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TECH TALK

Aruba Solutions For Smart Cities

Smart City

A smart city is an urban area that uses different types of electronic methods and sensors to collect data. Insights gained from that data are used to manage assets, resources and services efficiently, that data is used to improve the operations across the city.

Smart City Solution

E-Governance and Citizen Services

1. Public Information, Grievance Redressal
2. Electronic Service Delivery
3. Citizen Engagement
4. Citizens - City's Eyes and Ears
5. Video Crime Monitoring

Waste Management

6. Waste to Energy & fuel
7. Waste to Compost
8. Waste Water to be Treated
9. Recycling and Reduction of C&D Waste

Water Management

10. Smart Meters & Management
11. Leakage Identification, Preventive Maint.
12. Water Quality Monitoring

Energy Management

13. Smart Meters & Management
14. Renewable Sources of Energy
15. Energy Efficient & Green Buildings

Urban Mobility

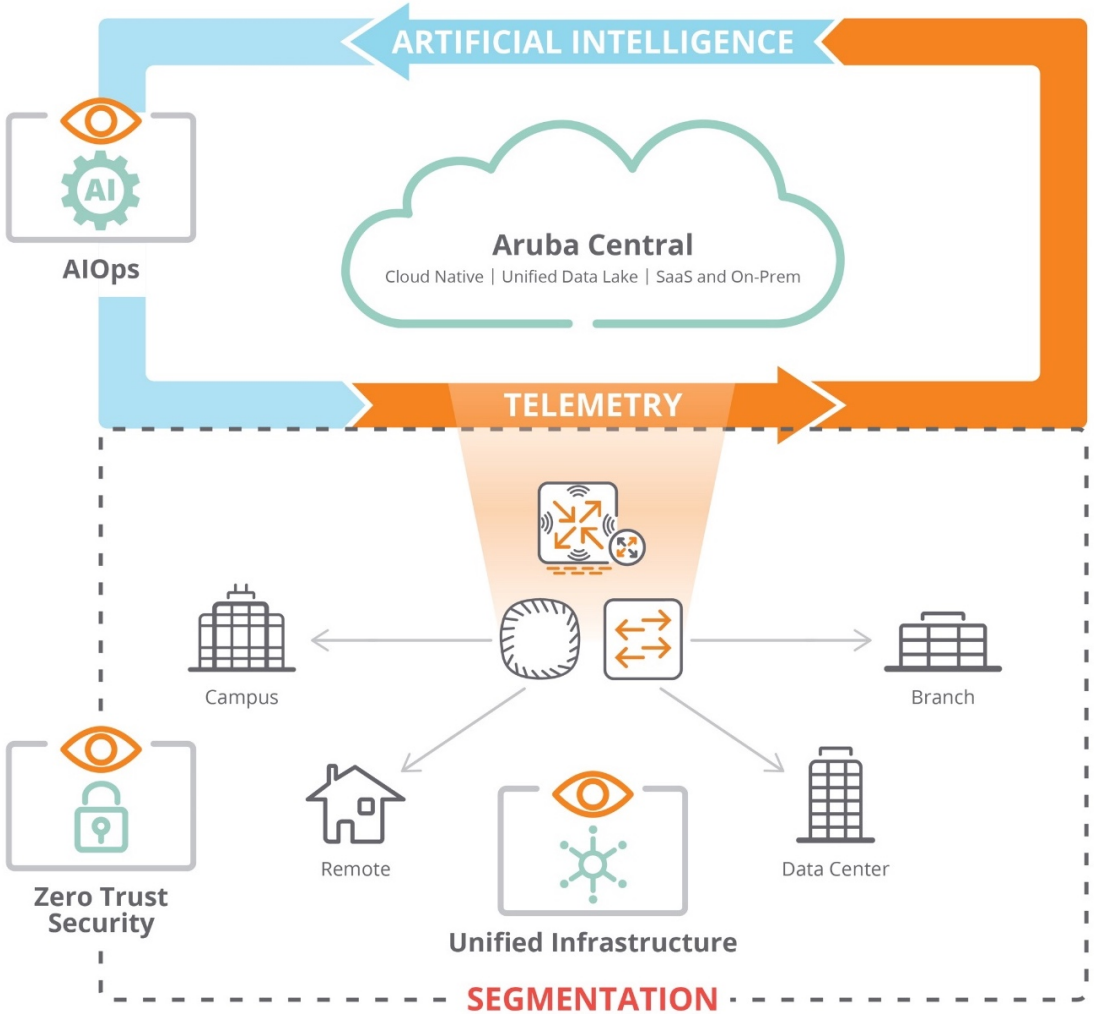
16. Smart Parking
17. Intelligent Traffic Management
18. Integrated Multi-Modal Transport

Others

19. Tele-Medicine & Tele Education
20. Incubation/Trade Facilitation Centers
21. Skill Development Centers

Aruba Solution for Smart City

ARUBA EDGE SERVICES PLATFORM (ESP)



Core Attributes

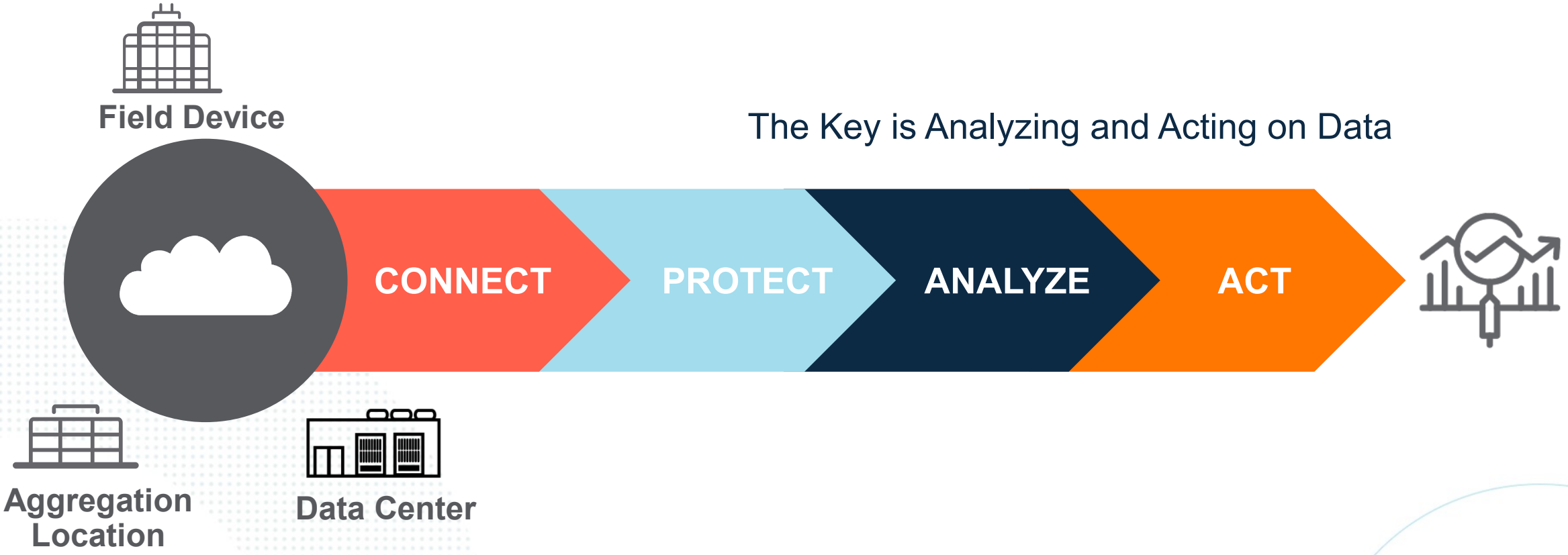
AIOps
Automated IT Intelligence

Zero Trust Security
Secure access from anywhere

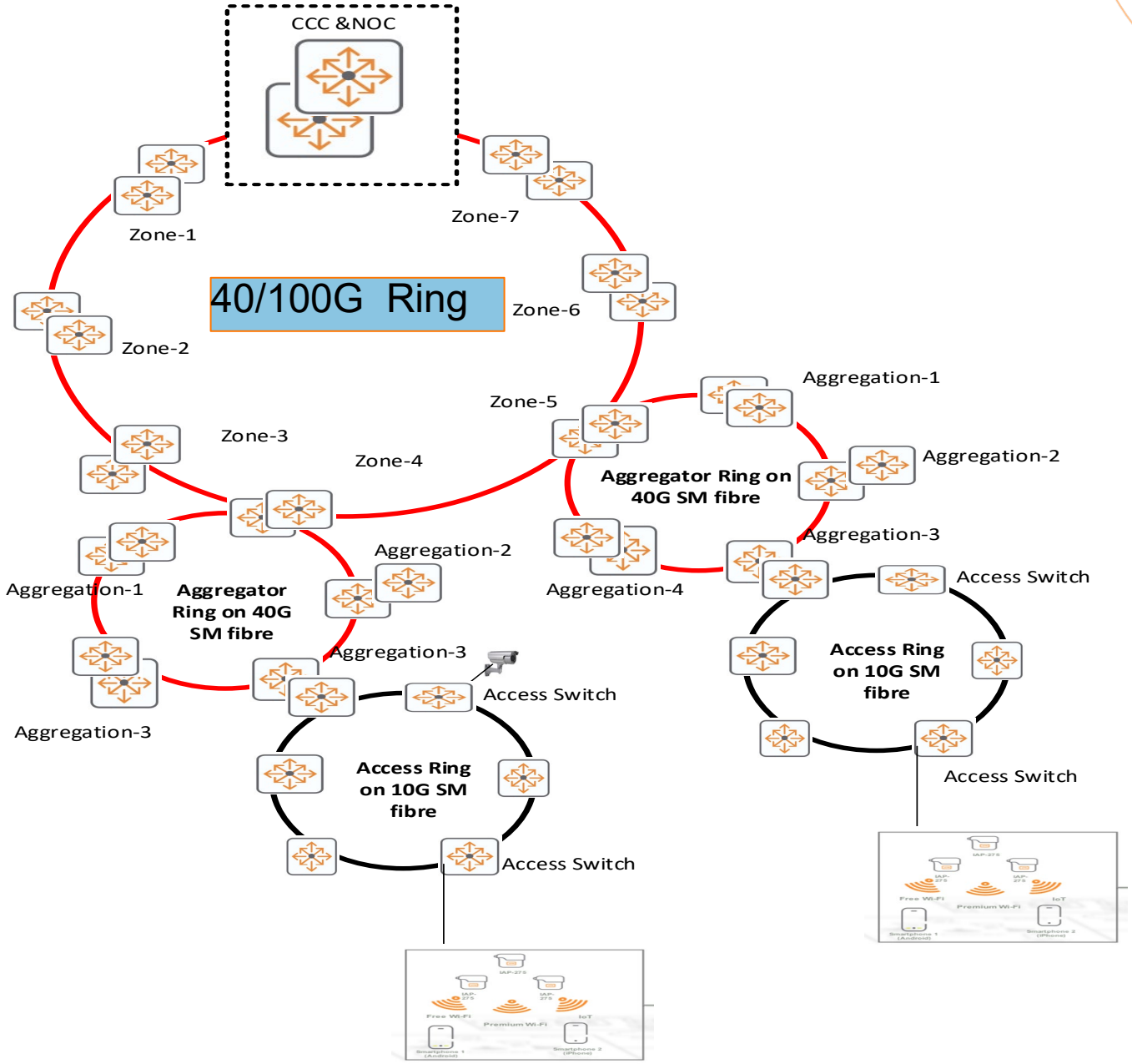
Unified Infrastructure
One portfolio for any use case

ARUBA VISION

Go Beyond Connect and Protect



Typical Network Architecture for Smart City



Access Points as a Platform

802.11ax Wi-Fi Radios – Wi-Fi 6

- 802.11ax network access
- Asset tracking tags
- Personnel location badges
- Smart wrist bands with telemetry sensors
- Smart lighting systems
- Bar code scanners and mobile printers

802.15.4 Radio – Standards such as Zigbee

- Food safety sensors
- Refrigeration sensors
- Heating, air quality, presence, security, panic button, lighting, leak sensors
- Door locking and access systems

Bluetooth 5 Radio

- Wayfinding and geofencing
- Energy harvesting heating, air quality, presence, security, panic button, lighting, leak sensors
- Door locking and access systems
- Asset and personnel location tags

USB Port

- Cellular interfaces
- Retrofit Zigbee interface in existing deployments
- Electronic shelf labels
- Gun shot detectors
- Custom interfaces

Video Surveillance

- Aruba secure wireless video links can significantly reduce the time and cost of installation versus trenching and conduit
- Ideal for point-to-point, point-to-multipoint, and mesh video, security, and access control applications
- Third-party power-over-fiber option allows the power supply to be located 3km away

