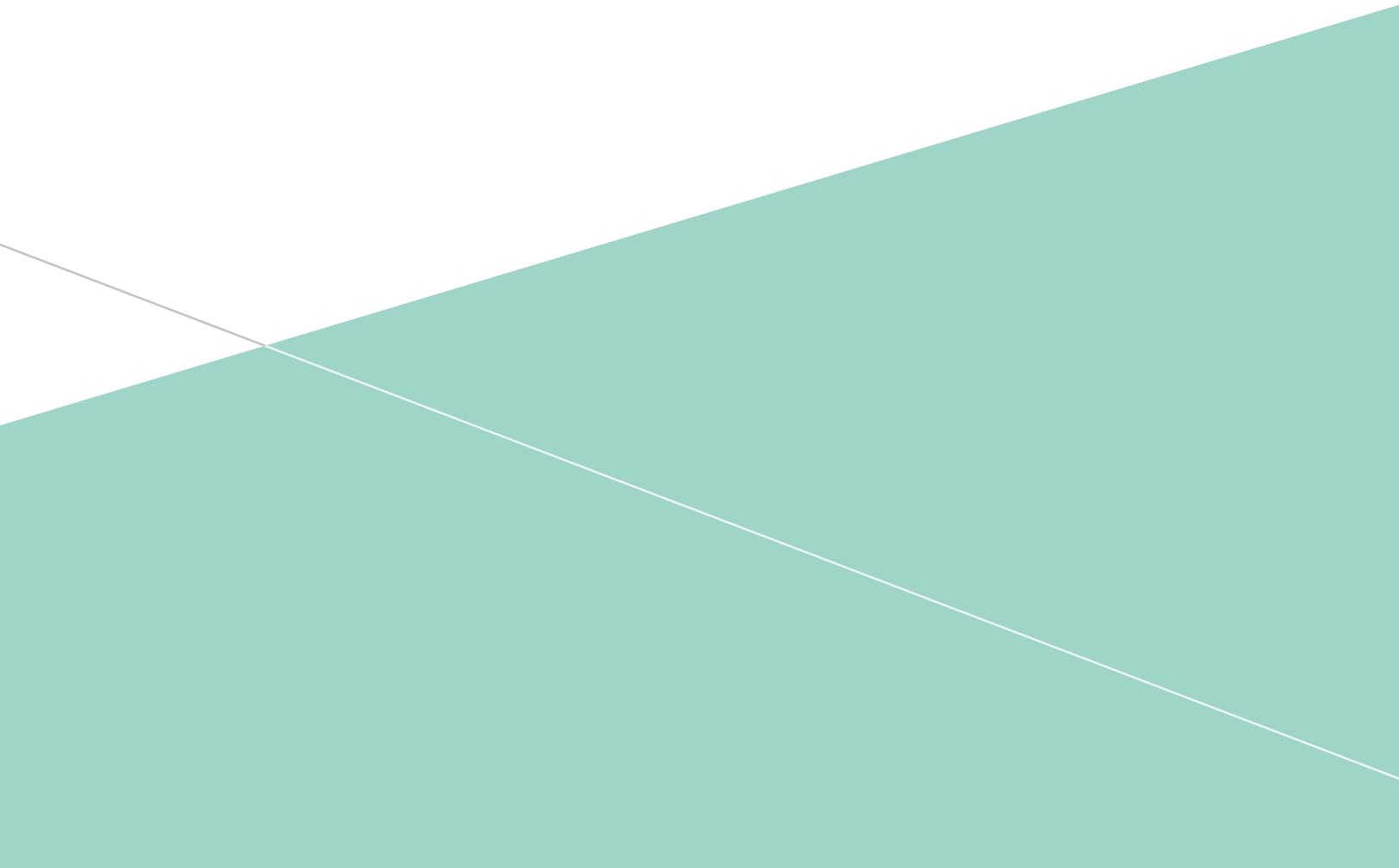


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OVERVIEW

Retailers are on the front lines of the market transitions brought by e-commerce and mobile commerce. Changes in how and where we buy, coupled with substantial investments in existing bricks-and-mortar stores, has raised the urgency of understanding new cross-channel buying behavior, brand loyalty, preferences, and emerging trends.

Plumbing these waters requires more than gut instinct: it requires actionable business intelligence. And retailers are looking to technology to gather these data. According to Gartner total worldwide retail IT spending is projected to increase to \$183.6B in 2015, rising from \$76.2B in 2012 to \$84.3B in the US alone.¹ Buried within this spending are the tools that will do the heavy lifting in making sense of market transitions and create actionable business intelligence: analytics engines.

Analytics engines sift through reams of data looking for trends and patterns. The richer and more relevant the input data, the more insightful the output of the engine. If you want to look at customer behavior proximate to and within stores, malls, and large public venues, then you need real-time data on presence, visit frequency, recency, queue behavior, dwell time, travel paths, preferred destinations, even the applications shoppers use while on site.

Recognizing the importance of analytics to business decision making, Aruba's Wi-Fi mobility networks harvest real-time contextual, behavioral, and location information. These data are then fed into best-in-class analytics engines, made by ArubaEdge Technology Partners, to tease out trends and glean actionable business intelligence.

Analytics engines are packaged for specific applications, with user interfaces, APIs, data models, and best-practices templates targeted for each use to speed deployment, reduce user training, and simplify integration with backend systems. There is no one-size-fits-all when it comes to analytics tools, a lesson learned by vendors of traditional, flexible business intelligence tools that have since migrated to applications targeting specific user groups and business problems. For this reason Gartner notes that analytics applications have specific domains, and end users should select tools based on cross-industry or industry-specific requirements.² Identify the problem and then pick the right analytics engine to address it.

For purposes of this paper, analytics solutions are divided into five categories: presence, loyalty, wayfinding, geofencing, and cross-channel. We'll examine each in turn, together with the analytics vendors that supply them, the Aruba infrastructure that feeds them, and the supplemental infrastructure required to build them.

As you'll see, it's possible to harvest meaningful business insights using nothing more than the Aruba infrastructure you've already deployed. As you climb the value pyramid, extracting more and deeper insights at each level, a commensurate investment in additional infrastructure is needed. By selecting from a range of analytics options, from a suite of top-flight partners, you can tailor your investment to precisely meet your business intelligence objectives.

THE BUSINESS VALUE AND INFRASTRUCTURE PYRAMIDS

As the primary conduits between users, applications, and the Internet, data networks are windows into the attributes and behavior of anyone coming into contact with them. Mining these networks for business intelligence about social, mobile, cloud, behavioral, and situational data about people, locations, activities, preferences, and associations should be low hanging fruit.

