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HPE Aruba 行動優先校園網路

Designing the Mobile First Campus for #GenMobile

Kent Wang
Solution Manager, Taiwan
Aruba, a Hewlett Packard Enterprise company

Can You Afford Not to Deliver Stable Wi-Fi?

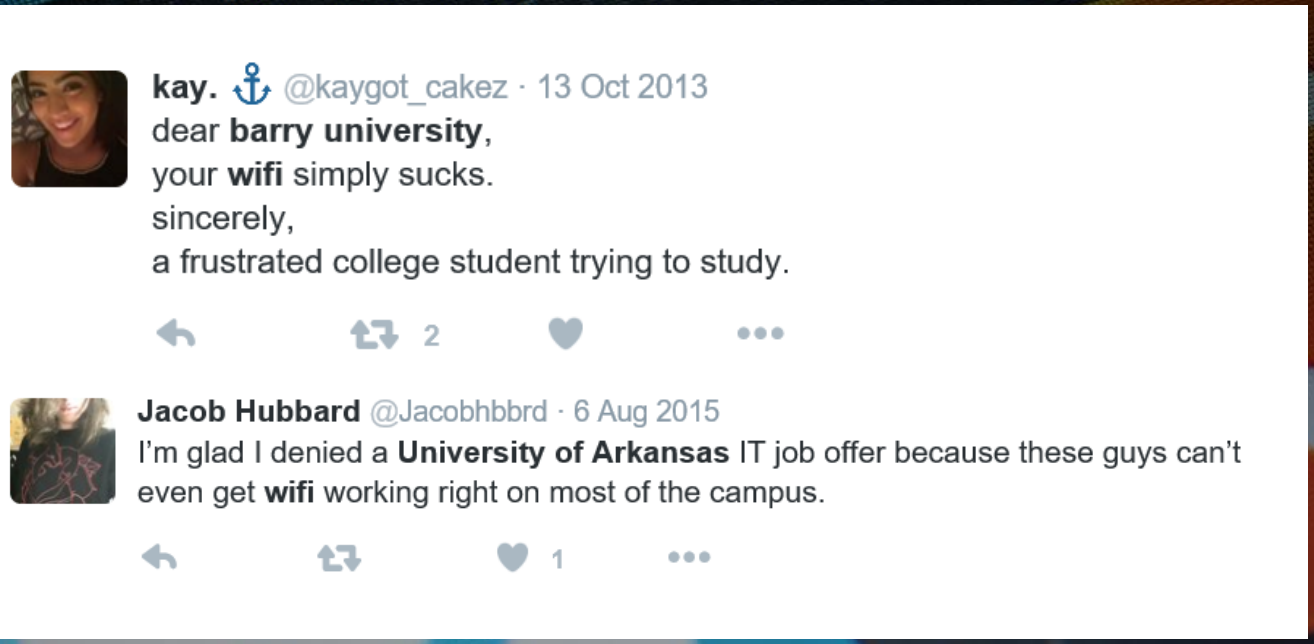
Public Grievances Impact:

Student Satisfaction

University Reputation

Recruitment

Student Retention



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Learning Requires a
Reliable and Smart Handling Network

Can teachers rely on Wi-Fi for 100's of student devices at once?

Can critical apps be prioritized to ensure student success?

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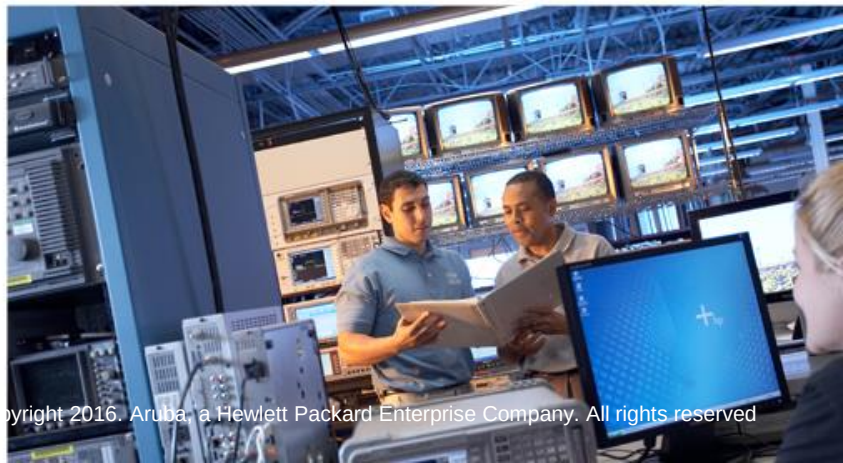
Building Environments for Student Success

Mobile-First Campus

Uninterrupted experience

Optimized Gigibit Wifi and connectivity for user, device, and environment



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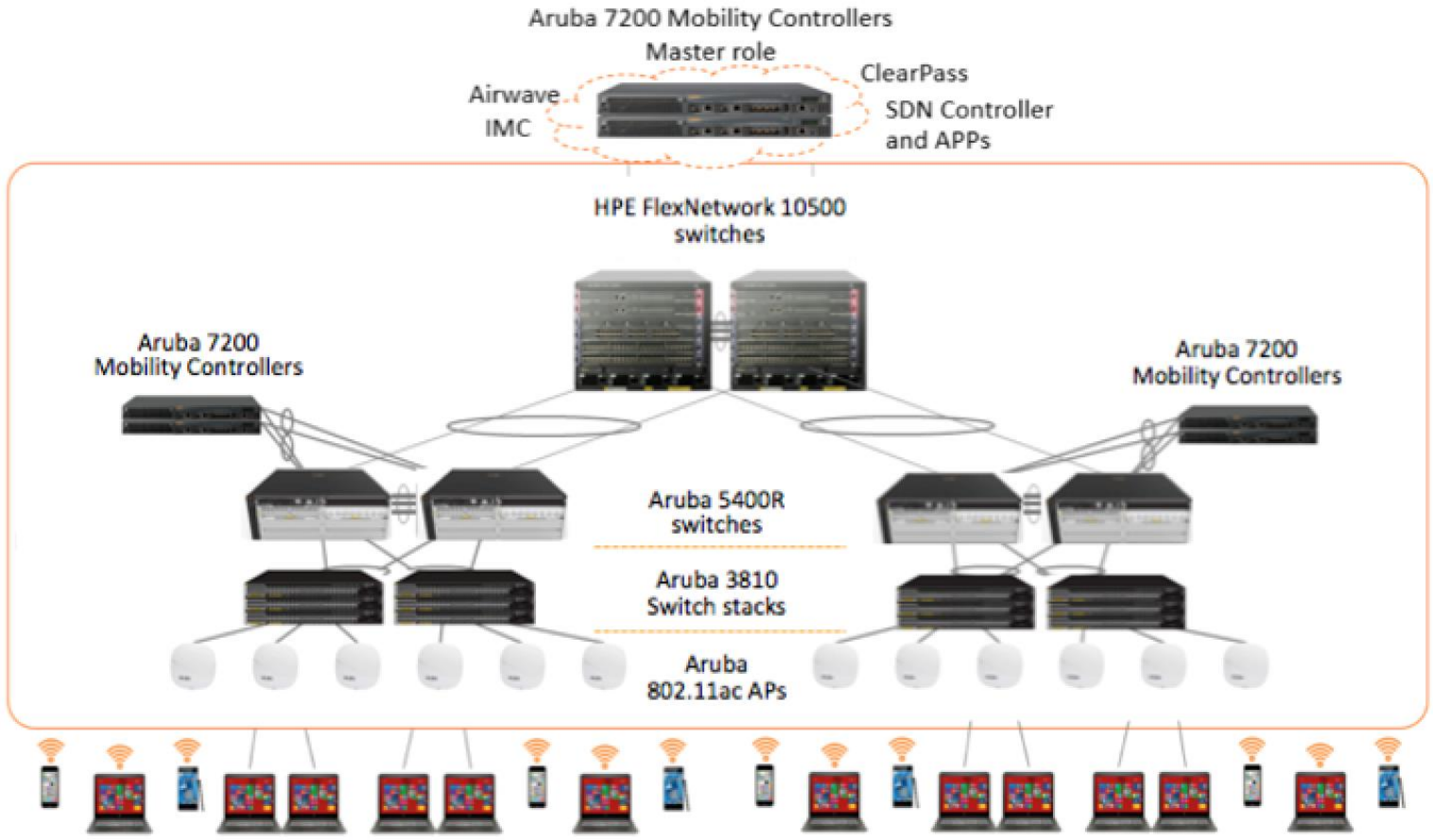
Aruba Mobile-First Network



- Assured User Experience
- Optimized for Mobile Apps
- App, Device, User Aware
- Unified Policy Enforcement

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#GenMobile Imperative: Mobile First Campus