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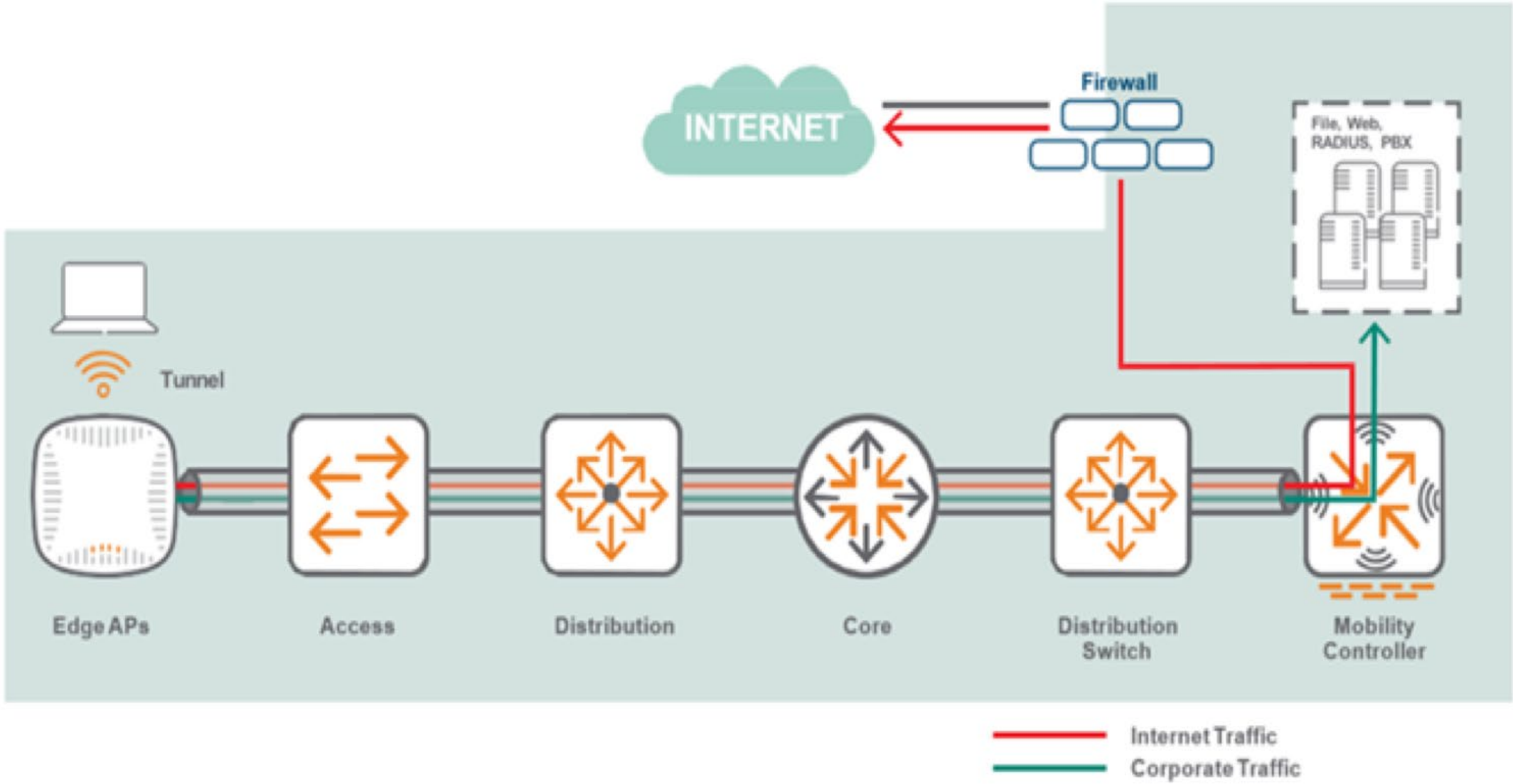
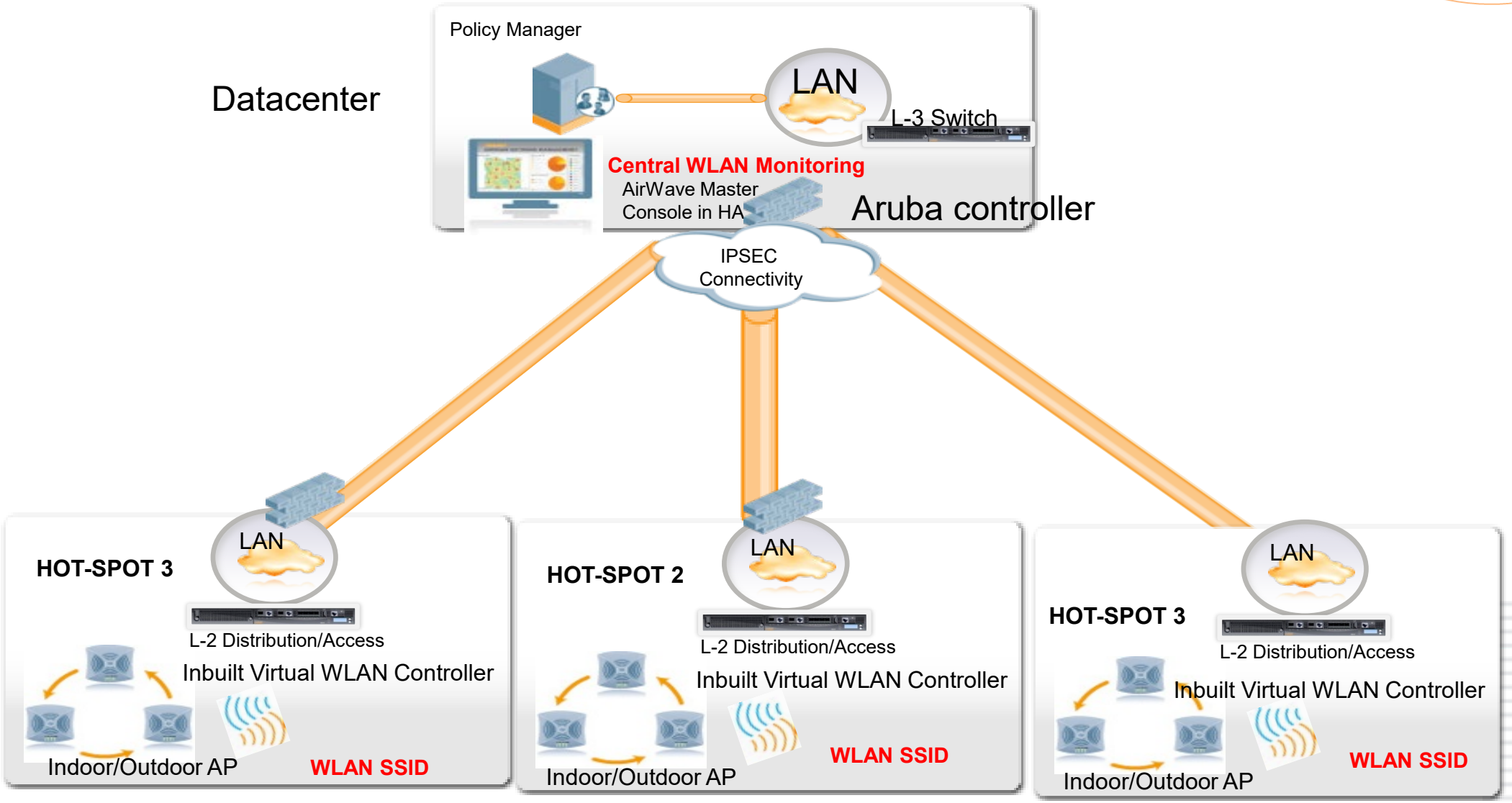
Wi-Fi Connectivity – Centralized Mode