But it's not. Why? Because these rich sources of data are typically inaccessible to analytics engines that could divine meaningful business intelligence from seemingly random network activity. These data, which are exceptionally valuable to business intelligence applications, are worthless to the networking infrastructure, which subsequently discards them.

A case in point. When a Wi-Fi enabled device comes within range of a wireless network it sends a message, called a "probe request," asking for the identity of the network. Probe requests are discarded by most Wi-Fi networks if the client device does not connect (associate) to the network. And yet, these simple transactions from unassociated client devices can yield important, business-relevant information. Broadly classified as "presence" information, probe requests can show how many people are near your network, how long they dwell there, and, if they leave and return, the recency, frequency, and timing of their visits.

Instead of discarding probe request and other context- and location-related information, Aruba makes them available to applications that can extract meaning and value. To speed secure user access to network services, and to ensure appropriate quality of service for each application, Aruba's networks must supervise who accesses its systems, how and where they do so, and what applications and services they use. Within the limitations of local privacy regulations, Aruba APIs and interfaces enable its customer to mine these data using prequalified analytics engines supplied by ArubaEdge Technology Partners.

As a rule, the value of business intelligence is directly related to the infrastructure required to extract it. The higher the value, the more sophisticated the infrastructure that's required to mine it. This relationship is summarized in Figure 1.

Presence is the lowest hanging fruit because it's available using an Aruba real-time location services (RTLS) interface from any Aruba 802.11n/ac access point. Other services require supplemental infrastructure.

Wayfinding applications that help users navigate a large mall or airport require a software client and precise Aruba Beacon location engine. Loyalty analytics that help tailor services to your best customers also require client software, plus integration with the ClearPass network access control and back-office Customer Relationship Management (CRM) systems. Geofencing solutions that trigger offers and services based on real-time location needs Aruba Beacons and associated app or the Analytics & Location Engine (ALE) application plus integration with back-office Point of Sales (POS) and CRM systems.

At the peak of the business intelligence pyramid is cross-channel analytics. This service correlates web behavior with bricks-and-mortar activity. Drawing on all of the previously mentioned Aruba services, this solution requires Aruba's AppRF technology to identify in real-time which application users are running, as well as a Web analytics engine.

The infrastructure required for the five business intelligence applications is summarized in Figure 2.

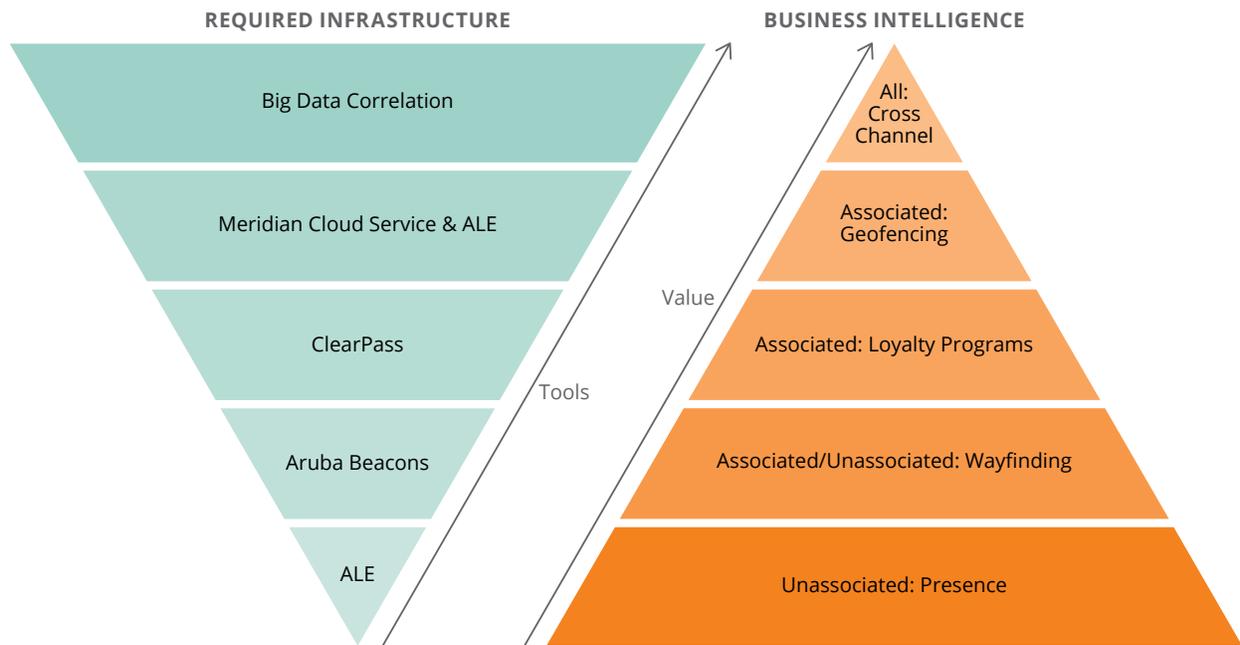


Figure 1: Infrastructure required to obtain different levels of business intelligence