Scalability

Wi-Fi that doesn't slow down as many people connect

Security

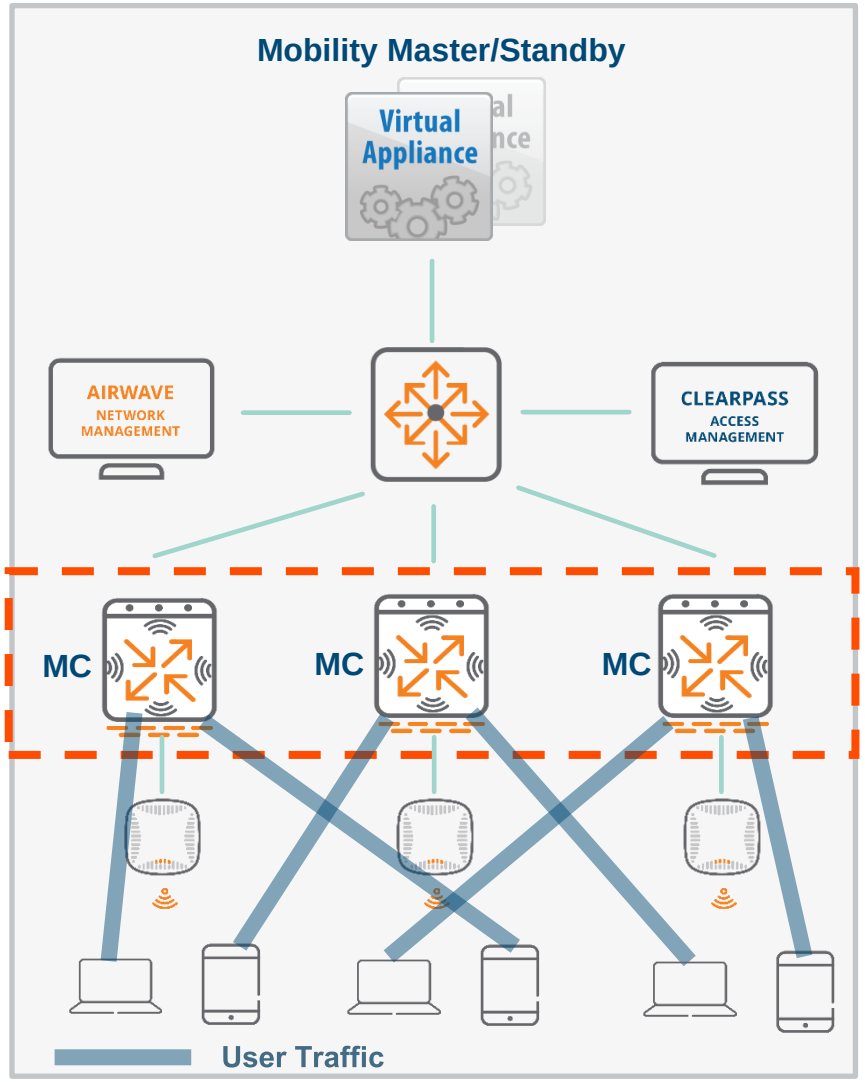
Secure resources when personal devices and guests connect

Performance

Allocate bandwidth for new collaboration apps at work

Solution:
Stable Air - Controller Clustering

1. **Stateful Client Failover**
   User traffic uninterrupted upon controller failure
2. **Seamless Campus Roaming**
   Clients stay anchored to a single Mobility Controller when roaming across controllers
3. **Client Load Balancing**
   Users automatically load balanced across cluster members
4. **AP Load Balancing**
   APs are automatically load balanced across cluster members



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1:1 Learning Requires Reliable, Stable Wi-Fi

Can teachers rely on Wi-Fi for 100 student devices at once?

Is Wi-Fi reliable for online testing?

Solution:
Stable Air - *Wi-Fi That Doesn't Slow Down*

Full Portfolio of Gigabit APs

INDOOR

OUTDOOR

802.11ac with standard PoE

RF Engineering with ClientMatch

Say goodbye to sticky clients

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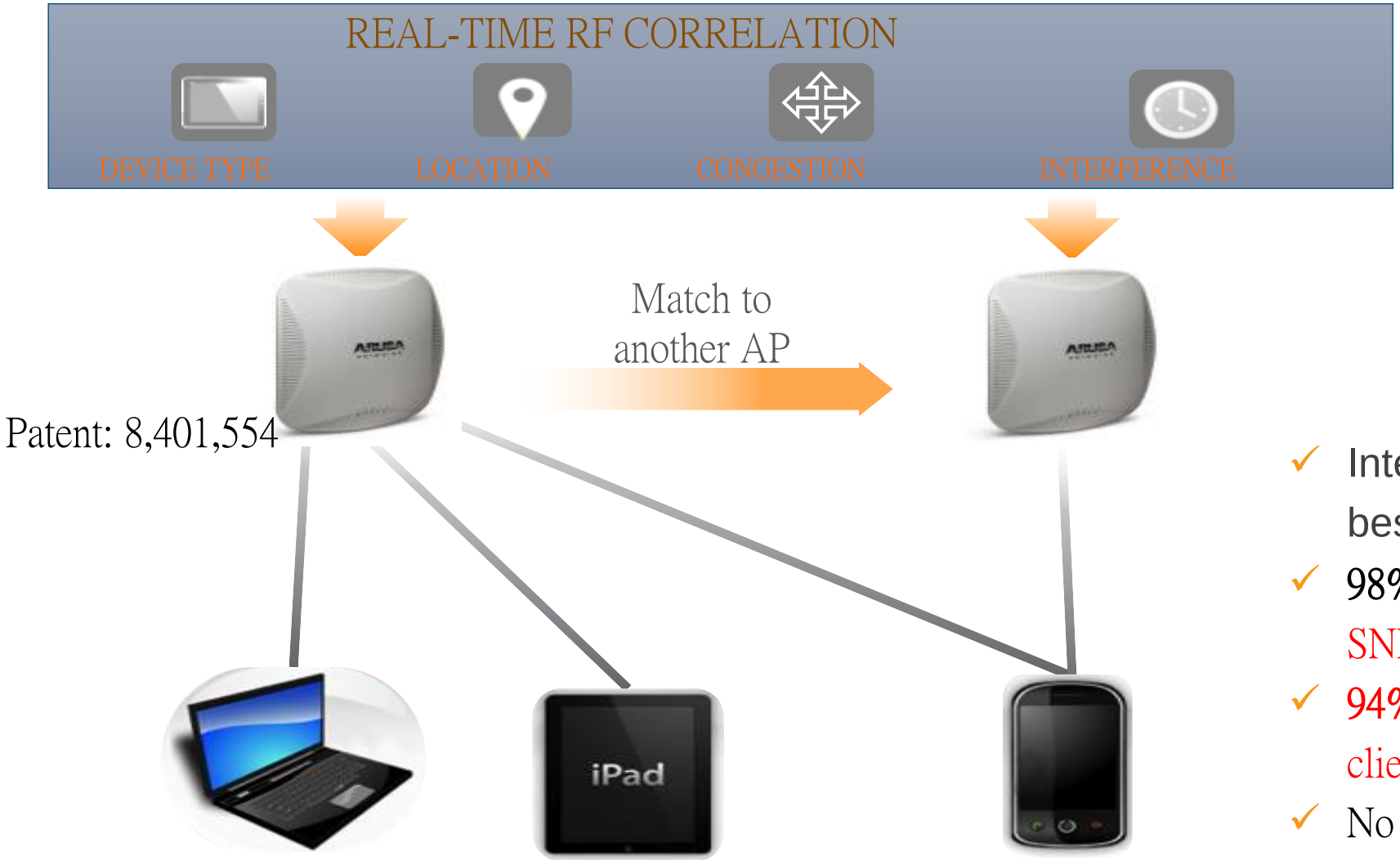
Aruba ClientMatch™ Enables 802.11ac Wi-Fi