Wi-Fi Connectivity -Distributed Mode



Flexible Deployment Options with Aruba

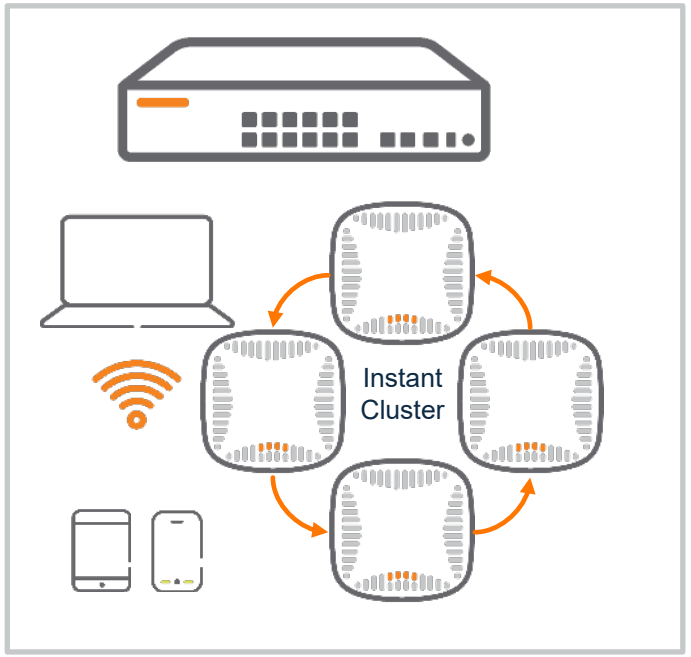
Micro location with RAPs

Basic WAN

RAP connected to WAN uplink

Small to Mid location with IAPs

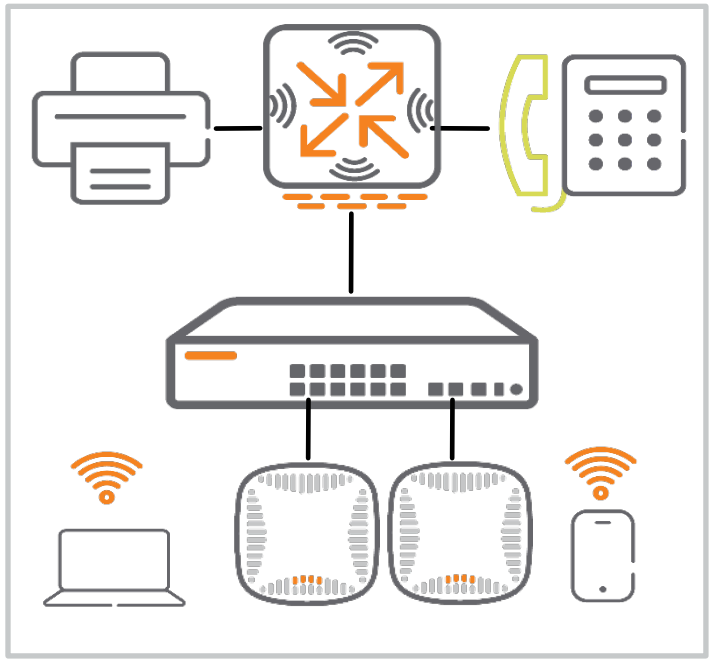
Basic WAN



Instant AP cluster connected to a Aruba access switch

Large to Mid Location with Gateway

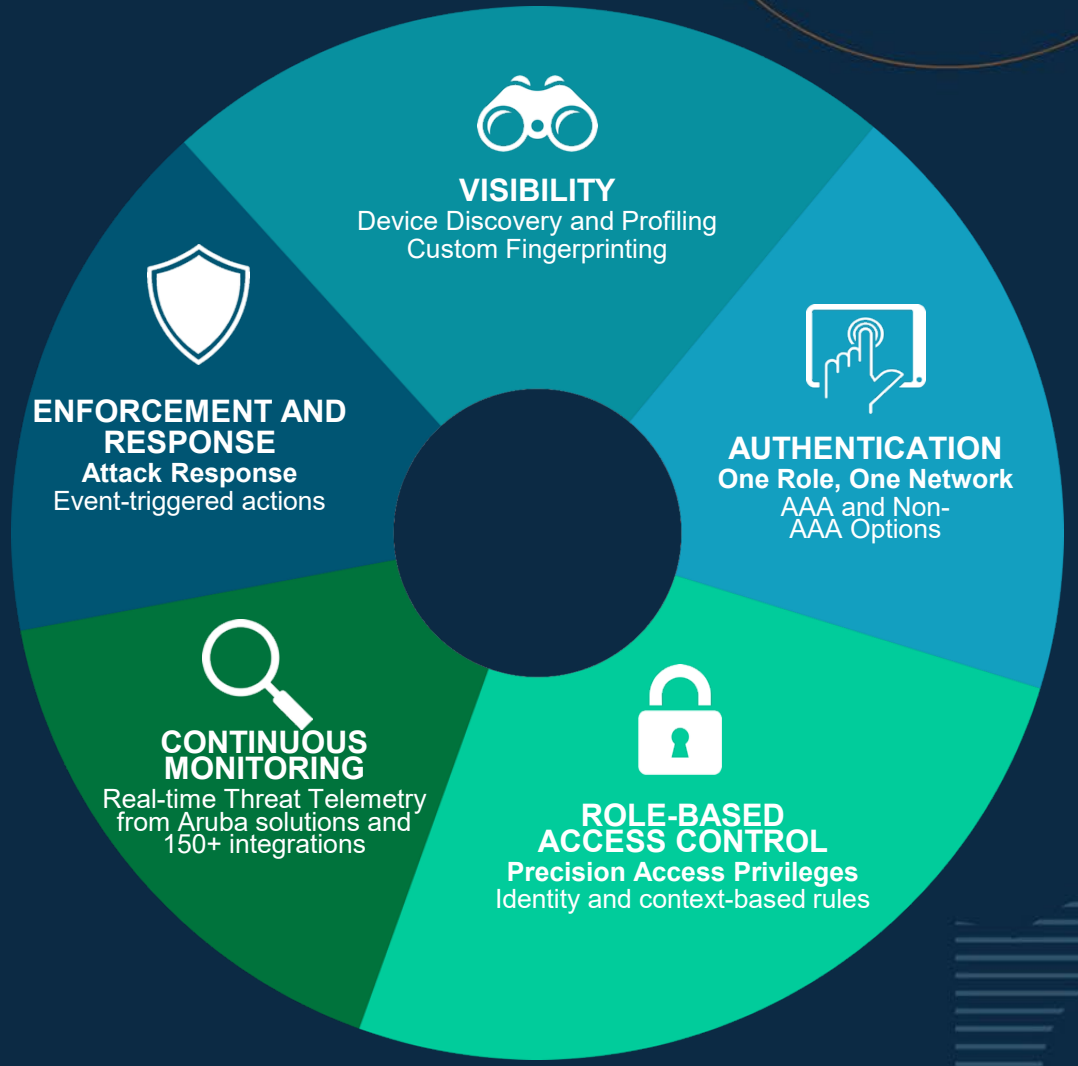
Advanced WAN



7000 Branch Controller connected to WAN uplinks, with Aruba switch and AP's

One Network and Policy Management Platform

ARUBA ZERO TRUST PROTECTION



DYNAMIC SEGMENTATION CONTEXT

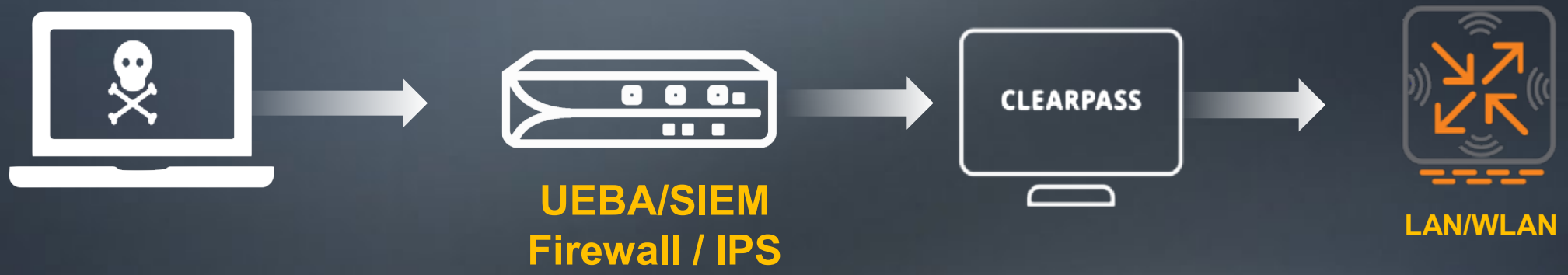
ClearPass Policy Manager

RESPONSE: REACT WHEN THINGS GO WRONG

1 User/Device Goes Rogue

2 Security Alert To ClearPass

3 ClearPass isolates client



THE CLEARPASS ECOSYSTEM:
150+ 3rd Party Integrations and Growing

Internet of Things (IoT)

Multi-vendor switching

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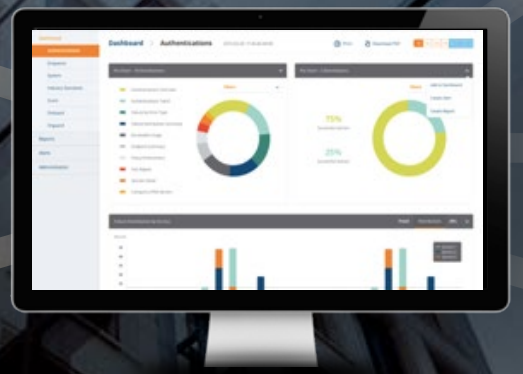
REST API, Syslog



Aruba ClearPass with Exchange Ecosystem

BYOD and corporate owned

Multi-vendor WLANs

JUNIPER NETWORKS · ArcSight An HP Company · paloalto NETWORKS · splunk> · Check Point SOFTWARE TECHNOLOGIES LTD.

Security monitoring and threat prevention

McAfee · Microsoft · Google · MobileIron · DUO · airwatch by vmware

Device management and multi-factor authentication

servicenow · pagerduty · twilio · SendGrid

Helpdesk and voice/SMS service in the cloud

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Sample of 150+ Integrations including OT Visibility

SECURITY

Attivo Networks
Carbon Black.
Check Point Software Technologies Ltd.
BlackBerry Cylance
FireEye
Fortinet
Juniper Networks
tenable
McAfee
paloalto Networks
Symantec
tenable
BIGFIX

AUTH

Auth0
Azure Active Directory
Duo
Envoy
Cloud Identity
ImageWare Systems, Inc. Securing The Future
okta
Ping Identity
sine
tesm by wework
zoom

NEW OT/ICS

Claroty
Indegy
CyberX
Nozomi Networks

LOGGING

ArcSight
splunk>
IBM QRadar
solarwinds loggly

HOTSPOT

Authorize.Net
PayPal
worldpay from FIS

MESSAGING

Microsoft Teams
pagerduty
Twilio SendGrid
servicenow
slack
twilio

PROPERTY

Agilysys
Oracle | micros Opera
protel hotel software
Silverbyte

EMM

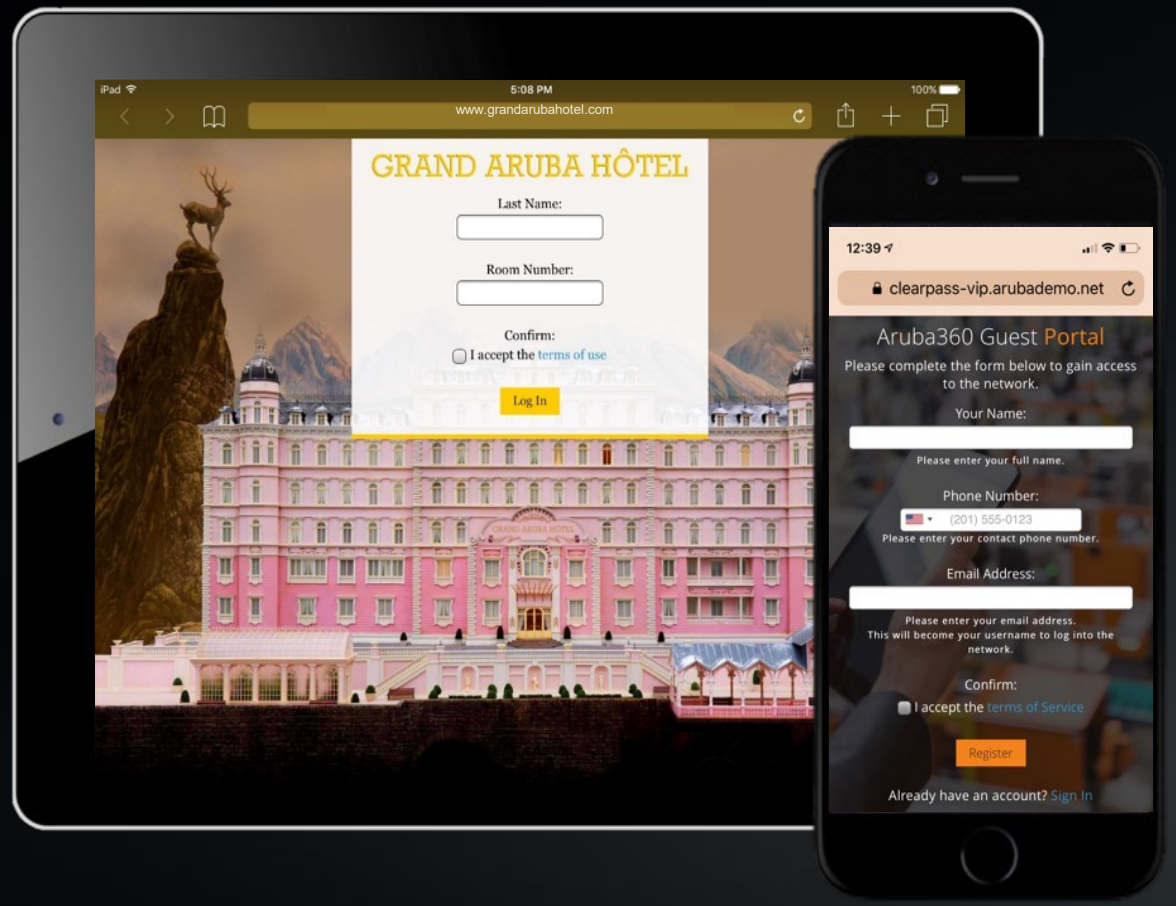
BlackBerry
Citrix
G Suite
IBM MaaS360
Intune
jamf
mobileiron
SAP
SOTI
Workspace ONE

SOCIAL

amazon
facebook
GitHub
Google
Instagram
LinkedIn
salesforce
twitter

CLEARPASS GUEST ACCESS

HELPING CUSTOMERS BUILD CUSTOMIZED, SECURE GUEST EXPERIENCES



Fully customizable and brandable guest access capabilities

Integrations with key property management, billing and visitor management systems

Provides a platform to reach customers and capture valuable end-user information

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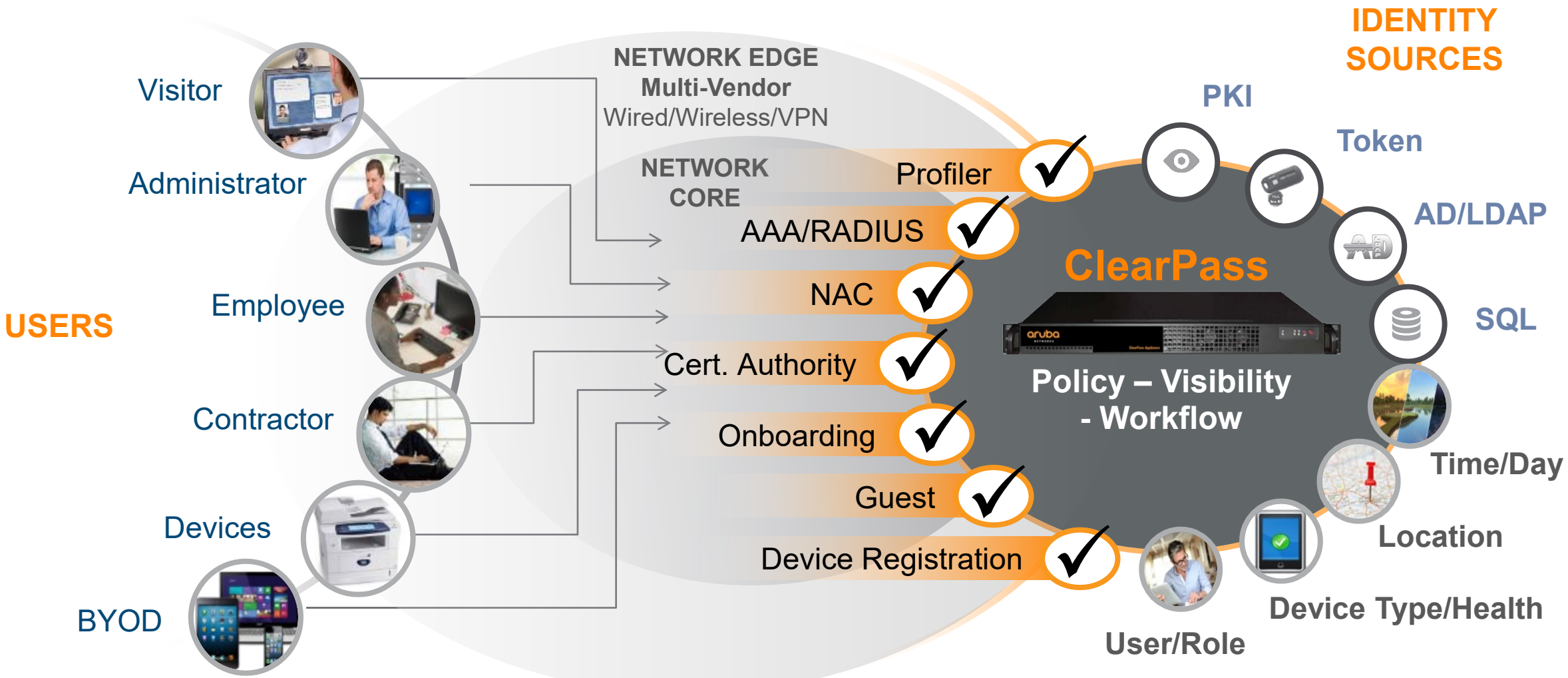
ClearPass Core Functionality