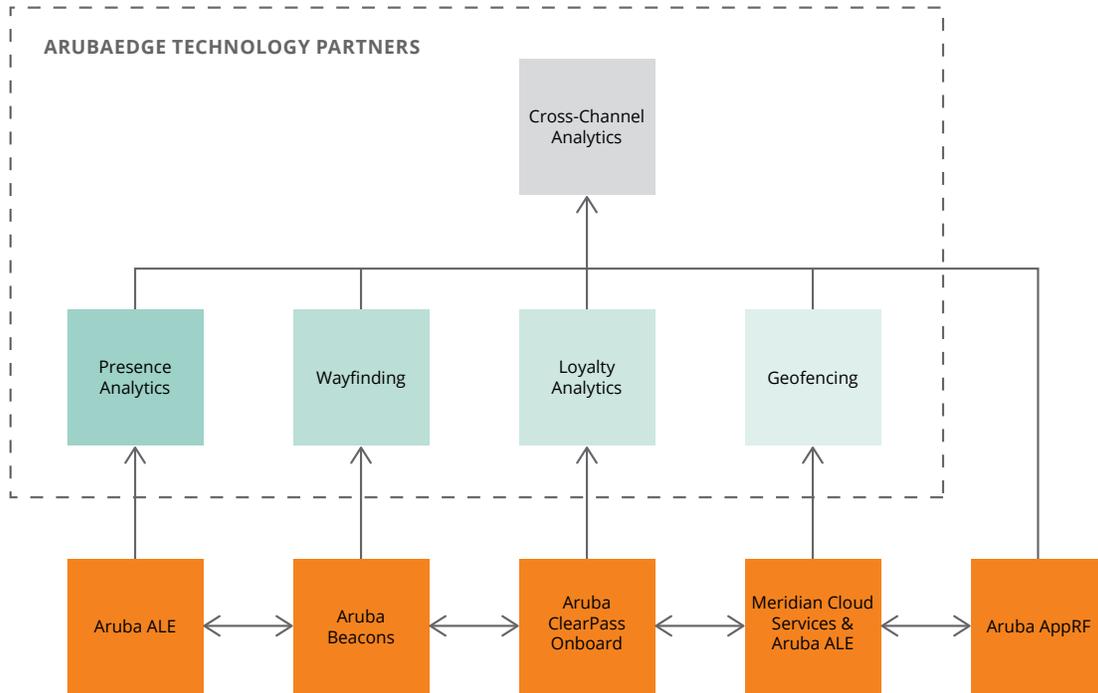


Figure 2: Aruba infrastructure required by business intelligence application

GUESS WHO'S HERE

When you get within range of a Wi-Fi network you've probably seen a request a pop-up on your smartphone asking if you wish to join. If you agree and you're authorized to access the network then you'll be admitted. But even if you don't associate with the network, the presence information revealed by the probe requests of your mobile device can inform a presence analytics application about traffic patterns and preferences.

For instance, it's possible to assess the impact of a new window display by looking at variations in dwell times at that location, or seeing which departments draw the most traffic and during which hours. Same-store and cross-store comparisons can be made about the effectiveness of a marketing campaign based on pre- and post-campaign traffic.

Presence information can also be exchanged with other systems to improve operational efficiency. For example, by inference presence data identifies which areas of a building

are occupied. Sharing presence data with an energy control system to proactively control lighting, heating, ventilation, and air conditioning translates into lower energy costs and a better user experience. These data can also be shared with public safety to identify occupied areas in an emergency, flag when crowd control is needed, and even optimize the dispatch of cleaning crews based on traffic.

Property owners can leverage presence information to set and justify tenant rents. Areas with high traffic should command higher rents, and by recording traffic flows over time hard evidence can be provided to substantiate pricing.

The large and growing number of Wi-Fi enabled smartphones and tablets makes presence a very rich source of data indeed. According to Portio Research's Worldwide Mobile Handset Installed Base 2012-2016, during 2013 North America will cross 50% smartphone penetration, rising to 70% in 2016.³ By the end of 2014 there will be over 500 million active smartphones in Europe, and by the end of 2016 there will be 555 million active smartphones in China alone.

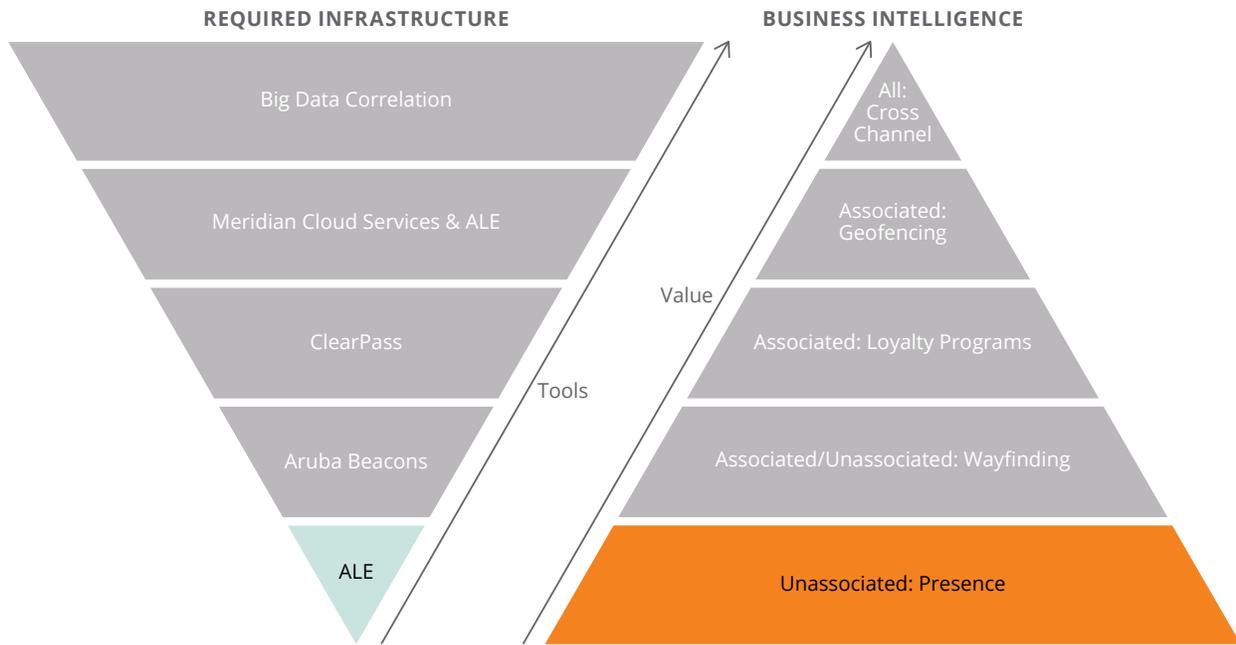


Figure 3: Infrastructure required to support presence analytics

The question is whether Wi-Fi on these smartphones and tablets will be active or not. The answer is yes, for three reasons. More homes, businesses, large venues, and even public facilities are equipped with Wi-Fi networks than ever before because users value the higher speed connections – and battery savings – afforded by using Wi-Fi over cellular data. So users enable Wi-Fi on their mobile devices and leave it turned on.

Additionally, carriers are aggressively offloading data traffic from cellular to Wi-Fi networks, pushing a large and growing percentage of mobile devices to run with Wi-Fi always enabled.

Finally and perhaps most importantly, shoppers are using Wi-Fi in and near stores. According to JiWire, 93.6% of smartphone owners report using their mobile devices while in-store.⁵ They’re using it for price comparisons, to read product reviews, look for coupons and deal offers, and browse the store’s own website. In fact, 44% of all age groups indicated that in-store Wi-Fi definitely influences where they shop, and 86% of consumer 21-24 and 35-44 were influenced by the availability of in-store Wi-Fi.