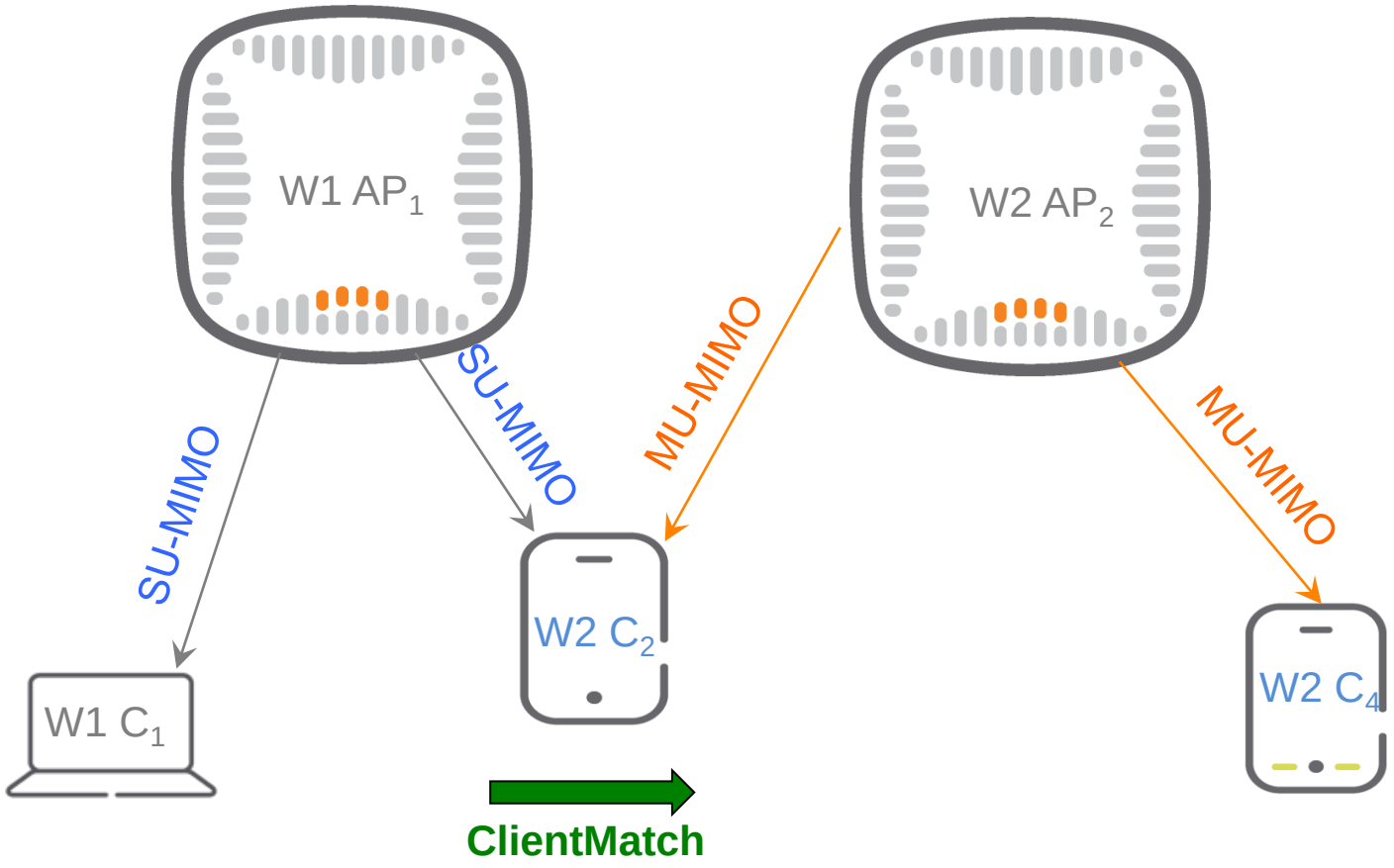
Enables use of 802.11ac Wi-Fi rates

- ✓ Intelligently steers devices to the best AP
- ✓ 98% of mobile devices with higher SNR
- ✓ 94% better performance for "sticky" clients
- ✓ No client-side software required

AP-330/320 Series (802.11ac Wave 2)

-Enhanced ClientMatch™ with MU-MIMO awareness

Without Enhanced ClientMatch (3 clients)



Aggregate Downstream Throughput

	Without ClientMatch	With ClientMatch
AP_1	300 Mbps	300 Mbps
AP_2	300 Mbps	450 Mbps
Network	**600 Mbps**	**750 Mbps**
ClientMatch boost →		**25%**

Efficiency of MU-MIMO

- 1SS clients deliver ~75%
- 2SS clients deliver ~65%

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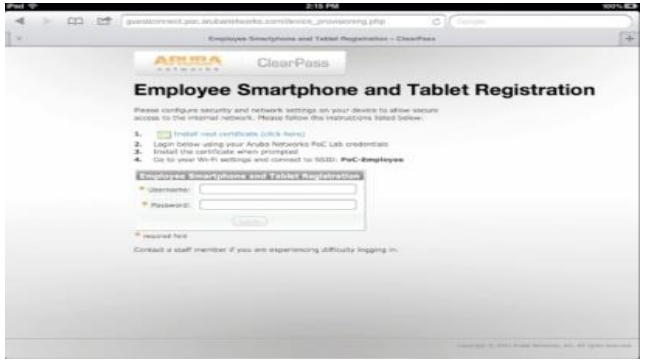
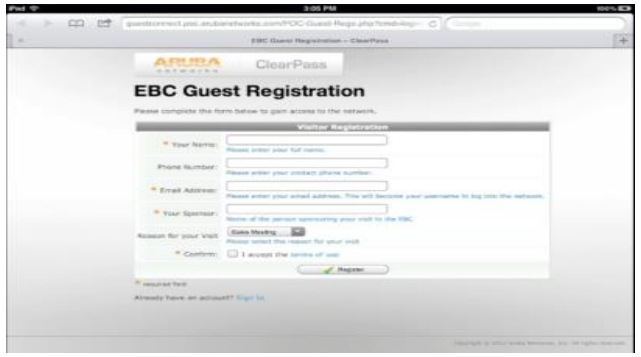
Solution:
Secure Air - *Secure Personal Devices & Guests (ClearPass)*

Automate Mobile Device Onboarding





1. Limited access
2. Self-register
3. Install certificate & security profile
4. Authenticated access

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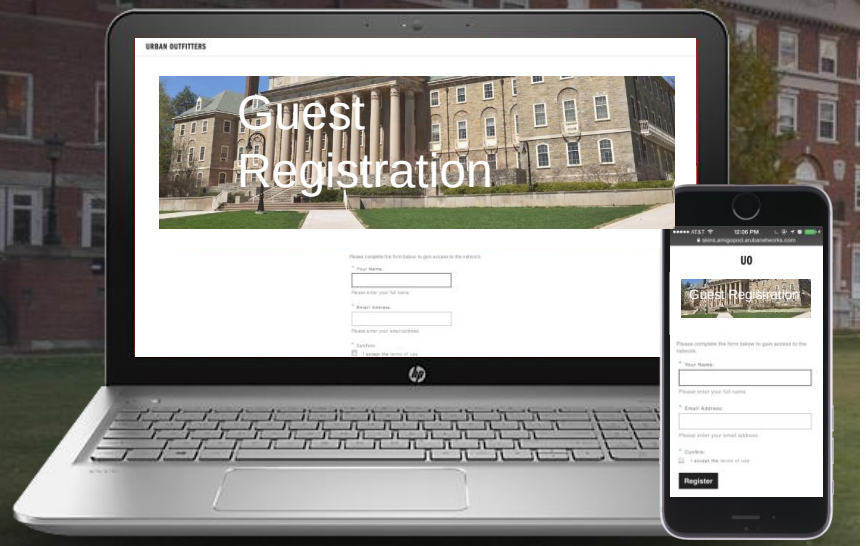
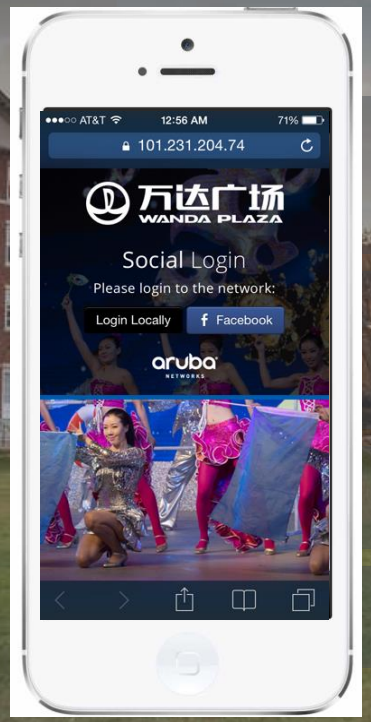
Registered Guest Access for Visitors

ClearPass Guest





- Custom portals to promote your campus
- Rich self-service workflows to provide guest access governance
- Social Login support
- One Wi-Fi login for repeat visitors

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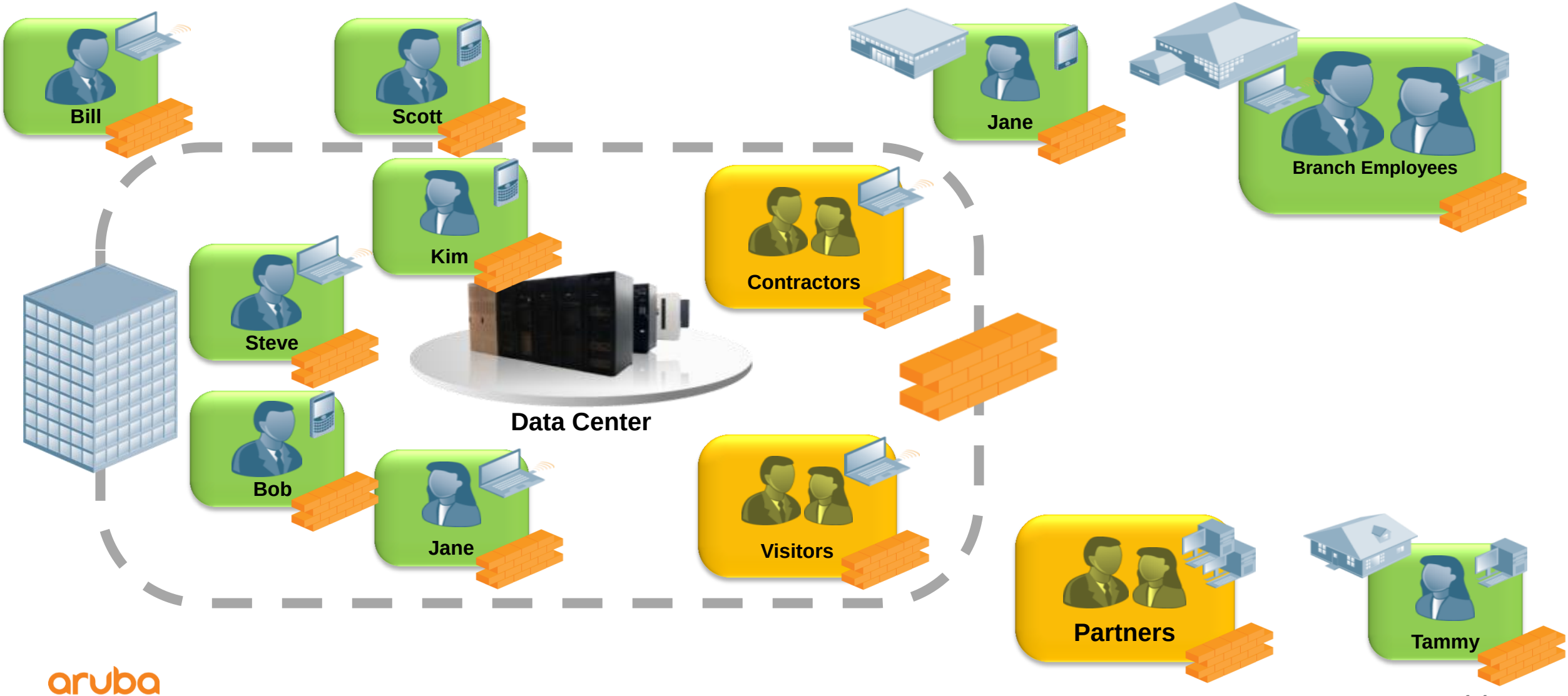
Context-Aware Policies & Enforcement
-Stateful Firewall