ARUBA AIR PASS

ARCHITECTURE

Device Provisioning

Passpoint profiles and SIM credentials pre-installed or pushed by operators

Authentication

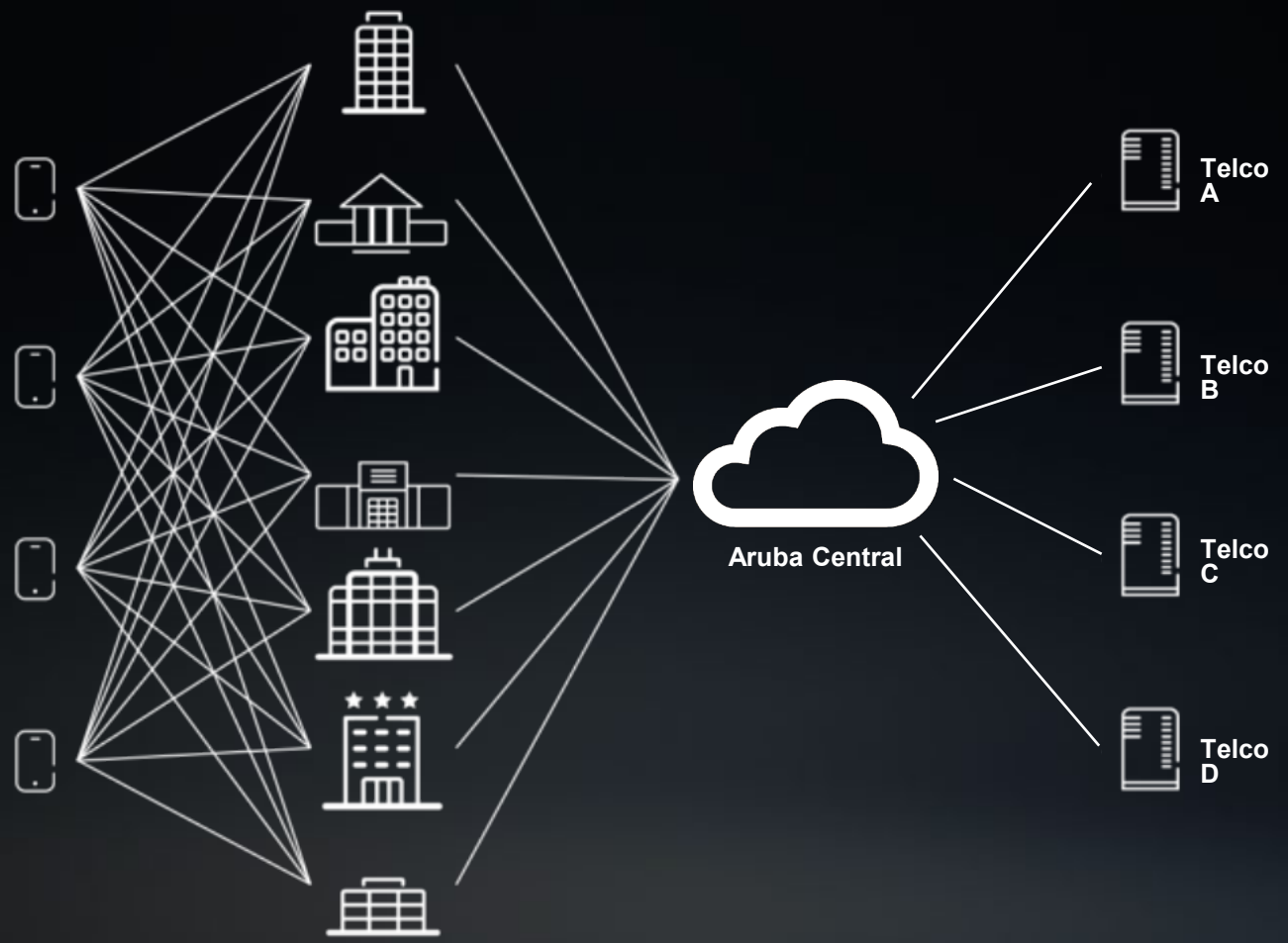
Authentication by operator with assistance from Aruba Air Pass services

Aruba Components

Passpoint-certified network equipment

Globally accessible, secure authentication hub with scalable architecture to support employee, guest and public access for any subscriber in any venue

Roaming agreements and exchange of QoS data lay foundation for future 5G operator / enterprise partnerships



ARUBA AIR SLICE

Usage based app prioritization

Application identification via Aruba's DPI engine

Scheduling intelligence provides fine-grained QoS assurance for individual applications

RF SLAs: Guaranteed bit rate, improved battery life, bounded latency/jitter/packet loss

Built on top of Wi-Fi 6 constructs: MU-MIMO, OFDMA, TWT (Target Wake Time)

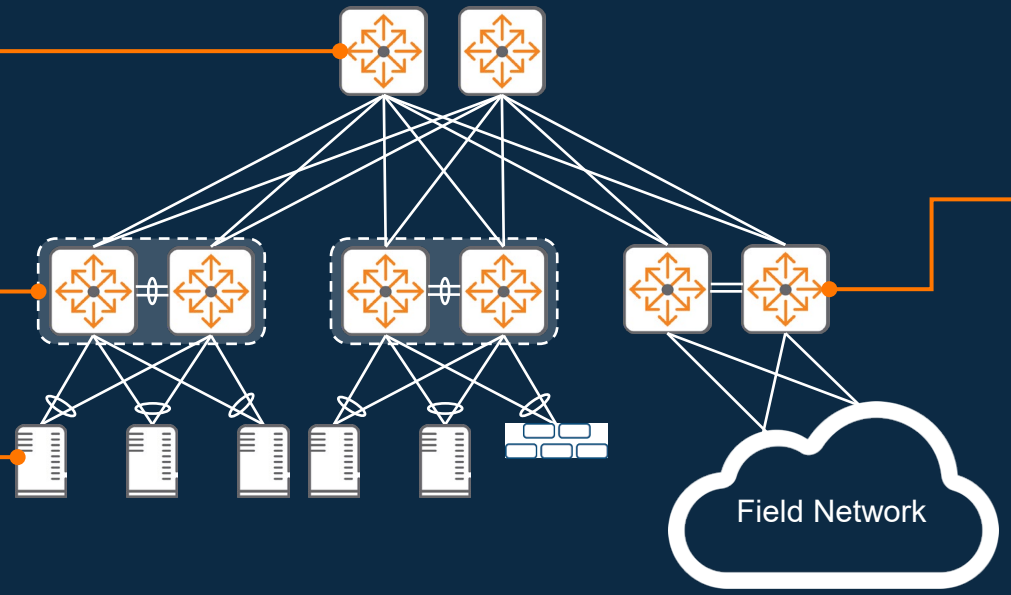
Benefits both .ax and non-.ax client devices, based on use of internal queuing

ARUBA DATA CENTER

SPINE
- Switch quantity determines fabric bandwidth and size of fault domain
- Switch ports determine number of supported leafs
- Aggregation point is optimized for east-west traffic

LEAF
- Determines server uplink capacity
- Virtual Switching Extension (VSX) for server uplink redundancy

DUAL CONNECTED SERVERS
- Path Resiliency
- High Speed Connectivity



CAPABILITIES
- Flexibility: Pay as you grow
- HA: ECMP + VSX
- Telemetry: AOS-CX / NAE

BORDER LEAF
- External fabric connectivity
- DC to Aggregation Location

FLEXIBILITY **HIGHLY AVAILABILE** **RICH TELEMETRY**

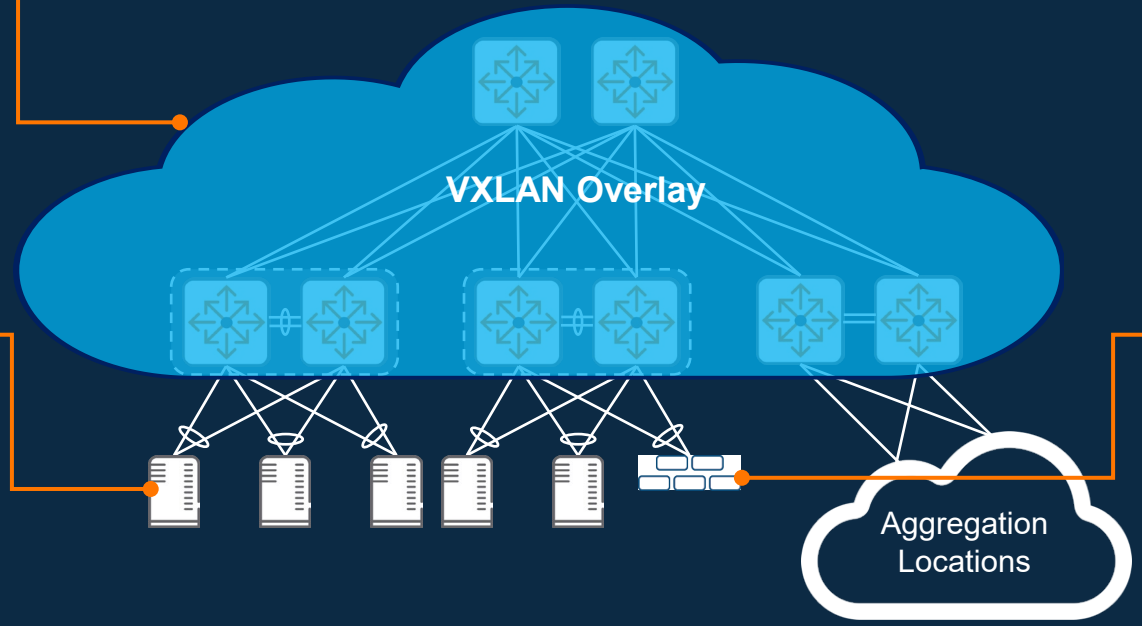
ARUBA DATA CENTER

VXLAN OVERLAY

- Macro Segmentation: VXLAN / BGP-EVPN
- Multi-tenancy Support
- Virtual Machine Mobility

COMPUTE NODES

- Micro Segmentation with VMware NSX



SERVICE INSERTION

- Firewalls, Load Balancers, etc.

SEGMENTATION **STANDARDS-BASED** **SERVICE INSERTION**

ARUBA DATA CENTER

Central on-Prim

Management | Control Services
Analytics and AI | Orchestration

AFC and NetEdit

Conformance, Automation and Analytics

MANAGEMENT

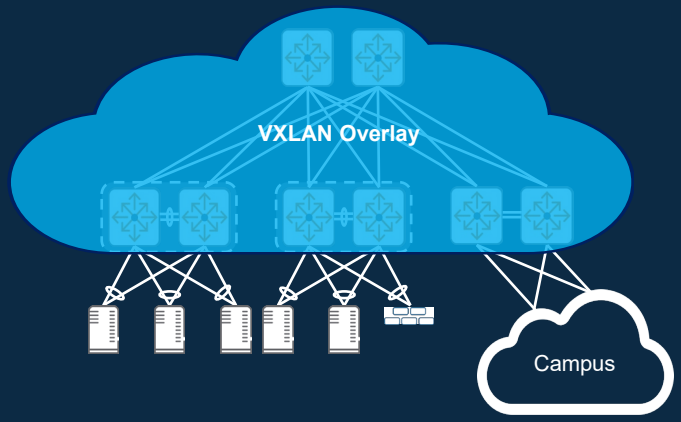
CONTROL SERVICES

ANALYTICS

- Network Analytics Engine (AOS-CX)
- Enhanced Troubleshooting

ORCHESTRATION

- Aruba Fabric Composer
- NetEdit
- Ansible

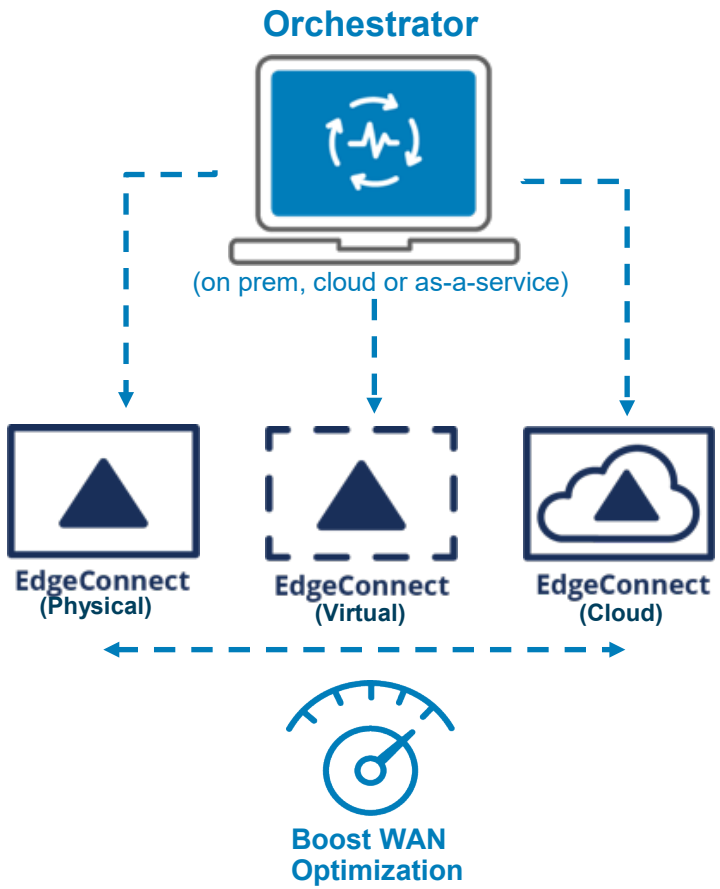


FLEXIBLE DEPLOYMENT

EXTENSIBILITY

ELASTICITY

UNITY EDGECONNECT™
THE UNIFIED SD-WAN EDGE PLATFORM



Unity Orchestrator™

Centralized policy orchestration, monitoring and reporting

Unity EdgeConnect™

Unified SD-WAN edge platform: routing, security, SD-WAN and WAN Optimization

Unity Boost™ WAN Optimization

On-demand WAN Optimization (Optional)