Presence analytics applications scour the data, process it, and present traffic flow, dwell time, frequency, recency, and other relevant information to the customer via user-friendly graphic user interfaces, alert notifications, reports, and/or APIs that interface with point-of-sale (POS) and customer-relationship management (CRM) applications.

What’s required to harvest presence data from an Aruba Wi-Fi network? Nothing more than Aruba’s standard controller-based or Aruba Instant access points and ALE. Just point the ALE data feed to a server or the cloud-hosted presence application from the ArubaEdge analytics partner of choice and you’re good to go. Minimal infrastructure, actionable business intelligence.

Find Aruba analytics partners at www.arubanetworks.com/partners/ecosystem/mobile-applications

WAYFINDING: THE PATH TO SUCCESS

Wayfinding defines the different ways in which people orient themselves within a physical space and then navigate from location to location. Historically the techniques helped travelers navigate new or unknown areas using the stars, maps, or a compass. Modern day wayfinders can use a global positioning system (GPS), but only if they’re outdoors and within the coverage zone of a GPS satellite; satellite-based GPS doesn’t work indoors.

Aruba’s Bluetooth low energy (BLE) Beacons and Meridian wayfinding application works inside and out. Compatible with Apple and Android smart phones and tablets, these solutions help visitors navigate large public venues such as casinos, hotels, convention centers, malls, and airports. Push messaging and ad insertions help influence behavior along the way to increase basket size.



How many users are likely to enable their smartphones in public venues to take advantage of a wayfinding application? A lot. According to JiWire mobile device usage on public Wi-Fi has increased steadily since 2012.⁵ Smartphones and tablets dominates public Wi-Fi usage, and are the commanding network client in airports and malls. The trend is clear – Wi-Fi is the preferred way to connect to networks in large public venues. Many property owners believe that wayfinding is a “must-have” application because it engages visitors and eliminates the stress of navigating large or unfamiliar settings. According

to the Pew Research Center, more than 70% of smartphone owners used their devices to get directions and other location-related information, up from 55% six months earlier.⁶ Visitors can more quickly find restaurants, theatres, gates, self-service kiosks, information assistance, toilets, medical and safety facilities, AEDs, phone charging stations, and concierges. In the event of an emergency, wayfinding applications can also lead the way to the fastest exit path.

Analytics applications monitor where users travel with higher precision than unassociated client presence detection. So in addition to assisting with navigation, the site owner obtains more precise information about travel paths and destinations.

The stickiness of wayfinding applications with customers makes them a perfect advertising platform for pay-to-play map placement, push advertising, and brand-awareness campaigns. Wayfinding applications can help underwrite the cost of the infrastructure installation by generating an on-going revenue stream from ads and promotions.

What’s required to support a wayfinding application? Aruba Beacons, Meridian cloud applications, and a control-plane interface for Beacon management - typically APs. An interface into a context-aware advertising service enables push location-based ads or messages to users in motion, driving up basket size and loyalty through targeted context relevant offers that monetize the infrastructure for faster ROI.

Aruba wayfinding solutions can be found at www.arubanetworks.com/solutions/mobile-engagement

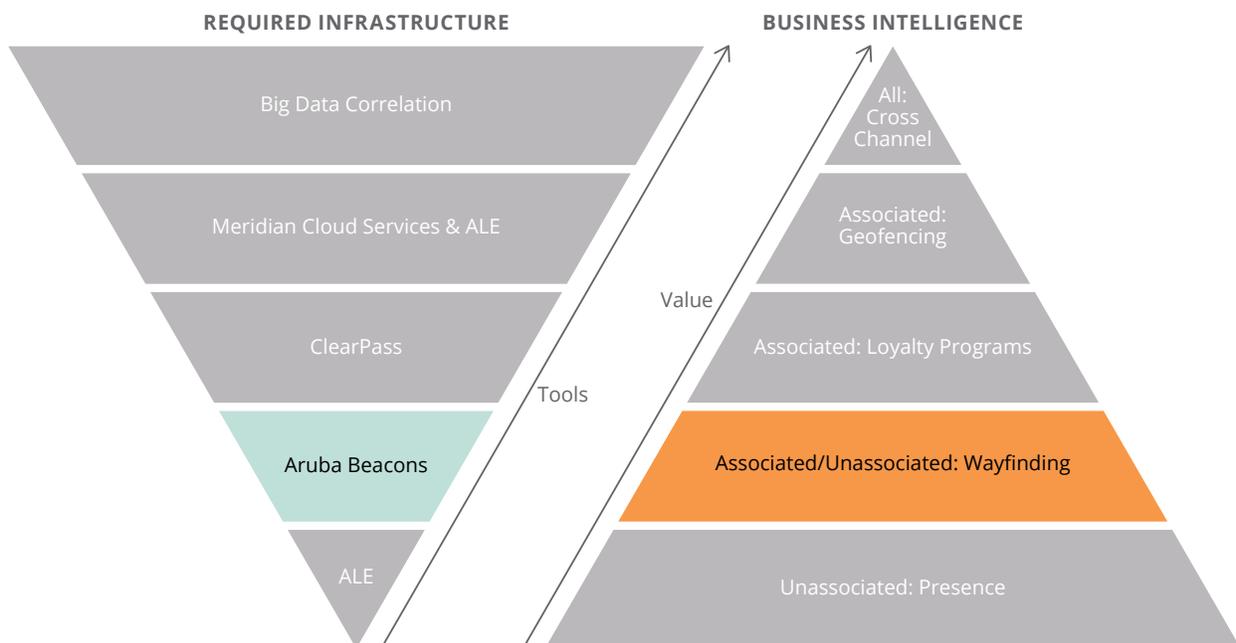


Figure 4: Infrastructure required to support wayfinding

LOYALTY ANALYTICS

Analytics applications mine data for business-relevant information, patterns, and trends. For many companies the targets of interest are in the best and biggest customers. Those buyers have been conditioned to spend at your establishment. Now you want to retain them and, ideally, entice them to spend even more by anticipating their needs and responding with relevant content, functions, products, services, and experiences.

Tailoring customer experiences, fostering brand loyalty, exploiting current trends and finding new ones – these are the objectives of loyalty analytics. And they accomplish these goals by monitoring the behavior of your best customers and helping to optimize marketing initiatives to attract and retain them. Key metrics include:

- **Acquisition rate:** What percentage of storefront traffic is made up of your best customers vs. casual shoppers? For shoppers that enter your store or make a purchase?
- **Commitment rate:** How frequently do your best customers return to your business and walk-by vs. enter the store?
- **Engagement:** How long do your best customers dwell in front of or inside your store compared with casual shoppers?