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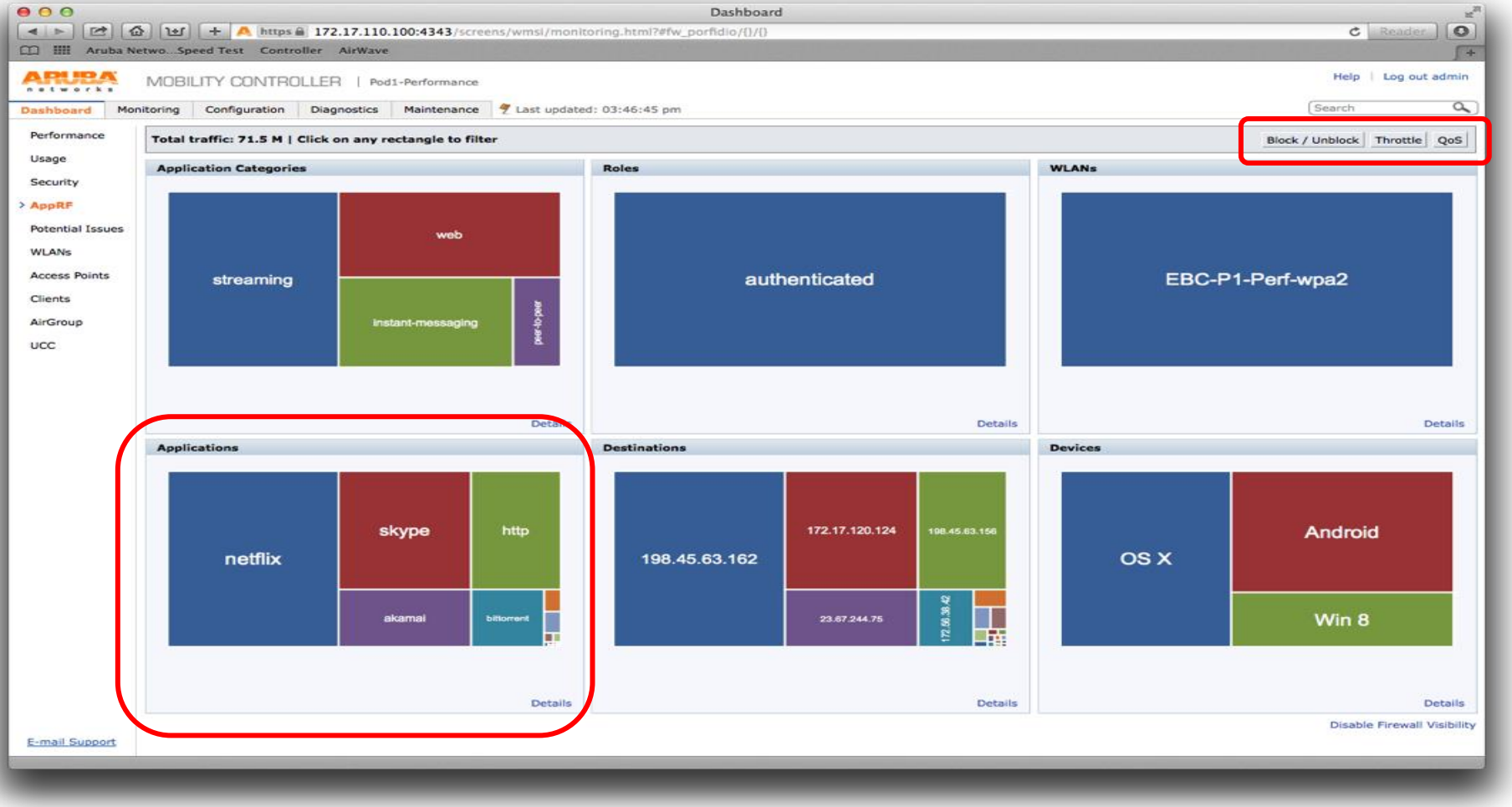
MISSION CRITICAL APPS NEED A LAYER 7 AWARE INFRASTRUCTURE

Solution:
Smart Air - Interactive Dashboard on ArubaOS 6.4 (AppRF)



Simple Control

- Select by:
  - application
  - **app category**
  - role
  - address
- Apply policy (block, throttle, prioritize)
- Eliminates complexity of configuration

Smart Air
-User Logging details (Airwave)

New Devices: 1 | Up: 8 | Down: 11 | Mismatched: 8 | Rogue: 2353 | Clients: 5 | VPN Sessions: 0 | VPN Users: 4 | Alerts: 6

Log out admin

Search

Home | Groups | APs/Devices | Clients | Reports | System | Device Setup | AMP Setup | RAPIDS | VisualRF

Overview | Connected | All | Rogue Clients | Guest Users | Client Detail | Diagnostics | VPN Sessions | VPN Users | Tags

Help

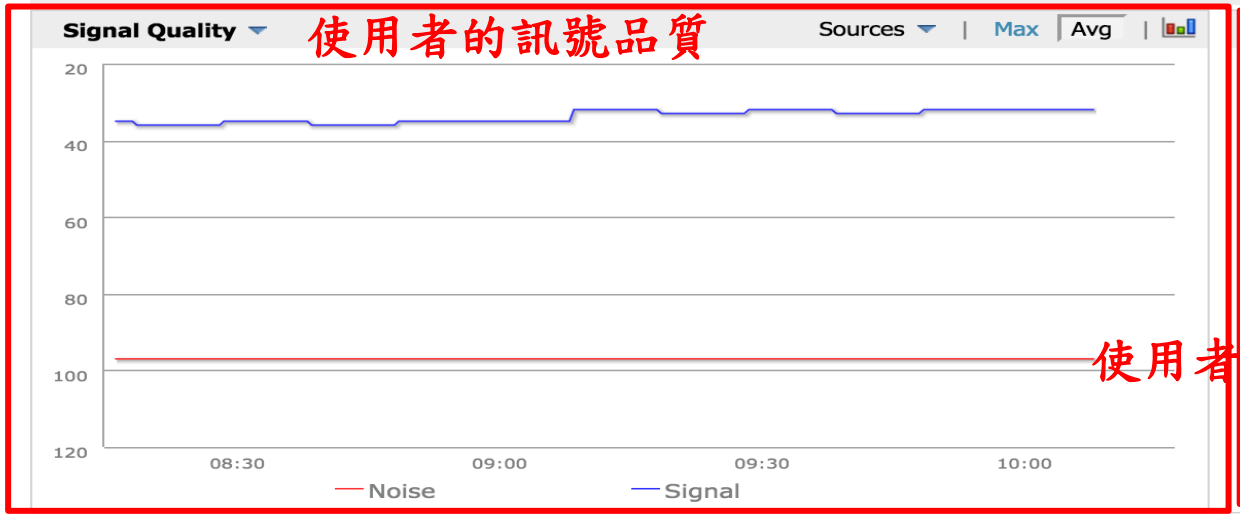
使用者的工作量(頻寬使用)

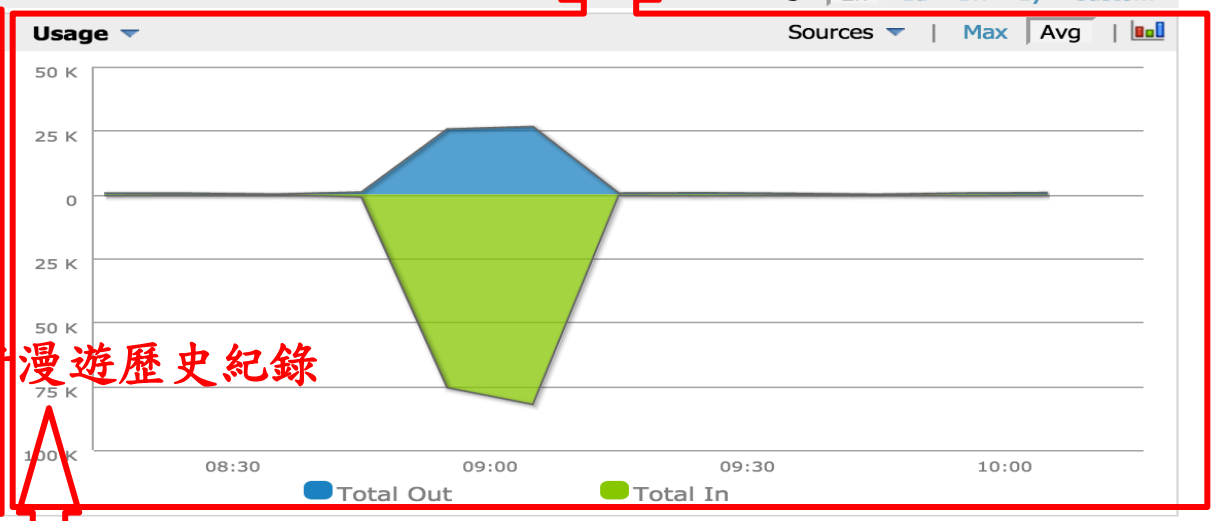
Detail for **C8:1E:E7:EB:0E:00**

Device Info	
Username:	kent
First Seen:	6/11/2015 9:16 AM on AP225-2 for 6 hrs 0 mins
Last Seen:	12/18/2015 10:15 AM on AP225-2 for 3 hrs 37 mins