silver peak

ARUBA ESP

Single pane of glass

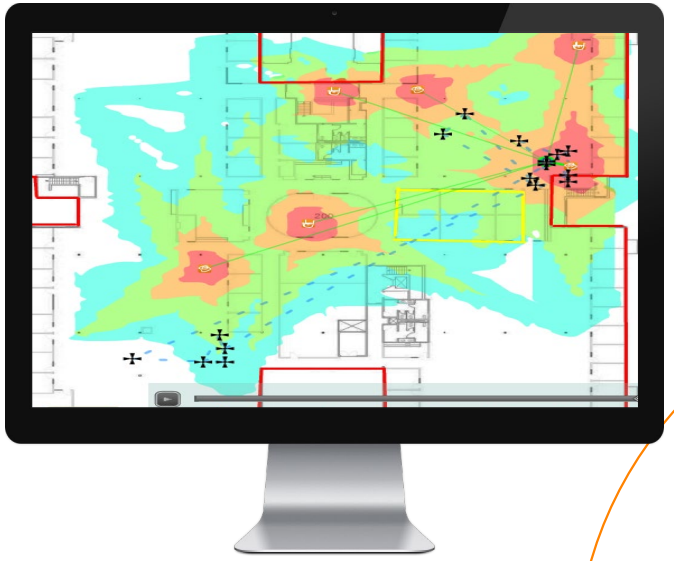
MANAGEMENT

NETWORK INFRASTRUCTURE

ACCESS POINTS

SWITCHES

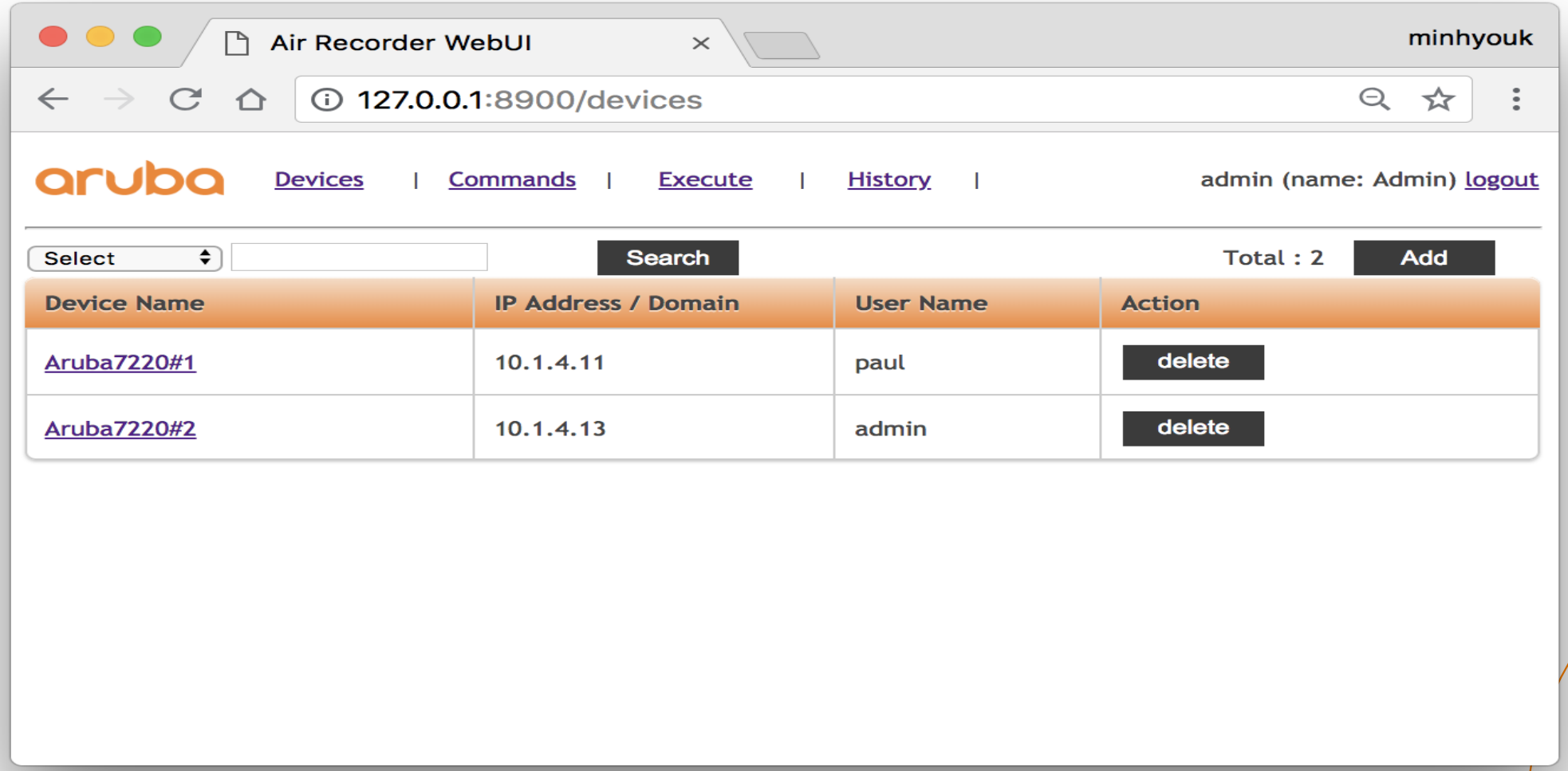
Wifi GATEWAY



VISIBILITY | CENTRALIZED MONITORING AND MANAGEMENT

ARUBA AirRecorder

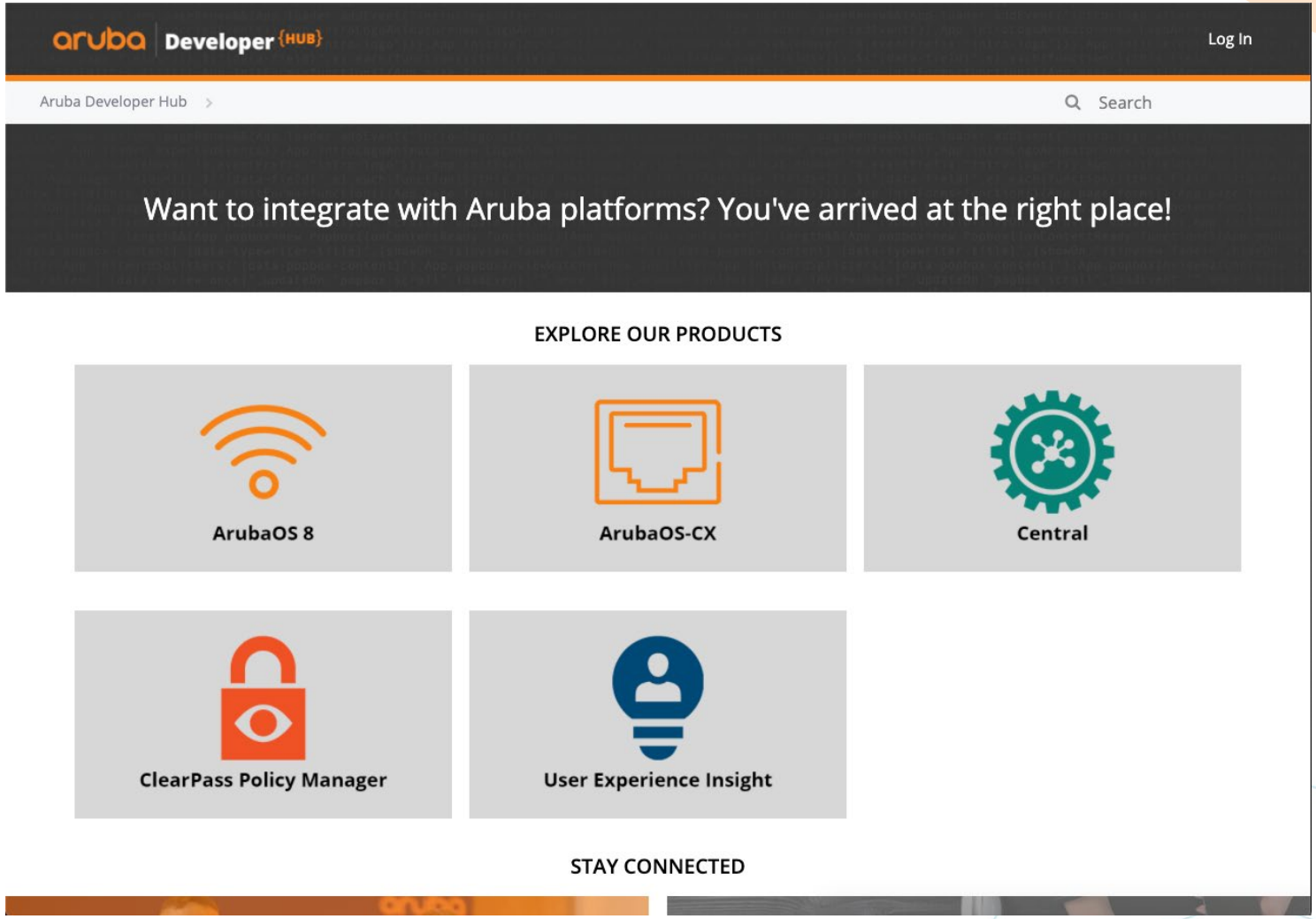
A Java based tool that will run several common CLI commands for checking controller, AP, and wireless device health. AirRecorder supports Aruba Swithes, Instant VC (IAP). AirRecorder runs on any operating system that supports a Java Platform Standard Edition version 6 or later.



SIMPLIFYING INTEGRATIONS WITH ARUBA DEVELOPER HUB

Rich APIs across portfolio

In-depth developer's documentation

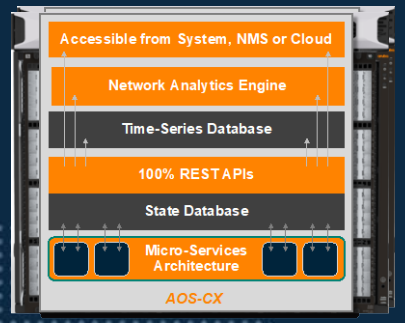


UNIQUE FEATURE

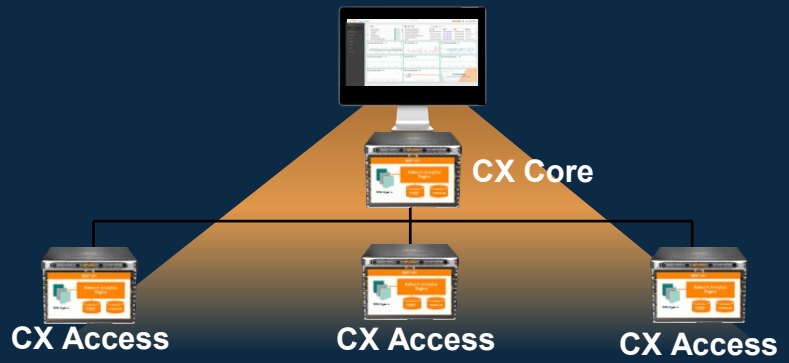
ARUBA CX SWITCHING

NEXT-GEN, CLOUD-NATIVE SWITCHING DESIGNED FOR THE NETWORK OPERATOR

AOS-CX



Aruba NetEdit and Network Analytics Engine



Aruba CX Switches

Cloud Native

Modern, microservices architecture for full network programmability and workflow automation

Distributed Analytics

Analytics in every node for network-wide, real-time insights to proactively detect and resolve issues

Edge Access to Data Center

Flexibility to deploy same hardware and software for a consistent operational experience from edge access to data center

AOS-CX KEY FEATURES

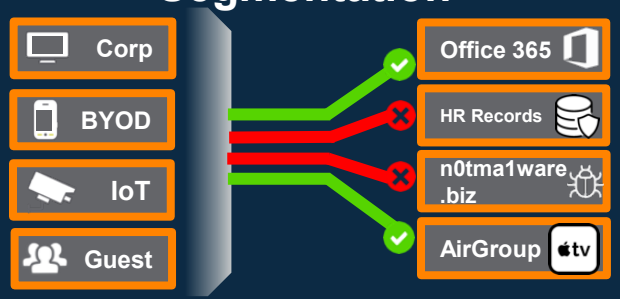
DRIVERS: SHRINKING MAINTENANCE WINDOWS, SECURITY, WI-FI 6

VSX Live Upgrades

Extended to Access

Dual control and data planes with improved performance to bring live upgrades to modular access

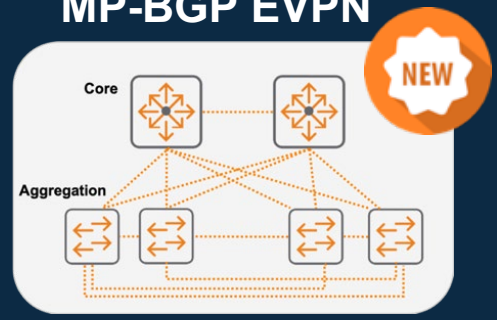
Dynamic Segmentation



Extended to Access and AOS-CX

Secure, unified access across wired and wireless for users and IoT, enabled by policy-based automation

VXLAN with MP-BGP EVPN



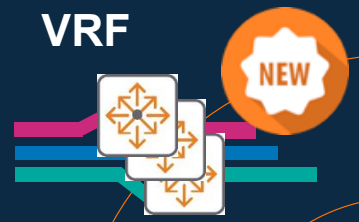
Industry-standard segmentation that scales and provides consistent architecture across campus and data center

ARUBA CX MOBILE APP

Always-on PoE

Enable APs, healthcare devices, sensors, and IoT devices to keep power during upgrades