When your best shoppers enroll in a loyalty program and download a loyalty application on their smartphone, tablet, or PC, the enrollment process will require explicit approval for the collection of data about their shopping behavior. And that’s when the magic starts.

In a typical deployment, as soon as a loyalty club member connects to your network, the loyalty analytics application will kick into gear. A sales associate might be dispatched to provide personalized service, or push offers tailored to that specific client. How important is it that offers are customized for loyalty customers? It’s essential. According to the CMO Council, 54% of US and Canadian consumers would consider ending their loyalty relationships if they were not given tailor-made, relevant content and offers.⁷

Wi-Fi network access plays a central role in delivering the best loyalty experience. That’s because customers are using Wi-Fi when they’re out and about. Smartphone usage on public Wi-Fi is highest in restaurants (78%), malls (55%), and cafes (55%).⁵ And shoppers are increasingly willing to receive offers and ads in exchange for free access to Wi-Fi, with 84.2% preferring free, ad-supported Wi-Fi versus paid Wi-Fi access.⁵ With Wi-Fi enabled on their smartphones so they can access the Internet, enrollment and participation in loyalty programs is a simple and straightforward process.

What’s required to support a loyalty analytics application using an Aruba Wi-Fi network? Aruba APs, ALE, ClearPass Onboard services thru which users Opt-In to the loyalty service, typically a client application, and backend integration with the POS and CRM systems. The investment in consulting and integration pays back handsomely with higher brand loyalty and incremental revenue from your most loyal, highest spending customers.

Aruba loyalty solution can be found at www.arubanetworks.com/solutions/mobile-engagement

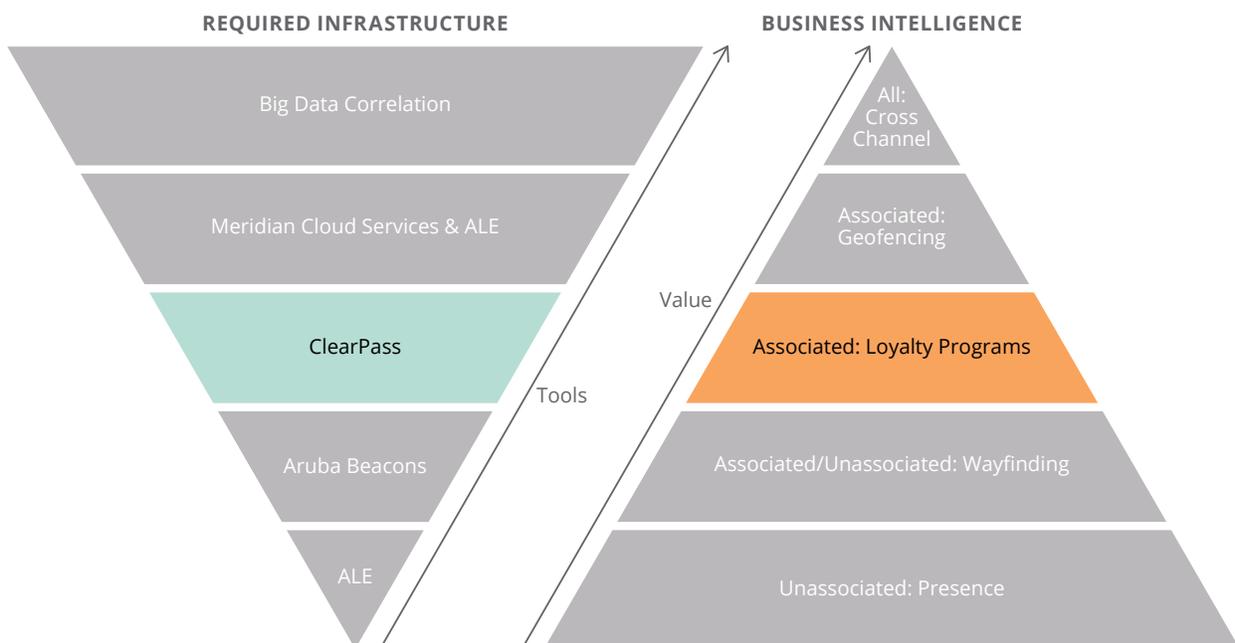


Figure 5: Infrastructure required to support loyalty analytics

GEOFENCING: THE FINAL FRONTIER

Location-based advertising and marketing that delivers context-appropriate content to consumers has the potential to be the financial engine of the location-based services market.⁸ Location-based advertising is pushed to a user's mobile device and includes banner/text ads, promotional logos on maps, and ads adjacent to Internet content. Location-based marketing includes a call to action accompanied by an enticement to follow-thru, i.e., notification about an upcoming sale and a QR code that can be scanned for a 25% discount off the purchase price. Both services require location intelligence.

Location intelligence-based services are on the rise. According to Econsultancy, 27% of companies worldwide intend to implement location-based marketing in 2013.⁹ Today, 80% of mobile users prefer locally relevant advertising, and 75% are more likely to take an action after seeing a location-specific message.¹⁰

The number of US mobile coupon users will rise from 12.3 million in 2010 to 53.2 million in 2014, driven by the rapid adoption of smartphones.¹¹ And Juniper Research reports that location-based services will drive mobile messaging ad spending to \$7.4 billion by 2017,¹² based in part by the demand for tailored content: 80% of smartphone owners want more mobile-optimized product information while they're shopping in stores.¹³

Geofencing is an ideal way in which to trigger location-based services. A geofence is a virtual perimeter created around a defined real-world physical area which, when crossed,

triggers an action of some kind. The location intelligence enabled by geofencing optimizes the efficiency and effectiveness of advertising and marketing campaigns by applying contextual filters to content delivery. For example, a validated parking code might be sent to a shopper when they enter a shopping center, but an ad for the newest fashion line pushed when they approach a particular store.

Geofencing software code is typically embedded inside of an application, like a retailers' club program that a shopper downloads into a smartphone or tablet. The application is triggered when the user crosses a pre-set boundary defined by the retailer. Boundaries can be Beacon or Wi-Fi based, confined to a store's physical boundary or extending throughout mall. Crossing the geofence causes the application to take action, both within the mobile device and in concert with hosted services.