Current Association			
Username:	kent		
Role:	authenticated	AP/Device:	AP225-2
Signal Quality:	65	Controller:	Aruba7010

Time Range: 2h | 1d | 1w | 1y | Custom





使用者漫遊歷史紀錄

Username	AP/Device	AOS Device Type	Association Time	Duration	Connection Mode	Avg. Speed	Avg. Signal Quality	Total Data Used	LAN IP Addresses	VLAN
kent	AP225-2	iPhone	12/17/15, 11:25 PM	51 minutes	11ac 5GHz	318 Mbps	62	599 KB	172.16.14.250	14
kent	AP225-2	iPhone	12/17/15, 10:58 PM	6 minutes	11ac 5GHz	-	-	0 B	172.18.168.43	-
kent	AP225-2	iPhone	12/17/15, 6:28 PM	3 hours 50 minutes	11ac 5GHz	328 Mbps	42	9.45 MB	172.16.14.250	-
kent	AP225-2	iPhone	12/17/15, 6:27 PM	34 seconds	11ac 5GHz	-	-	0 B	172.16.14.250	-
kent	AP205H-1	iPhone	12/17/15, 8:19 AM	7 minutes	11ac 5GHz	-	-	0 B	172.18.168.43	-
kent	AP205H-1	iPhone	12/17/15, 8:06 AM	13 minutes	11ac 5GHz	395 Mbps	63	44.4 KB	172.18.168.43	-

Smart Air
-Client Details - Device Classification (Airwave)

New Devices: 1 | Up: 8 | Down: 11 | Mismatched: 8 | Rogue: 2353 | Clients: 5 | VPN Sessions: 0 | VPN Users: 4 | Alerts: 6 | Log out admin | Search

Home | Groups | APs/Devices | Clients | Reports | System | Device Setup | AMP Setup | RAPIDS | VisualRF

Overview | Connected | All | Rogue Clients | Guest Users | Client Detail | Diagnostics | VPN Sessions | VPN Users | Tags

Help

Detail for **C8:1E:E7:EB:0E:00**

Device Info

Username:	kent
First Seen:	6/11/2015 9:16 AM on AP225-2 for 6 hrs 0 mins
Last Seen:	12/18/2015 10:15 AM on AP225-2 for 3 hrs 37 mins
Device Type:	Apple iPhone
OS:	iOS
OS Detail:	8.3 (12F70)
Manufacturer:	Apple
Model:	iPhone
Network Interface Vendor:	Unknown
AOS Device Type:	iPhone
Aruba HTTP Fingerprint:	iPhone7,2/8.3 (12F70)
Classification:	Unclassified
Matchable:	Yes
Watched Client:	Yes / No
Notes:	

Show additional properties

Save | Open controller web UI... | Run command...

Current Association

Username:	kent		
Role:	authenticated	AP/Device:	AP225-2
Signal Quality:	65	Controller:	Aruba7010
Association:	12/18/2015 6:38 AM	Group:	7010
Duration:	3 hrs 37 mins	Folder:	Top > 7010 > AP225-2
Mode:	802.11ac	AP/Device Location:	-
Usage:	1.11 Kbps	Radio:	802.11ac
SSID:	test168	VLAN:	14
Ch. BW:	VHT80	Forward Mode:	Tunnel Encrypted
LAN IP 1:	172.16.14.250	LAN Hostname 1:	
Auth Type:	EAP	Auth Time:	3 hrs 27 mins
Cipher:	-	Security Mode:	<unknown>
Source:	Poll		

Deauthenticate Client

Location: Home_LAB > Home Building > Floor 1 (Floor 1)

Last Placed: 12/18/2015 10:14 AM

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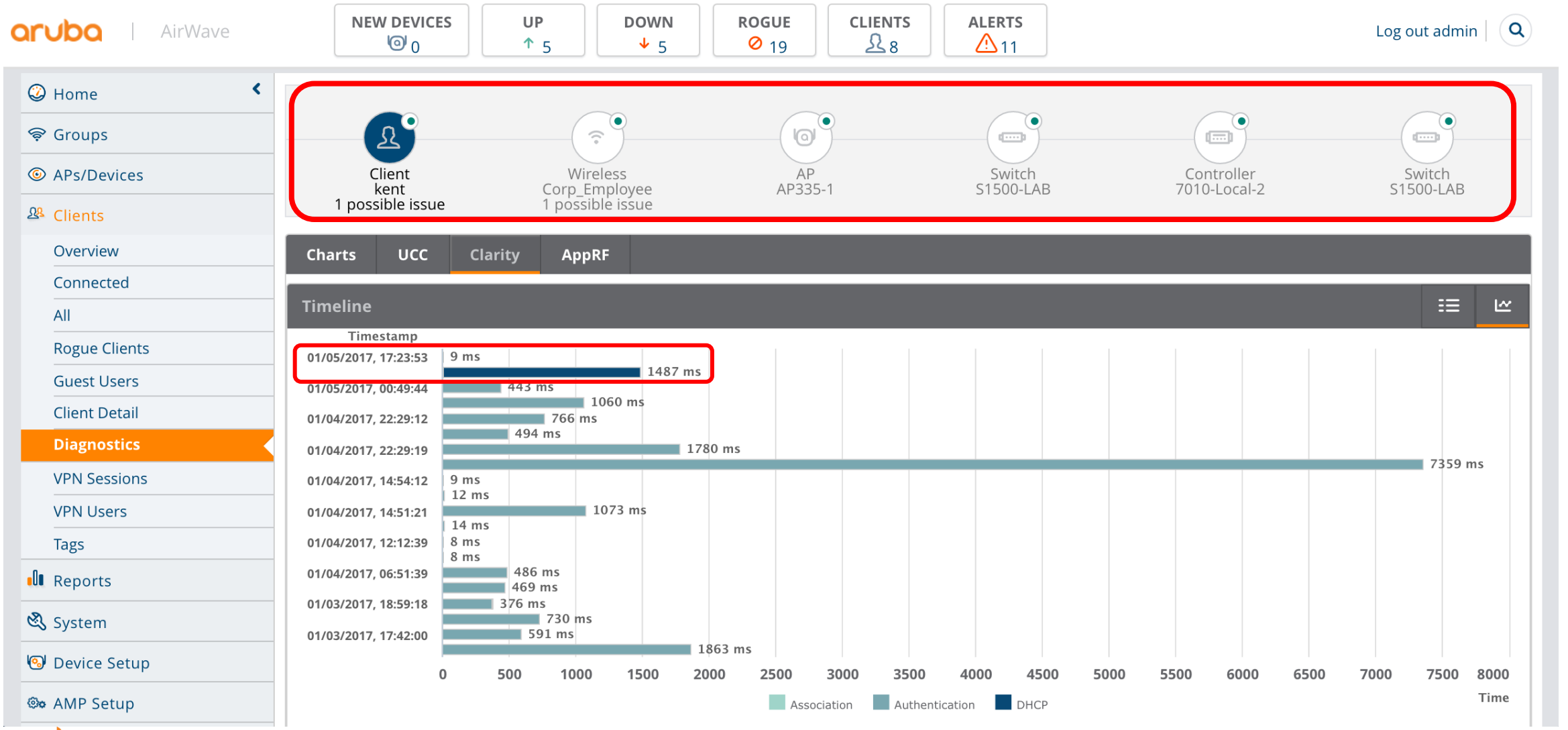
Smart Air
-End-to End Visibility into User Experience (Airwave Clarity)



Airwave AppRF Report

ABC-AppRF Filtering for (Multiple...)
9/9/2014 2:26 AM to 9/10/2014 2:26 AM
Generated on 9/10/2014 2:27 AM

Top Applications

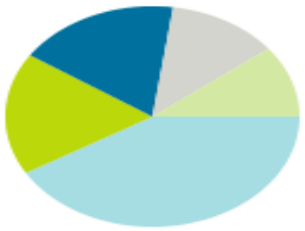
web	95.2%
amazon	1.8%
Port 43866	1.2%
Other	1.0%
facebook	0.8%

1-10 of 10 Applications Page 1 of 1 Export CSV

Application	Total Bytes
web	1.12 GB
amazon	21.47 MB
Port 43866	14.09 MB
facebook	9.06 MB
vrrp	3.45 MB
https	3.25 MB
youtube	2.22 MB
ssdp	1.55 MB
dns	1.28 MB
sys-svc-dns	628.09 KB

1-10 of 10 Applications Page 1 of 1

Top Destinations



Other	41.5%
proxy-20.sv6.dailymo...	17.9%
proxy-03.sv6.dailymo...	17.9%
r7---sn-ipoxu-un5s.g...	12.2%
r7---sn-ipoxu-un5z.g...	10.5%

1-10 of 10 Destinations Page 1 of 1 Export CSV

Destination	Total Bytes
proxy-20.sv6.dailymotion.com	133.72 MB
proxy-03.sv6.dailymotion.com	133.57 MB
r7---sn-ipoxu-un5s.googlevideo.com	91.18 MB
r7---sn-ipoxu-un5z.googlevideo.com	78.66 MB
proxy-02.sv6.dailymotion.com	76.05 MB
e1753.b.akamaiedge.net	51.01 MB
proxy-04.sv6.dailymotion.com	50.75 MB
r6---sn-u2x76n7d.googlevideo.com	46.38 MB
74.125.101.170	46.24 MB
a1510.phobos.apple.com	39.26 MB