VRF



Simplified routing segmentation used across distributed VXLAN

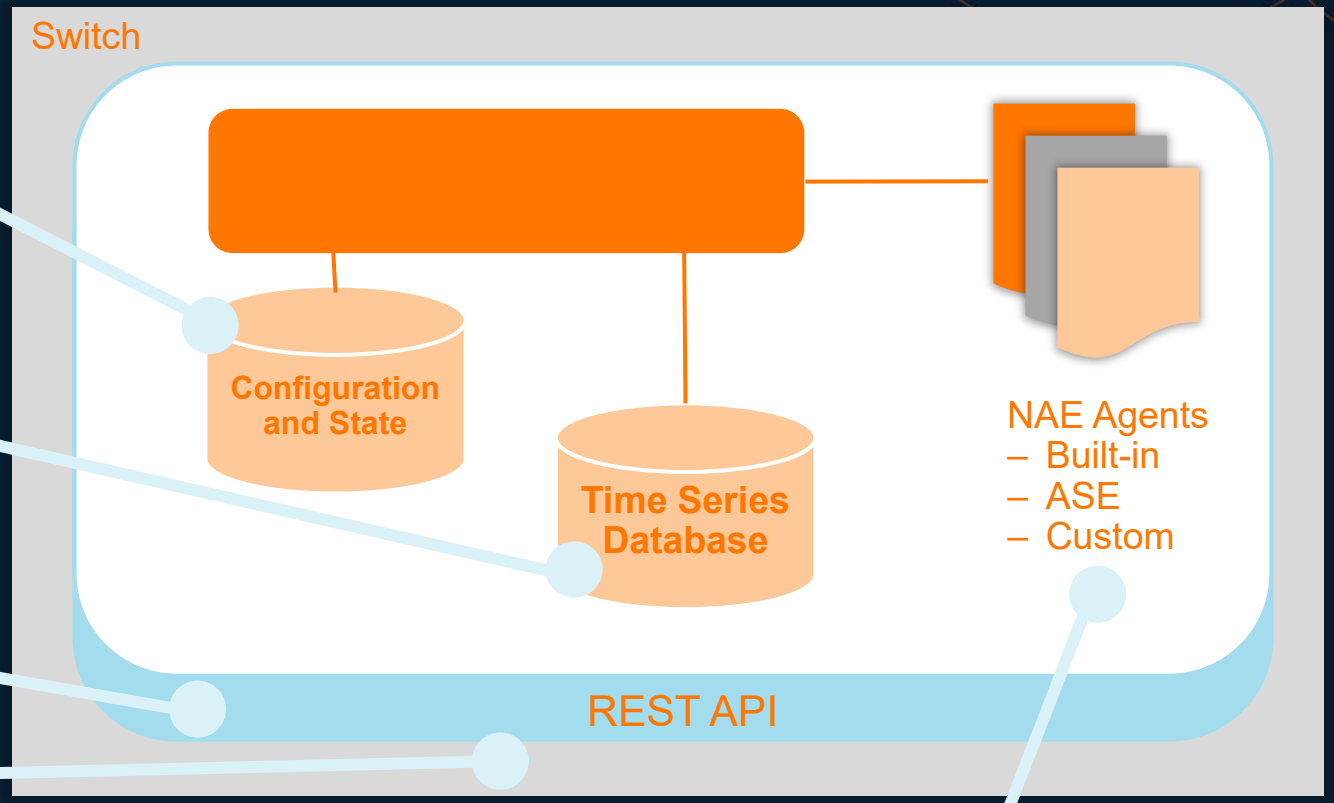
Monitoring & Troubleshooting Made Easy

Wide Monitoring Capabilities
Configuration • Protocol and System State
ASIC Counters • ACL's

Real Time Network Visibility
Synchronization every 5 seconds
Realistic model of network behavior

Intelligence and Automation
Full power of Python
Parameters for customization
Variables for persistent policy state

Sandbox Isolation
Low system overhead



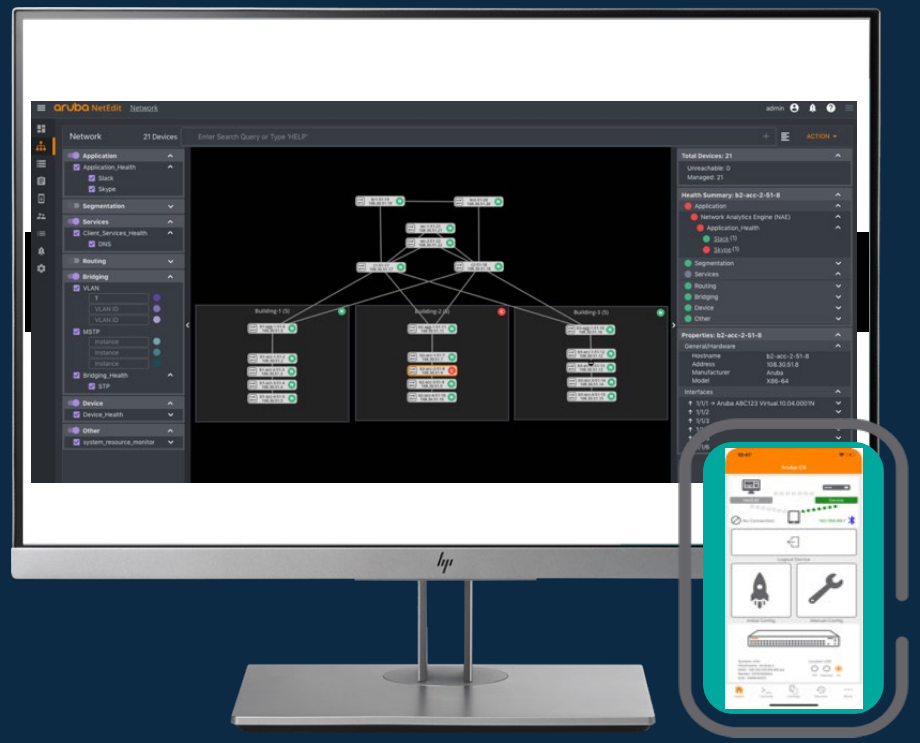
Flexible Actions
Alert Level
CLI command execution
CLI command output capture
Configuration checkpoint diff capture
Syslog generation
Script function callback

Simple: Programmability for Network Operations…Driving Predictability

ANALYTICS AND AUTOMATION POWERED NETWORK OPERATIONS

AUTOMATED CONFIG MANAGEMENT WITH ARUBA NETEDIT

- Search
- Edit
- Validate
- Deploy
- Audit
- Troubleshoot



Aruba CX Mobile App

Management Simplicity

Topology for fast view into network health, including devices with config issues

GUI-driven solution configs to implement common configurations easily across multiple systems

Auto-Change Verification to minimize change windows and reduce errors

Continuous Validation to monitor for deviations from intended policy or design

One Touch Deployment with Aruba CX Mobile App

Accelerate day zero config, view and manage using your mobile device

Visibility and Analytics via NAE

Embedded analytics with real-time health status and diagnostics for efficient root cause analysis

Health reports on devices, apps, and network services

Script tags indicate what layer is contributing to issues, speeding root cause analysis

Workflow Integration with 3rd Party Tools

Immediate notifications from Slack, TOPdesk, ServiceNow, etc.

Intelligent Traffic Control with Application Visibility

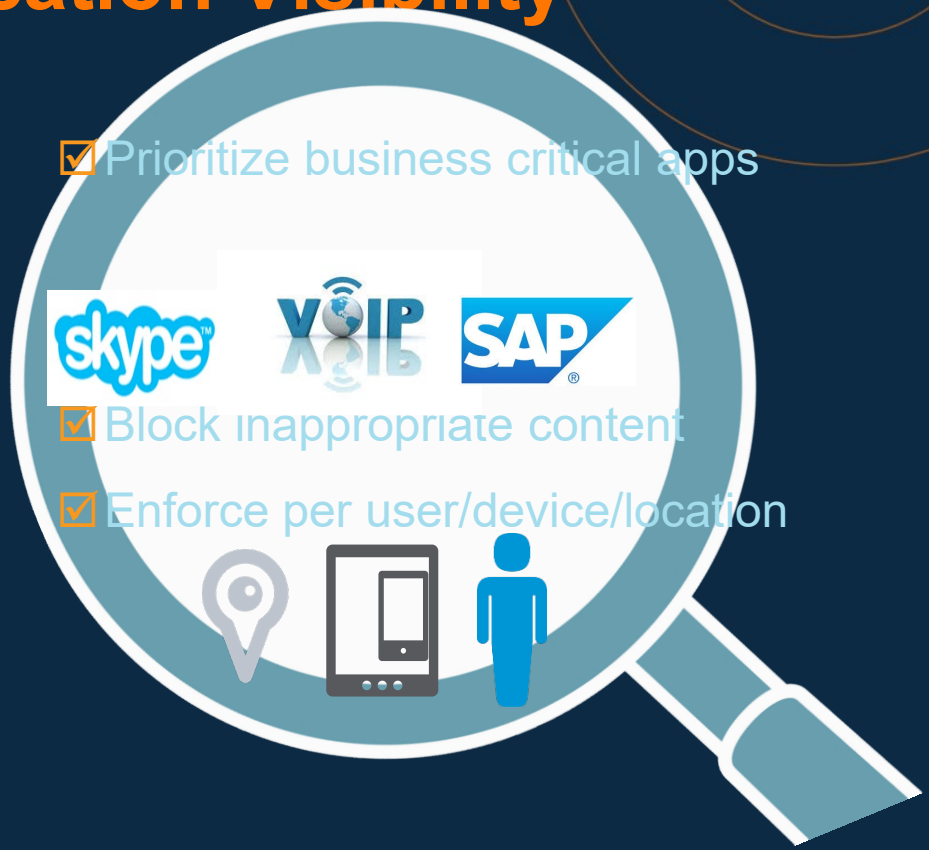
Aruba AppRF & WebCC

DPI

- Depth - common apps
- Enterprise traffic

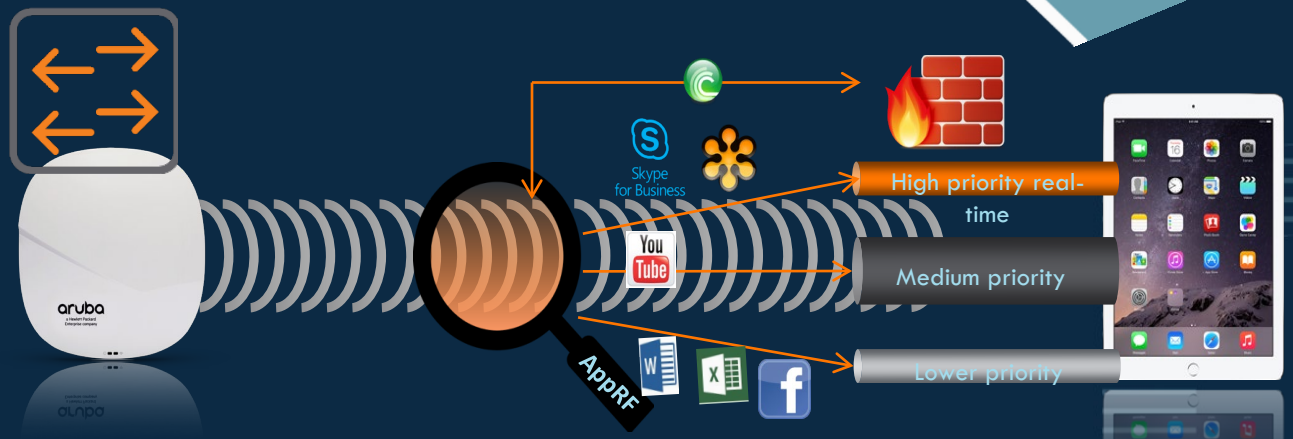
Cloud-Based Web Policy Enforcement

- Breadth - less common apps
- Web traffic



GRANULAR VISIBILITY & CONTROL

- App category
- Individual app
- Web category
- Web reputation
- Allow/deny
- QoS
- Throttle
- Log
- Blacklist



Automatically identifying traffic and prioritizing traffic per user and device

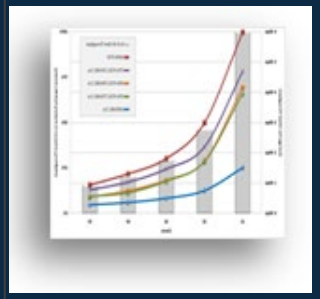
Policy Enforcement Firewall (PEF)