What's required to support geofencing? Aruba Beacons and Meridian cloud service, or ALE on an Aruba Wi-Fi network, supplemented by the ClearPass policy engine, and backend integration with POS and CRM systems. Implementation steps include:

1. Integrating the Meridian SDK with the client's app
2. Using ALE's geofencing feature with a back-end offer engine
3. Having users opt-in to the geofencing service thru ClearPass
4. Interfacing the enterprise POS and CRM systems so responses can be tailored based on past behavior.

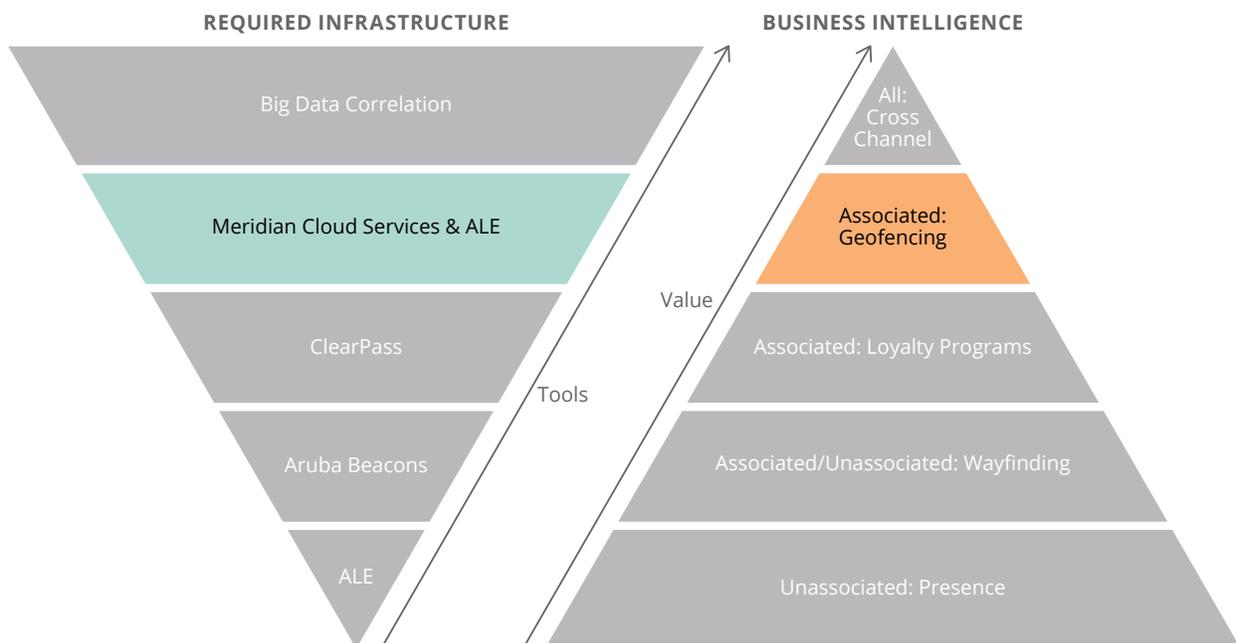


Figure 6: Infrastructure required to support geofencing

The infrastructure investment required for geofencing is more substantial than for presence analytics, but so, too, are the returns. Focused B2C campaigns make better use of advertising and marketing funds, and drive higher customer spending with contextually-relevant messaging.

Aruba geofencing solutions can be found at www.arubanetworks.com/solutions/mobile-engagement

CROSS-CHANNEL ANALYTICS

The proliferation of mobile devices and customers' growing expertise in using them has changed the way consumers shop. A 2012 Harris Poll revealed that 43% of U.S. adults have participated in showrooming, the process of surfing the web for a better on-line deal while in a retail store.¹⁴ Showrooming gives the customer direct control of the shopping experience, allowing them to check on prices, availability, and features independent of the local sales associate.

The quest for informed customer decision making has a direct impact on sales conversion time and rate. Retail researcher Conlumino reports that 40% of shoppers consulted three or more channels before making a big-ticket purchase, lengthening the shopping process and changing the sales engagement experience.¹⁵ Furthermore, the Interactive Advertising Bureau reports that of the 53% of consumers who stopped an in-store purchase as a result of using their mobile device, 38% did so because they found a better price at another store while 30% found a better price on-line.¹⁶ Clearly what defines a superior shopping experience in today's multi-channel world is a far cry from what it was at the turn of this century, and retailers need to change their sales strategy accordingly.

Gartner states that retailers are struggling with articulating multi-channel solutions, much less prioritizing technology investments to support cross-channel processes.¹⁷ Denial is not a strategy: cross-channel shopping is here to stay, and a thoughtful embrace, backed by infrastructure and executional excellence, is the only successful path forward. At its hub will be bricks-and-mortar stores, both because shoppers prefer to see-and-feel products prior to purchasing, and because stores will generate the highest revenue for retailers for some time to come. Even with the growth of other channels, Gartner estimates that stores will generate 87% of revenue in 2013 and a still high 84% in 2015.¹⁸

Embracing showrooming by offering price matching, faster delivery, or on-site fulfillment requires redirecting the shopper in mid-stream or mid-surf.^{18, 19} It requires knowledge of where they're looking and how you can fashion and deliver a better offer based on reaching the pyramidion of the business intelligence structure. Getting there mandates a whole new dimension of infrastructure: Aruba's AppRF technology to identify applications in flight, and big data mining to assess web behavior.

Designed to bring application awareness to Wi-Fi, Aruba's AppRF technology recognizes cloud-based and mobile applications as they're launched. Originally designed to enable IT to prioritize mobile application quality of service by application and user, AppRF is integrated into the ArubaOS Policy Enforcement Firewall (PEF) module thru which it delivers mobile application traffic visibility. By offering a window into Layer 4-7 traffic, AppRF technology can identify individual mobile and web-based applications as they're launched. As such it has a central role in assessing on-line behavior while a user is on premise.

The web analytics component also requires a big data mining partner to link web data with user location and the enterprise CRM and POS applications. Typically customers in need of cross-channel analytics are looking for a broad range of trend data – customer, company, industry, national. This requires the analysis of macro data about sales channels, vertical markets, and the economy.