1-10 of 10 Destinations Page 1 of 1

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Airwave AppRF Report

Details for User 'aruba123' with Device 'OS X'

1-22 of 22 Archived PEF User Application Details Page 1 of 1 Export CSV

Application	Total Bytes	Destinations
web	492.72 MB	r7---sn-ipoxu-un5s.googlevideo.com, r7---sn-ipoxu-un5z.googlevideo.com, (more...)
amazon	18.90 MB	amazon
facebook	5.97 MB	facebook
youtube	2.21 MB	youtube
sys-svc-dns	314.62 KB	8.8.8.8
google drive	111.14 KB	google drive
apple push svc	88.15 KB	3-courier.push.apple.com, 18-courier.push.apple.com, (more...)
twitter	69.40 KB	cdn.syndication.twimg.com, twitter
ssdp	52.88 KB	239.255.255.250, 172.16.14.254
amazon cloud drive	39.77 KB	amazon cloud drive
mdns	22.97 KB	224.0.0.251
verisign	16.60 KB	verisign
nat-pmp	7.47 KB	172.16.14.254
osu-nms	6.62 KB	172.16.14.254
sys-svc-msrpc-udp	4.09 KB	172.16.14.255
svc-ntp	2.13 KB	17.83.253.7
Port 58361	1.49 KB	amazon
Port 60061	1.49 KB	203.84.196.142
Port 59847	1.49 KB	s-am-ap.dp.yahoo.com
Port 60633	1.49 KB	amazon
Port 64123	156 B	8.8.8.8
Port 59938	79 B	facebook

1-22 of 22 Archived PEF User Application Details Page 1 of 1

Details for User 'aruba123' with Device 'Win 7'

1-16 of 16 Archived PEF User Application Details Page 1 of 1 Export CSV

Application	Total Bytes	Destinations
Port 43866	14.09 MB	mail.arubanetworks.com
web	8.96 MB	172.16.0.240, 54.230.84.215, (more...)
https	2.83 MB	172.16.0.240
svc-ssh	129.13 KB	172.18.168.130, 172.18.168.140
sys-svc-kerberos-tcp	109.60 KB	sjc-dc-07.arubanetworks.com, arubanetworks.com
dns	107.68 KB	224.0.0.252
Port 43701	67.86 KB	mail.arubanetworks.com
llmnr	41.08 KB	224.0.0.252
svc-msrpc-tcp	22.63 KB	mail.arubanetworks.com
sys-svc-dns	20.45 KB	arubanetworks.com, 172.16.12.1, (more...)
Port 23993	17.29 KB	SIERRA.arubanetworks.com
ssdp	14.61 KB	239.255.255.250
trivnet1	10.36 KB	216.115.208.199
mdns	5.80 KB	224.0.0.251
Port 61624	3.33 KB	54.209.10.160, 54.210.180.92
wikimedia	291 B	wikimedia

1-16 of 16 Archived PEF User Application Details Page 1 of 1


Too complicated to print, project and sign-on from a mobile device.

Solution:
Simple Air – Wi-Fi-based screen-sharing & printing (AirGroup with ClearPass)

London Business School

Apple TVs in Classrooms for AirPlay sharing

LIPSCOMB UNIVERSITY

Self-registration & sharing of personal devices in dorms

aruba NETWORKS

Extending policies to wired and wireless including IoT devices

Policy Management

Only Solution that Delivers Wired Specific IoT Connectivity

Connect, Enforce, Protect

Connect

- Any IoT device
  - Up to 48 devices
  - Includes PoE+
  - Works with cameras, sensors, healthcare equipment, PoS

Enforce

- Policy enforcement
  - Utilize ClearPass Policy Manager and third-party security tools for real-time threat prevention

Protect

- Automated tunnels
  - Define what resources IoT devices can reach
  - Limit access by administrators

IoT-Ready Switch

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Role Mapping

Policy:

Policy Name:	OnConnect Roles_v2
Description:	
Default Role:	[Other]

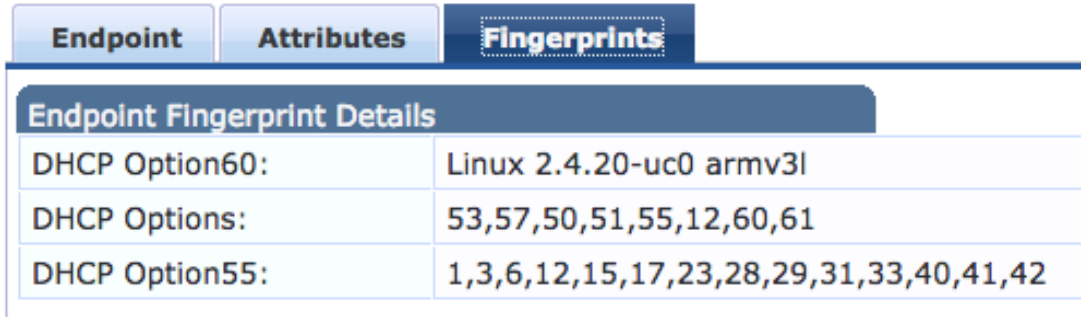
Mapping Rules:

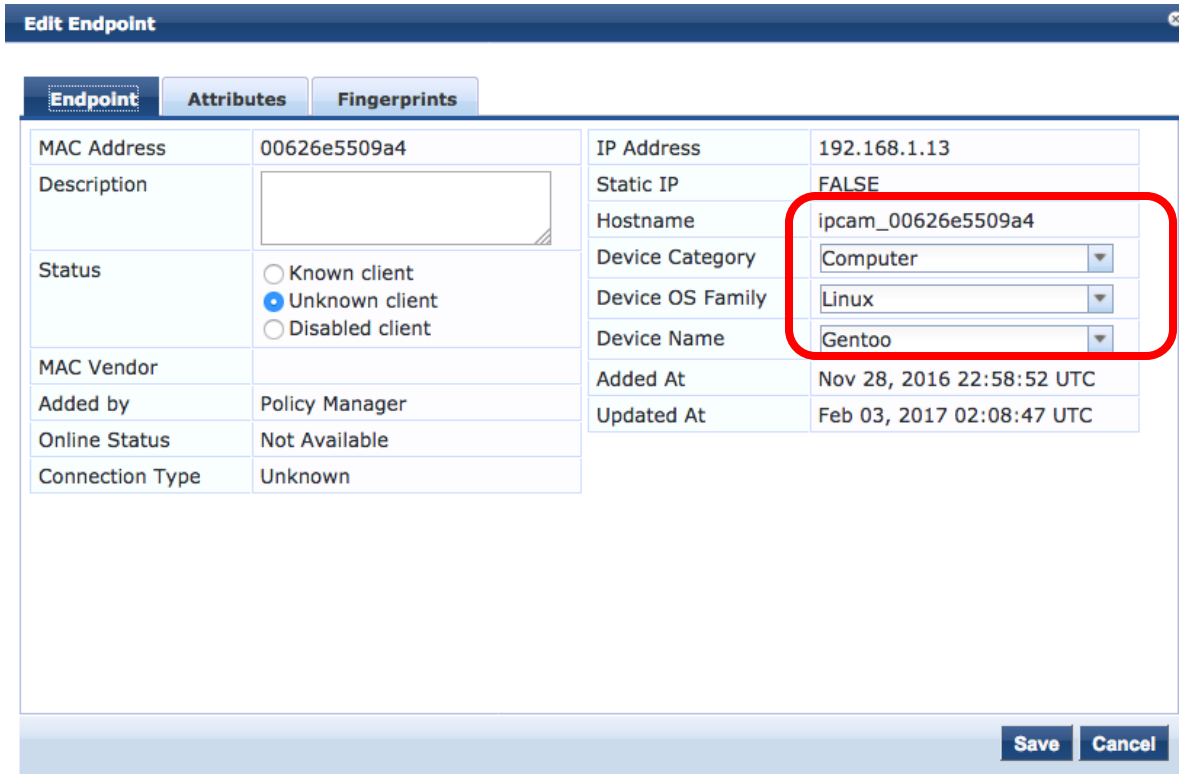
Rules Evaluation Algorithm:	Evaluate all

	Conditions	Role Name
1.	(Connection:Src-IP-Address *NOT_EXISTS*)	get IP
2.	(Authorization:Kent-AD04:UserDN *EXISTS*)	[Employee]
3.	(Authorization:[Endpoints Repository]:Category *EQUALS* Computer)	Computer
4.	(Authorization:[Endpoints Repository]:Category *EQUALS* Printer)	Printer
5.	(Authorization:[Endpoints Repository]:Category *EQUALS* VoIP Phone)	VoIP_Phone
6.	(Authorization:[Endpoints Repository]:Category *EQUALS* Access Points)	AP
7.	(Authorization:[Endpoints Repository]:Hostname *CONTAINS* ipcam)	IP_CAM
8.	(Authorization:[Endpoints Repository]:Status *NOT_EQUALS* Known)	New IoT device

Use case – New device with unknown profile

- New device detected
- Profiled
  - Profile does not match defined role based access
- Inform Net Management / Security
  - Text
  - Phone
  - Email
  - Pager
- Assign quarantine role