– Aruba Firewall advantage for Wired Users

Identify
the User

Control
Access per User

Prioritize
Applications



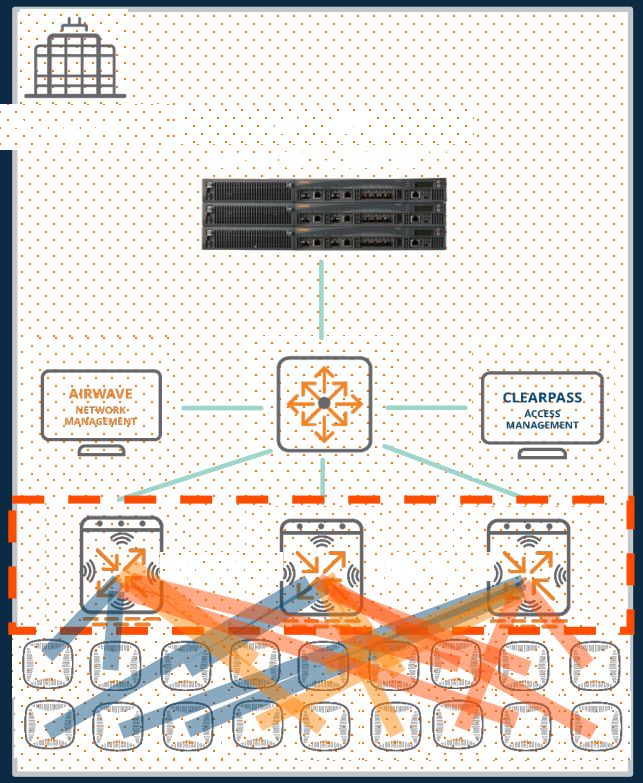
Optimize
Performance

Follow
the User

Policy Enforcement Firewall

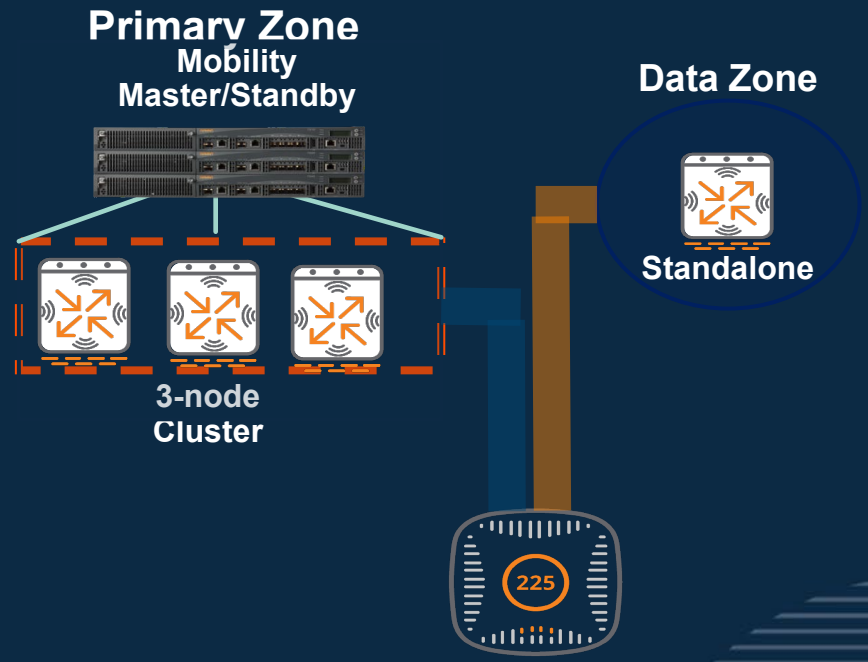
- Identity-based Stateful firewall
- Role/identity based
- Application Aware
- Stateful policies versus “access control lists”
  - Bi-directional
  - Session aware; more difficult to spoof
  - Dynamic

AOS Feature : Clustering, Live upgrade and Multizone



- Up to 12 Nodes in a cluster
- Hitless Failover for AP's and Users supported with Clustering
- Users do not necessarily terminate on the same controller as their AP

- Upgrade applications without upgrading controller firmware
- Every application has its own compressed image
- Upgrades are done in runtime and do NOT require controller reboot

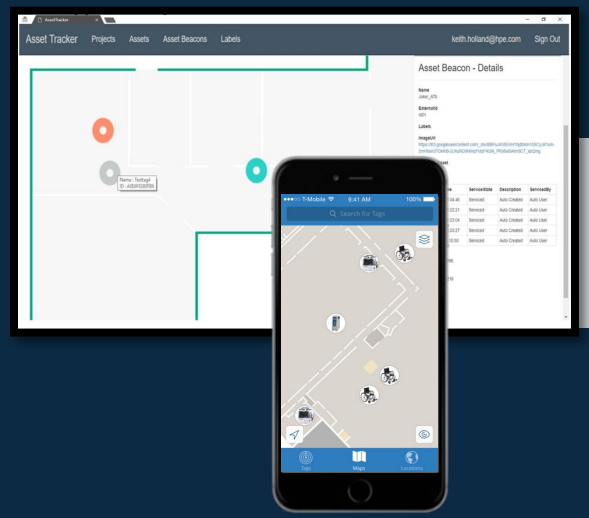


- Collection of controllers under a single administration domain
- Can be a single controller or a cluster of controllers
- AP capable of terminating its tunnels on controllers residing in different zones

Aruba Meridian
The Guiding Beacon

Asset Tracking

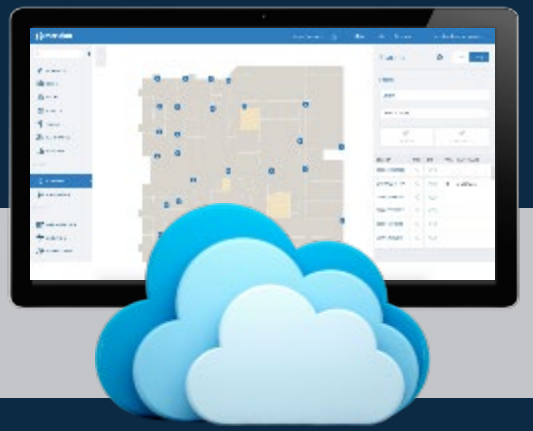
Mobile Engagement



Mobile and web apps

Aruba Tags

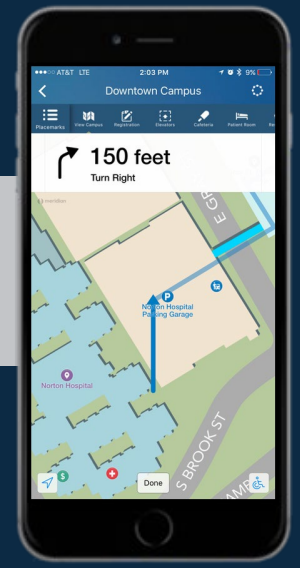
Aruba AP with Bluetooth



Aruba Meridian

Aruba Beacons

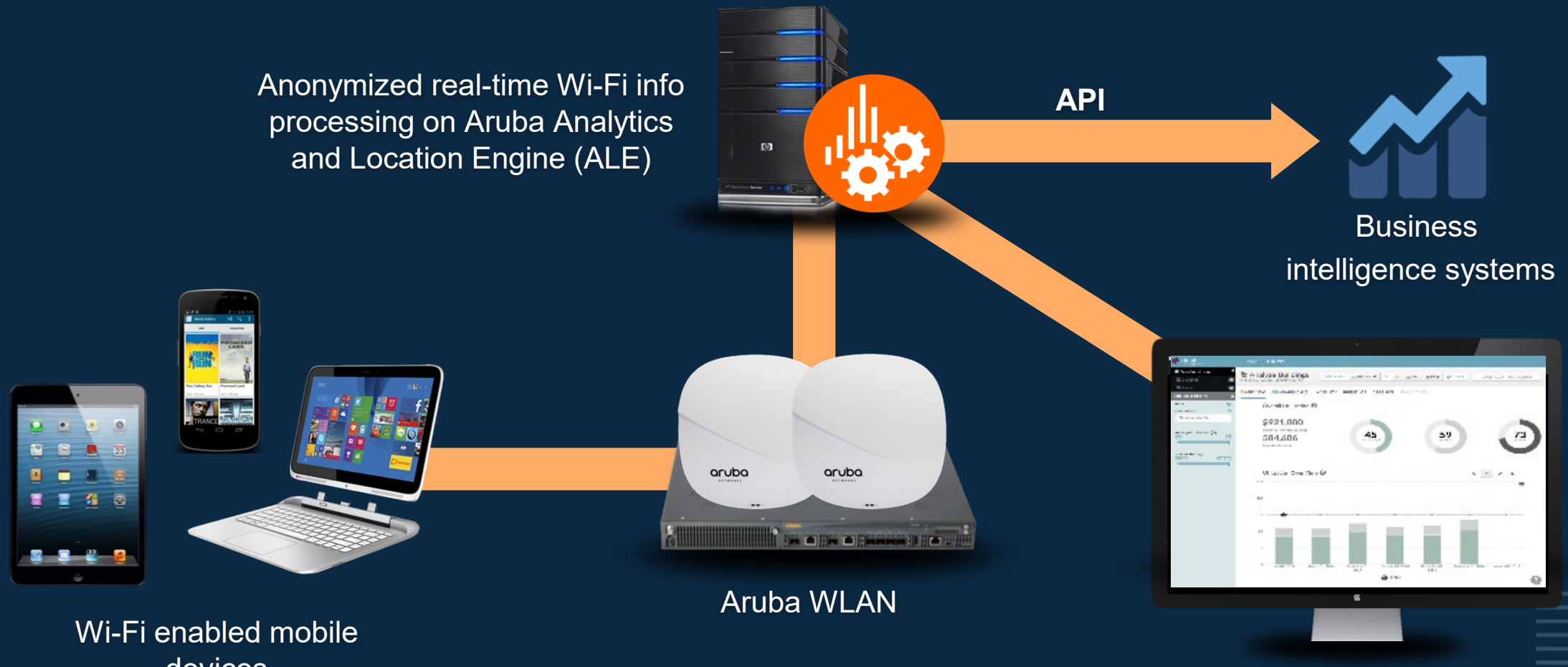
Aruba AP with Bluetooth



Mobile apps with Meridian SDK

Aruba Analytics and Location Engine (ALE)

Analytics improve Business Intelligence



Broadest Certified Product Portfolio

FIPS 140-2

- FIPS 140-2 Enterprise WLAN validation since 2006
- Validated 802.11n WLAN in 2009 / 802.11ac in 2014
- Latest FIPS Validation: ArubaOS 6.4 (Controllers & APs), ClearPass 6.5

Common Criteria

- Controllers/APs: WLAS-PP, NDPP-VPNGW, NDPP-TTFW
- ClearPass: NDPP-Auth Server EP
- VIA: VPN Client PP
- RAP: VPN Client PP

DoD UC-APL

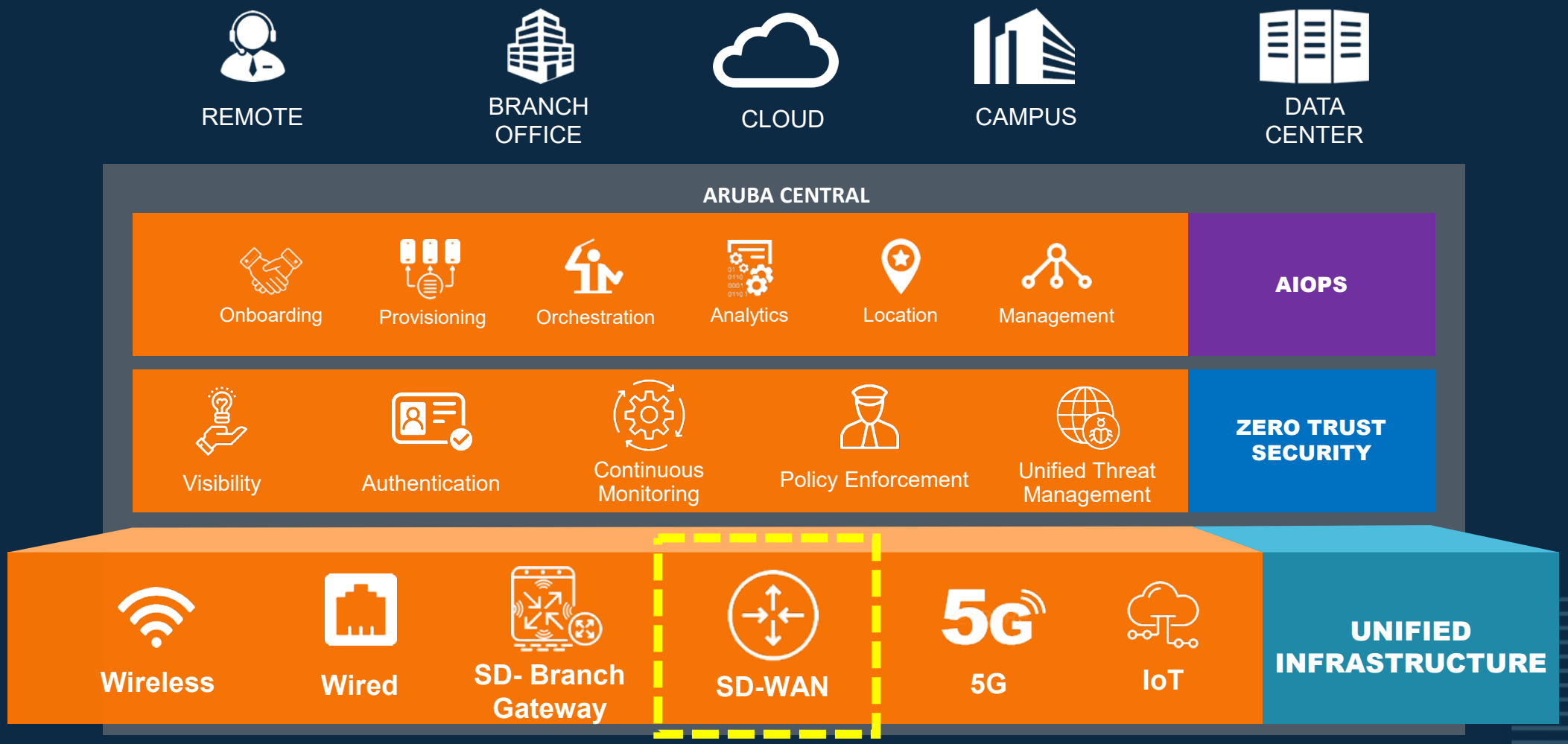
- First Enterprise WLAN on US Army Product List in 2008
- First Enterprise WLAN through JITC and UC-APL listed October 2010
- Track record of accreditation for each subsequent release

ATOs

- Hundreds of ATO-operating WLANs in DoD
- JTIC, TIC, SPAWAR Certs
- Type Accredited