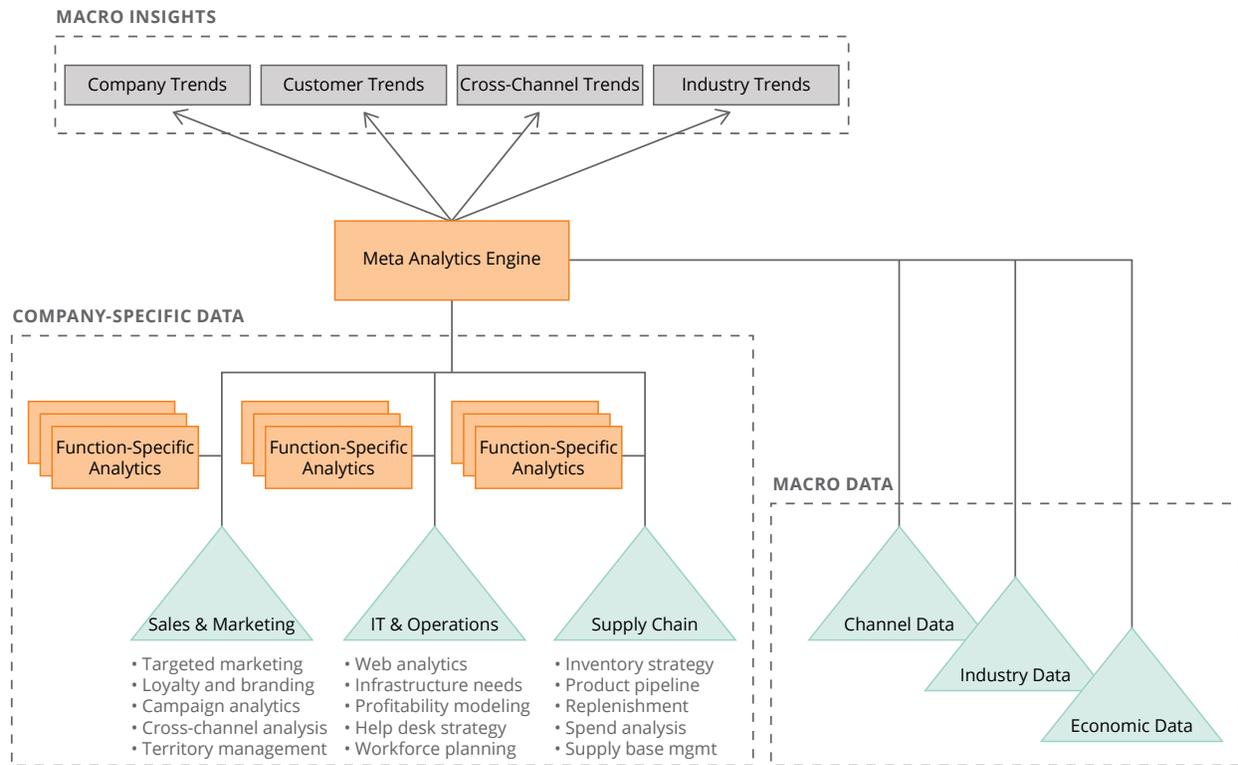


Figure 7: Cross-channel analytics data sources

There are many applications for cross-channel analytics including implementing and monitoring national marketing campaigns, connecting social media activity with buying behavior, and trending the origin of online shopping purchases. Let's examine a specific use case to see the power and value of cross-channel analytics.

Consider that today web and bricks-and-mortar retailers have an adversarial relationship: Web sites have lower overhead and encourage prospects to visit bricks-and-mortar stores to see products but to buy them online (showrooming); brick-and-mortar stores offer personalized service and immediate fulfillment of customer orders that Web sites can't match.

The primary issue is that the situation is predatory because the web retailer benefits at the expense of the store owner. But it doesn't have to be so. ecommerce and mail order companies need brick-and-mortar stores to expose potential customers to goods and services. Likewise, brick and mortar stores risk losing sales to lower cost ecommerce companies unless they find a way to participate in showrooming sales.

Online affiliate programs have been established that allow merchants to benefit when an ecommerce online sale is initiated via their website. Extending the affiliate model to shoppers buying online from within a brick-and-mortar store would open vast sales and revenue opportunities for both merchants.

Doing so requires a means of validating that a shopper in a store is using a mobile device to jump to and shop on another channel. If a cross-channel affiliate program could validate the location of the shopper and the site(s) visited, then a referral fee program could be implemented that benefits all parties.

Enter cross-channel analytics as a bridge between web and brick-and-mortar retailers. Here's how it would work:

- The Aruba Wi-Fi network and ClearPass verifies that a shopper is physically in a brick-and-mortar store affiliated with the online merchant;

- AppRF and PEF validates when the shopper accesses the affiliate website or launches their mobile application;
- The controller notifies the online retailer of the transaction so click- and buy-thru credit can be applied;
- The online retailer authenticates the validity of the transaction and logs the source information received from the controller for auditing purposes;
- An online wallet payment system is engaged over the PCI-compliant secure Wi-Fi connection.