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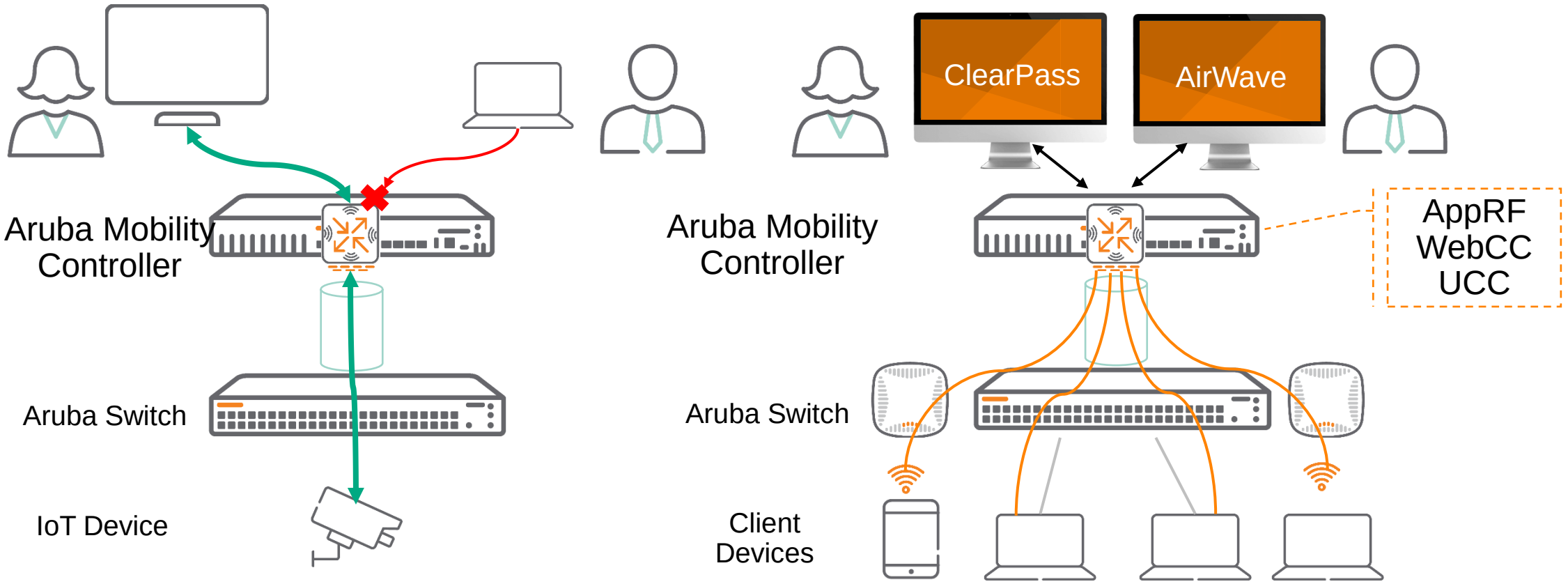
Extending Management from Wireless to Wired and Assured User Experience on Wireless and Wired

Critical client protection

Unified policy and visibility



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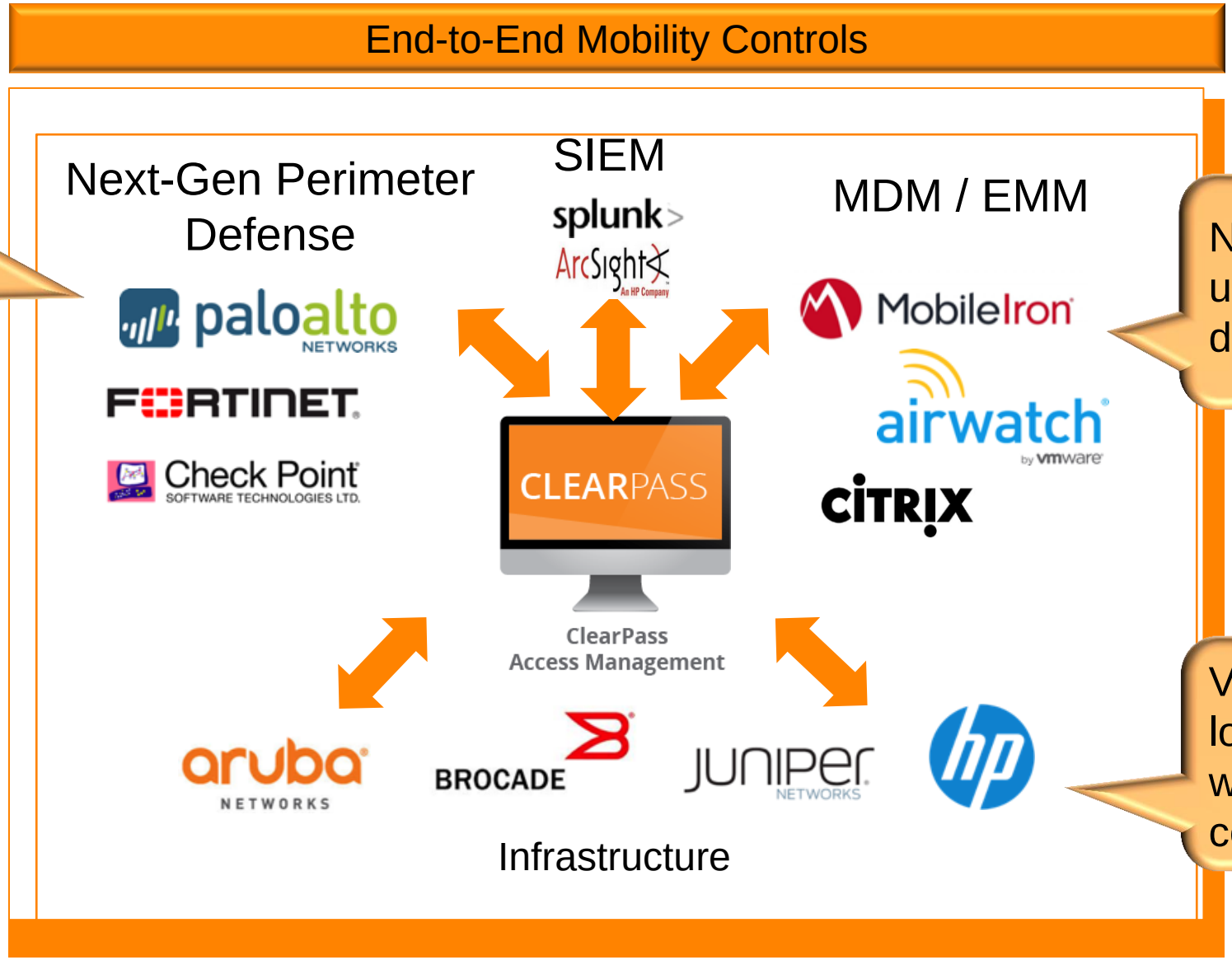
Time for New Defense Model – Adaptive Trust