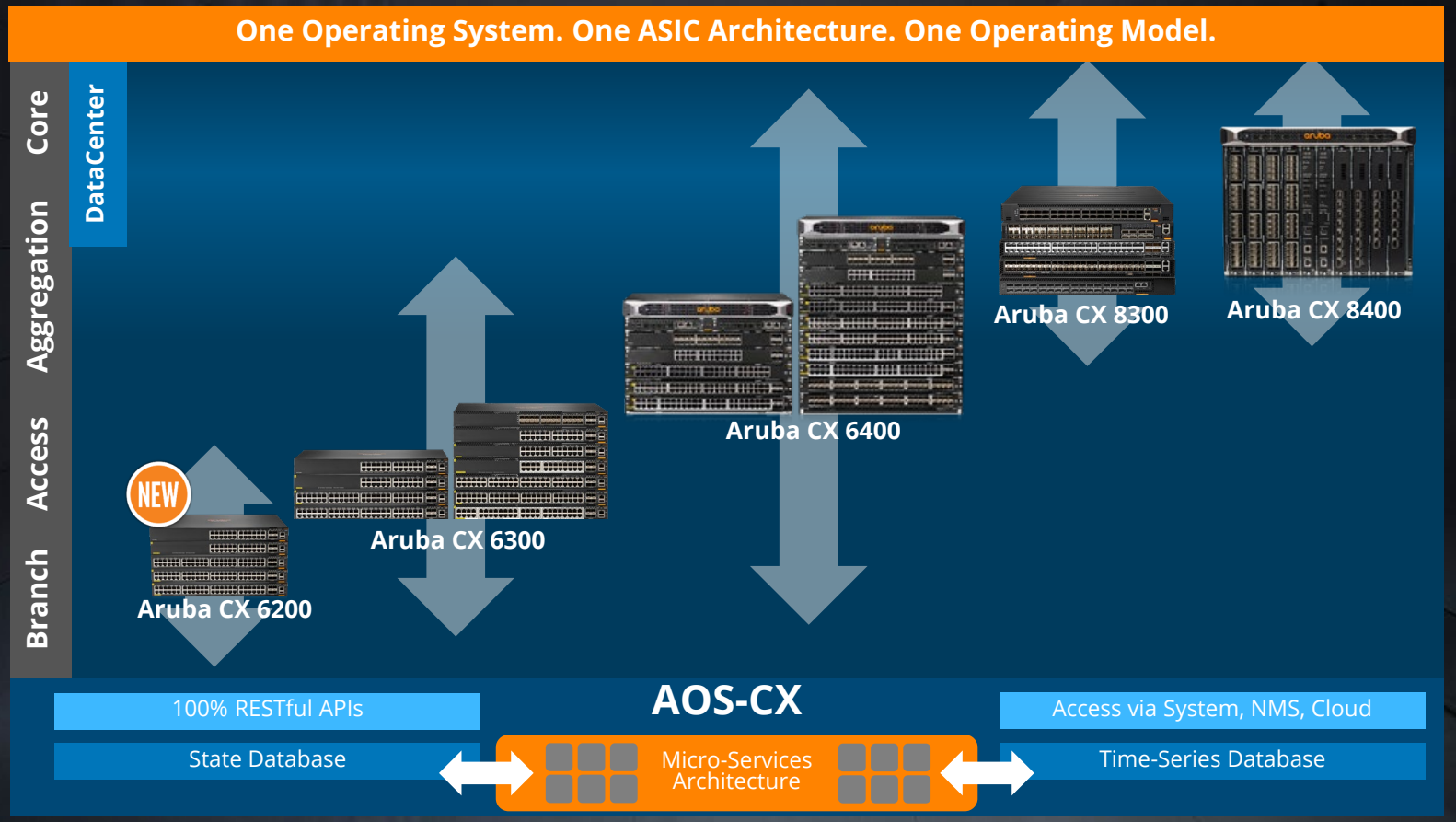
ARUBA EDGE SERVICES PLATFORM (ESP)

Provides connectivity, security and AI to connect the edge to the cloud



ARUBA CX SWITCHING

END-TO-END PORTFOLIO FOR THE ENTERPRISE



A complete Wi-Fi 6 AP Platform Portfolio

Flagship: 550 Series (AP-555)
8x8:8SS / 4x4:4SS (37RU), tri-radio mode
2x 5GE, USB, BLE / 15.4, UL-MU-MIMO

Hospitality: AP-505H & AP-503H
Dual 2x2:2SS (8RU)
505H: 2.5GE up, 4x 1GE down, PSE, USB, BLE / 15.4
503H: 1GE up, 2x 1GE down, BLE / 15.4

High-end: 530 Series (AP-534/535)
Dual 4x4:4SS (37RU)
2x 5GE, USB, BLE / 15.4 UL-MU-MIMO

Outdoor: 570 Series (AP-574/575/577)
4x4:4SS / 2x2:2SS (16RU)
1x 2.5GE + 1x 1GE, BLE / 15.4

Mid-range: 510 Series (AP-514/515)
4x4:4SS / 2x2:2SS (16RU)
1x 2.5GE + 1x 1GE, USB, BLE / 15.4

Hardened/Industrial: AP-518
4x4:4SS / 2x2:2SS (16RU)
1x 2.5GE + 1x 1GE, BLE / 15.4

Entry-level: 500 Series (AP-504/505)
Dual 2x2:2SS (8RU)
1x 1GE, USB, BLE / 15.4

Entry-level Outdoor: 560 Series (AP-565/567)
Dual 2x2:2SS (8RU)
1x 1GE, BLE / 15.4

Wi Fi 6 CERTIFIED

Indoor Campus Platforms

Hospitality, Industrial & Outdoor

Aruba's Outdoor and Ruggedized Portfolio Matrix and Mapping

Wi-Fi 6 (11ax)

Wi-Fi 5 (11ac Wave 2)

High Performance Outdoor

AP-575
Omni-Directional

AP-577
Directional

AP-574
Connectorized

- 5Ghz 4x4 11ax Wi-Fi 6 Radio
- 2.4Ghz 2x2 11ax Wi-Fi 6 Radio
- 2.5Gbps Ethernet / 1Gbps Ethernet
- 802.3bt / 802.3at (dual-Eth and dual-PoE)

AP-375
Omni-Directional

AP-377
Directional

AP-374
Connectorized

- 5Ghz 4x4 11ac Wave 2 Radio
- 2.4Ghz 2x2 11an Radio
- 1Gbps Ethernet / 1Gbps SFP (Ext Temp)
- 802.3at and AC Power

Low-Cost Outdoor

AP-565
Omni-Directional

AP-567
Directional

- Dual-Band 2x2 11ax Wi-Fi 6 Radio
- 1Gbps Ethernet
- BLE / 802.15.4
- 802.3at (802.3af w/IPM)

AP-365
Omni-Directional

AP-367
Directional

- 5Ghz 2x2 11ac Wave 2 Radio
- 2.4Ghz 2x2 11an Radio
- 1Gbps Ethernet
- 802.3af

Ruggedized and Temperature Rated

AP-518
Connectorized

- 5Ghz 4x4 11ax Wi-Fi 6 Radio
- 2.4Ghz 2x2 11ax Radio
- 2.5Gbps Ethernet / 1Gbps Ethernet
- 802.3bt / 802.3at (dual-Eth/dual-PoE)

AP-318
Connectorized

- 5Ghz 4x4 11ac Wave 2 Radio
- 2.4Ghz 2x2 11an Radio
- 1Gbps Ethernet / 1Gbps SFP (Ext Temp)
- 802.3at and AC Power

Smart PoE BLE & Zigbee Radio

ClientMatch

AirMatch

Air Slice

WPA3

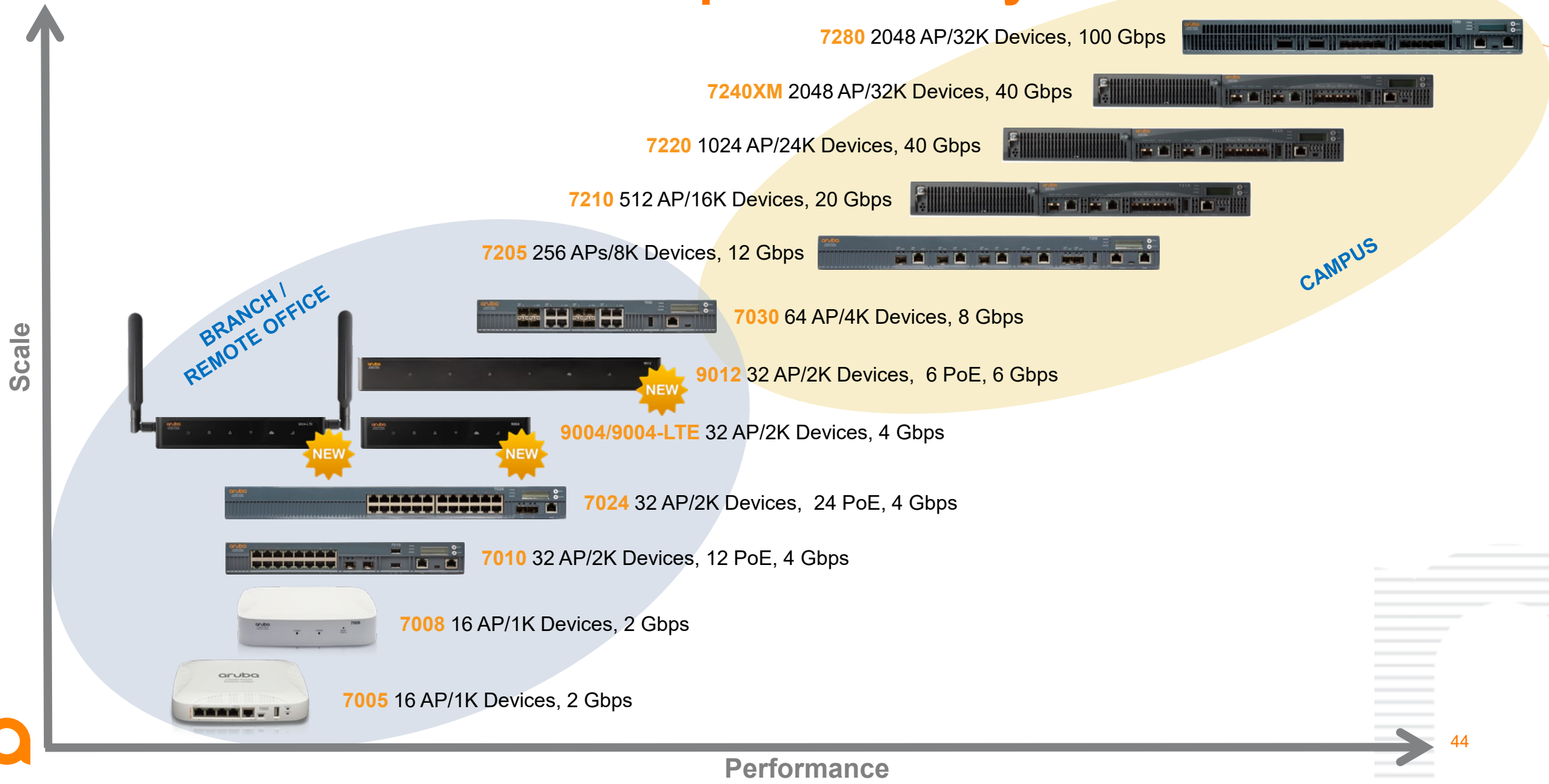
AI and Green AP

60Ghz Point-to-Point

AP-387
Point-to-Point

- 11ad 60Ghz
- 5Ghz 2x2 11ac W2
- 1Gbps Ethernet
- 802.3at/af

Hardware Branch and Campus Gateways



Mobility Master Hardware Appliance

- **x86 platform based on Intel Haswell-EP / Broadwell-EP Technology using E5-2600 v3/v4 CPU family**
- **Solid State Drive for better reliability**
- **Three (3) Models**
  - **MM-HW-1K (JY791A): Support up to 1,000 Devices**
  - **MM-HW-5K (JY792A): Support up to 5,000 Devices**
  - **MM-HW-10K (JY793A): Support up to 10,0000 Devices**
- **Dual redundant load shared power supplies**
- **TPM Module supporting SHA2**
- **Platform monitoring of power supplies, fans, thermal**
- **Mechanical Form Factor**
  - **1 RU** (H x W x D – 1.73” x 17.4” x 15.79”)
- **Supported from ArubaOS 8.1.0**

Thank You

aruba
a Hewlett Packard
Enterprise company

Quiz

Question

Q. Which of the following switches are used in Smart city Data center in Spine-leaf Deployment ?

A- Aruba 6300M Series

B- Aruba 8400

C-Aruba 6200 Series

D- Aruba 8300 Series

Answer – B & D

Question

Q. Which of the following product is used as Aruba IoT Gateway ?

A- Aruba 6300M Switch

B- Aruba AP 575

C-Aruba NetEdit

D- Aruba Network Analytics Engine

Answer – B

Question

Q. Which of the following technology provides an on-box application built-in framework for monitoring and troubleshooting for Aruba OS-CX Switch networks ?

A-Aruba AirSlice

B- Aruba Network Analytics Engine

C-Aruba NetEdit

D- Aruba Clearpass

Answer – B

Question

Q. Which of the following Aruba product provides secure onboarding of IOT devices ?

A- Aruba AP 575

B- Aruba Mobility master

C-Aruba 7200 series controller

D- Aruba Clearpass

Answer – D

Question

Q. Which of the following Aruba technology provides multiple and separate secure networks while using the same access point ?

A- Aruba Clustering

B- Aruba Multizone

C-Aruba Client Match

D- Aruba ARM

Answer – B