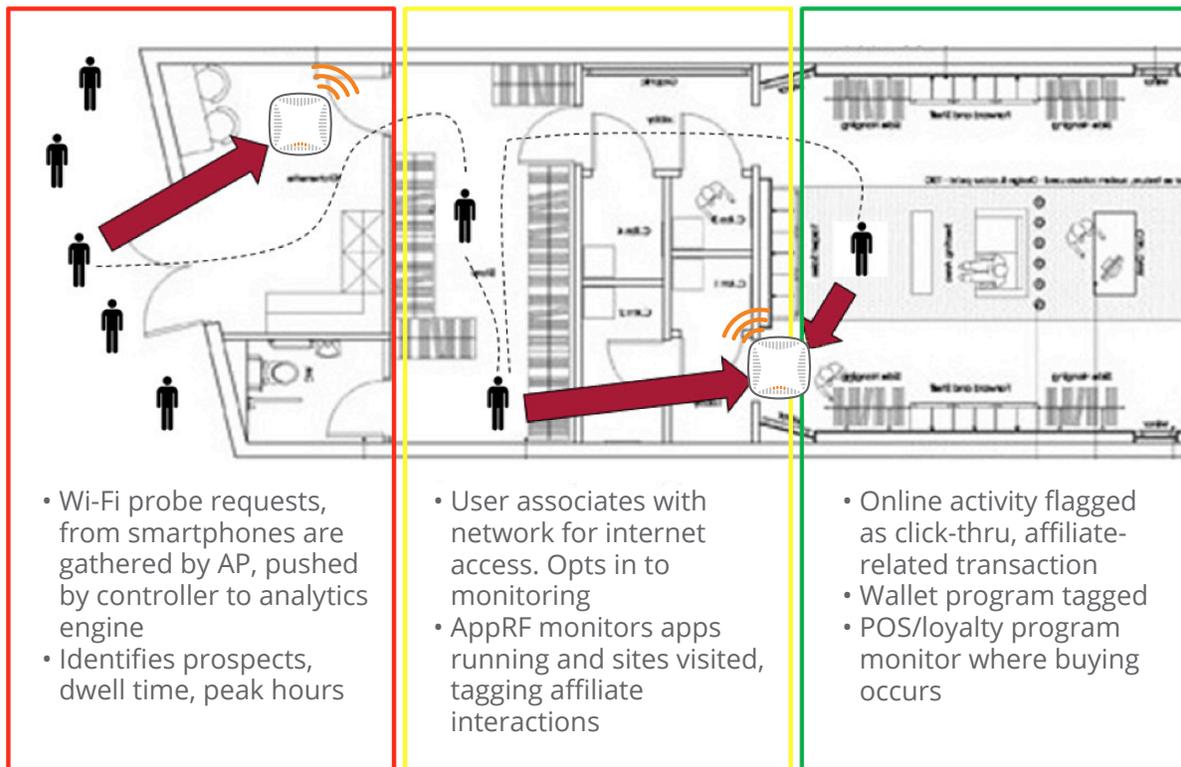


Figure 8: Cross-channel affiliate retail transactions

What’s required to support such a cross-channel analytics solution using an Aruba Wi-Fi network? Aruba APs, PEF, AppRF, ClearPass Onboard and policy engine, and backend integration with the brick-and-mortar merchant POS and affiliate marketing systems. The heavy lifting of integration requires experience with transactional processing, a task well suited for Aruba integration partners like Accenture and HP.

The infrastructure investment required for cross-channel analytics is substantial, but the revenue opportunities it targets are astounding. IDC Retail Insights estimates that showrooming influences billions of dollars of U.S. holiday retail purchases, and that the number of showrooming shoppers will grow to 78 million in 2015.²⁰ With so much revenue at stake, retailers simply can’t afford to turn away from using cross-channel analytics to influence multi-channel buying behavior.

ARUBA INTEGRATIONS PARTNERS: ACCENTURE AND HP

Aruba has architected a suite of solutions to mine the business intelligence that’s carried over, or can be derived from, its networks. It’s possible to harvest meaningful business insights using nothing more than the Aruba Instant or controller-based Wi-Fi you’ve already deployed. Or you can climb the value pyramid, extracting deeper insights at each level with a commensurate investment in infrastructure.

Context- and location-aware data extracted from Aruba’s networks drive presence, wayfinding, loyalty, geofencing, and cross-channel engines available from a stable of ArubaEdge partners. Each solution targets a specific need and price point. Customers can buy with the confidence that they’re getting a best-in-class analytics solution tailored to a specific business intelligence need and budget.

For additional information on ArubaEdge partners, please visit our ecosystem at <http://www.arubanetworks.com/partners/ecosystem/>.

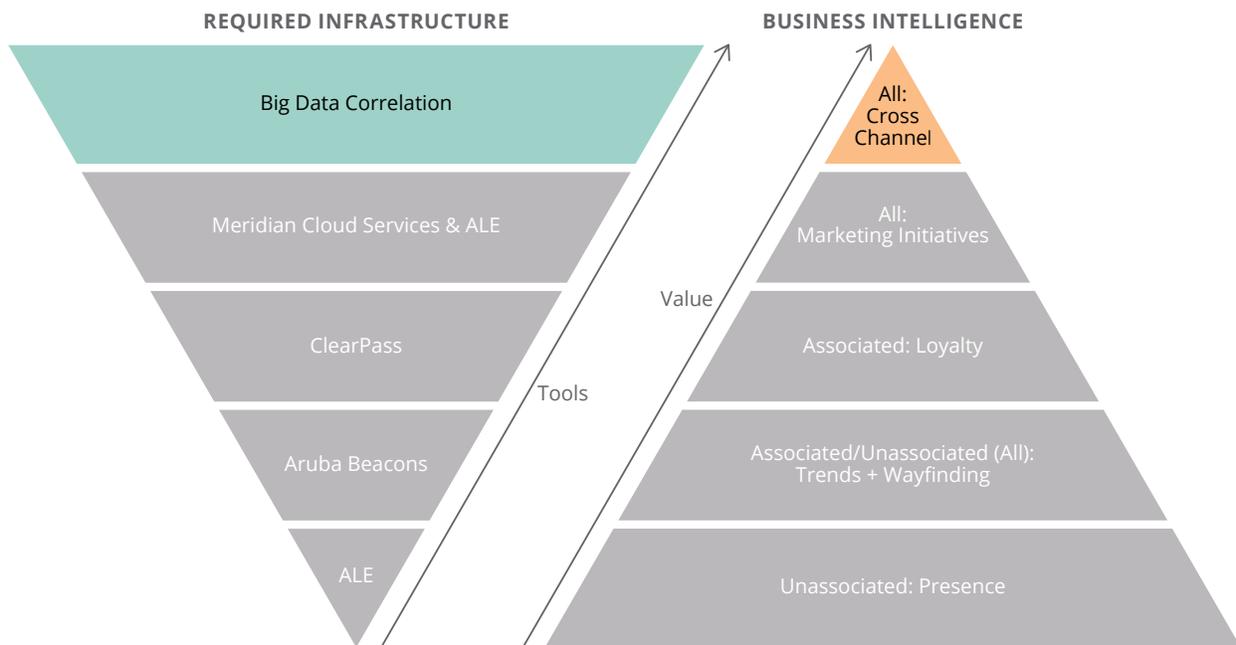


Figure 9: Aruba infrastructure required to support cross-channel analytics

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ABOUT ARUBA NETWORKS, AN HP COMPANY

Aruba Networks, an HP company, is a leading provider of next-generation network access solutions for the mobile enterprise. The company designs and delivers Mobility-Defined Networks that empower IT departments and #GenMobile, a new generation of tech-savvy users who rely on their mobile devices for every aspect of work and personal communication. To create a mobility experience that #GenMobile and IT can rely upon, Aruba Mobility-Defined Networks automate infrastructure-wide performance optimization and trigger security actions that used to require manual IT intervention. The results are dramatically improved productivity and lower operational costs.

To learn more, visit Aruba at <http://www.arubanetworks.com>. For real-time news updates follow Aruba on [Twitter](#) and [Facebook](#), and for the latest technical discussions on mobility and Aruba products visit Airheads Community at <http://community.arubanetworks.com>.



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