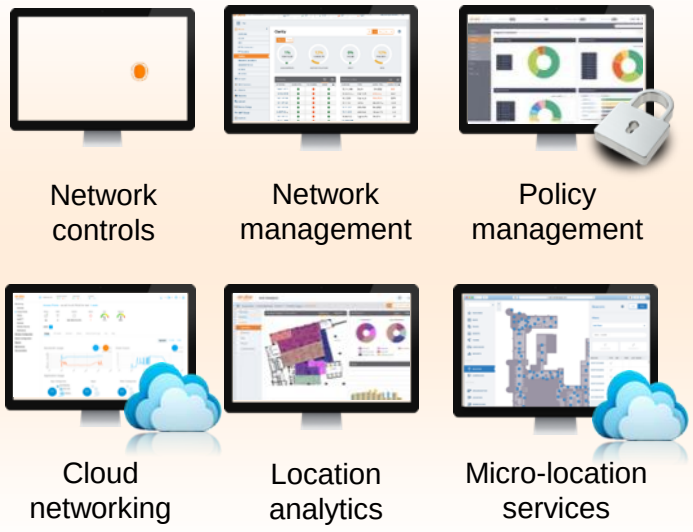


- ✔ Multivendor integration
- ✔ Context sharing
- ✔ Open API

Mobile First Network

Ready for Mobile, IoT and Future

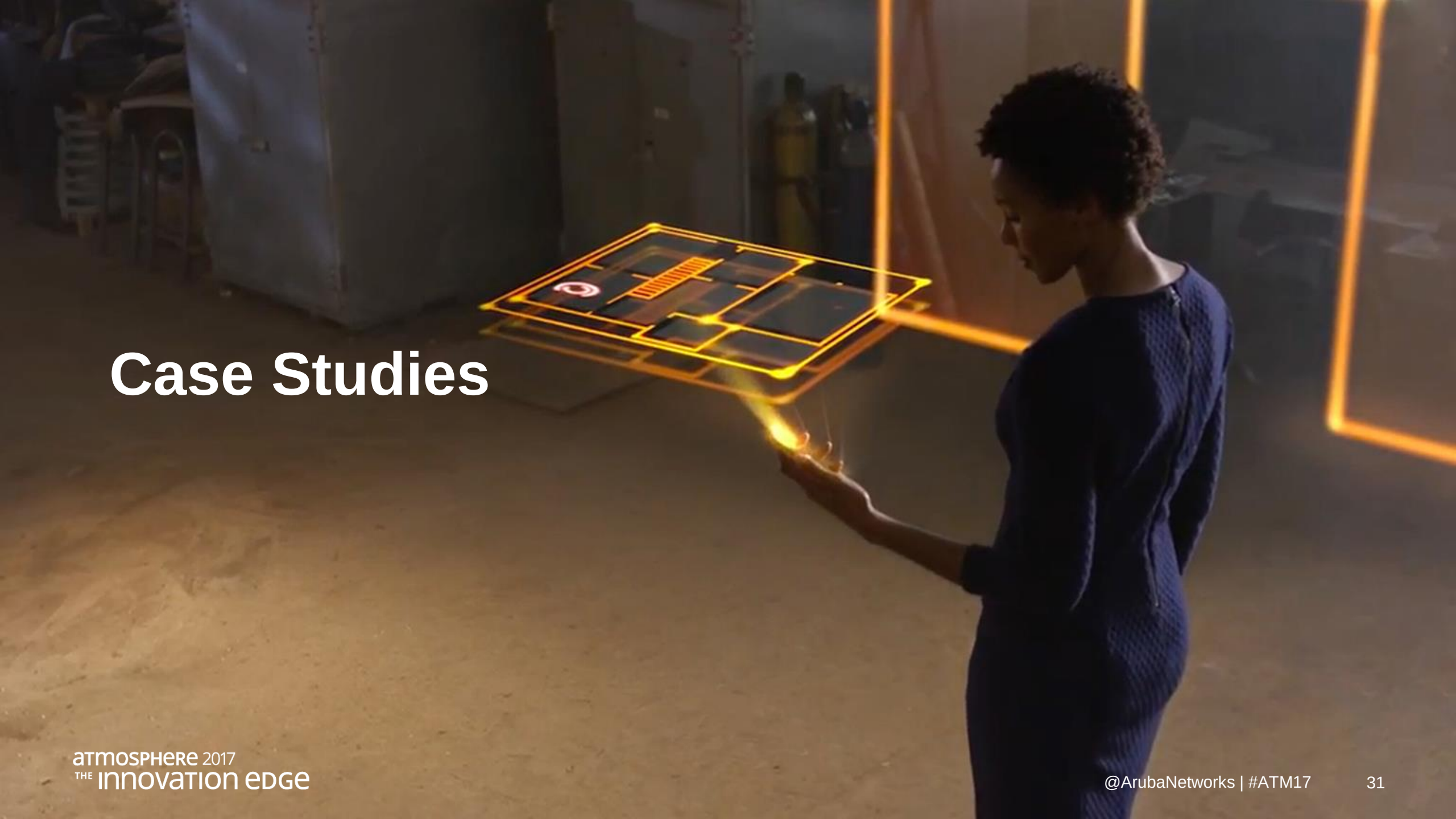
Aruba infrastructure:
Wi-Fi, BLE, Wired, WAN



Aruba Mobile First Platform

IT services

Business & user facing apps



Case Studies

Case Study: Ohio State University (Over 85k Users)

Reason for upgrade

- Over 400 buildings (25 million square feet) on approximately 1,700 acres.
- Replace hundreds of different departmental and dormitory networks, comprised of thick APs and other legacy equipment, with a secure, unified pervasive wireless network.

Solution

- Consist of over 11,000 access points distributed across three core router points of presence.
- Initial deployment of 1,700 APs was deployed in 3 weeks!
- Will provide ubiquitous wireless access to over 85,000 students, faculty and staff.

Why Aruba

- Central policy and network management
- Remote diagnostics and troubleshooting
- Mobile computing and Internet-based collaborative learning programs

"We needed a single mobile network that worked everywhere on campus."

Bob Corbin
Director of Telecommunications & Networking
The Ohio State University

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Superior Performance

Aruba .11ac Wi-Fi, ClientMatch: Campus-wide .11ac infrastructure maximizing devices/AP matching

AirWave: End-to-end management

集中控管式管理 降低人事成本

未建置Aruba Networks Wireless solution前，使用一般傳統無線網路服務全校師生約一萬八千人，行動設備無線網路連線約23,000人次。以0.1%的報修率來估算，每日需要排除大約23件無線網路設備連線等問題。每件報修平均花1小時處理，則電算中心需要2人專門處理與排除無線網路設備連線問題。」

而建置Aruba Networks Wireless solution後，除了以上連線等問題，更可由集中式控管交換器與無線網路管理平台，直接取得連設備設資訊、使用者資訊、連線狀態、認證狀態、數據化的連線品質與強度等，亦不需要技術人員至現場測試與排除問題，並節省約1人以上的人力成本，由一專職技術人員即可於中心端協助排除故障，大大提升整體營運效率。

Innovative Classroom Instruction

Aruba .11ac Wi-Fi, AppRF: Real-time proctored testing

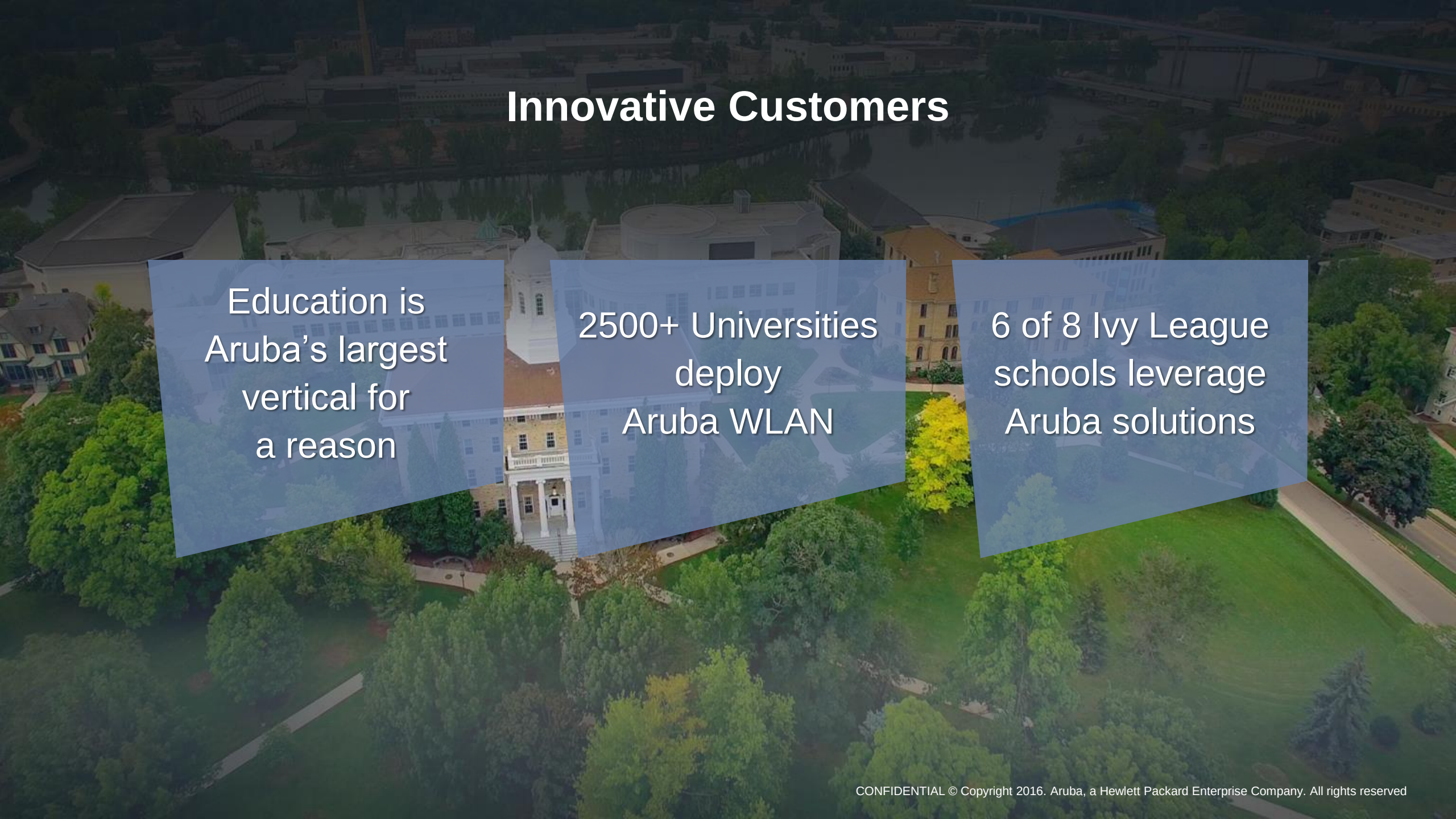
ClearPass: Advance policy services for tablet app based learning

UNC CHARLOTTE

"A robust Wi-Fi network enables classroom innovations (app-based learning, shared communications, on-the-fly presentations, quizzing and testing) for improving student learning."

Bret Wood, Professor

Innovative Customers



Education is Aruba's largest vertical for a reason

2500+ Universities deploy Aruba WLAN

6 of 8 Ivy League schools leverage Aruba solutions

Gartner Magic Quadrant for the Wired and Wireless LAN Access Infrastructure

Figure 1. Magic Quadrant for the Wired and Wireless LAN Access Infrastructure

Source: Gartner (August 2016)

Gartner once again positions HPE Aruba in the Leaders Quadrant of the latest Wired and Wireless LAN Access Infrastructure Magic Quadrant

Further validation that HPE Aruba is a leader in connecting the world with intelligent mobility

aruba
a Hewlett Packard Enterprise company

Source: Gartner Magic Quadrant for the Wired and Wireless LAN Access Infrastructure
August 2016. Tim Zimmerman, Christian Canales, Bill Menezes, Danilo Ciscato

Thank You