



Wi-Fi 6無線安全應用及智慧管理

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Technical Consultant

無線演進過程

Today's Network

“Theoretical peak speed”

11a | 11b | 11g

11n

Tomorrow's Network

“Overall network capacity”

Wi-Fi 5 (11 ac)

Wi-Fi 6 (11 ax)

僅使用Wi-Fi辦公的人越來越多

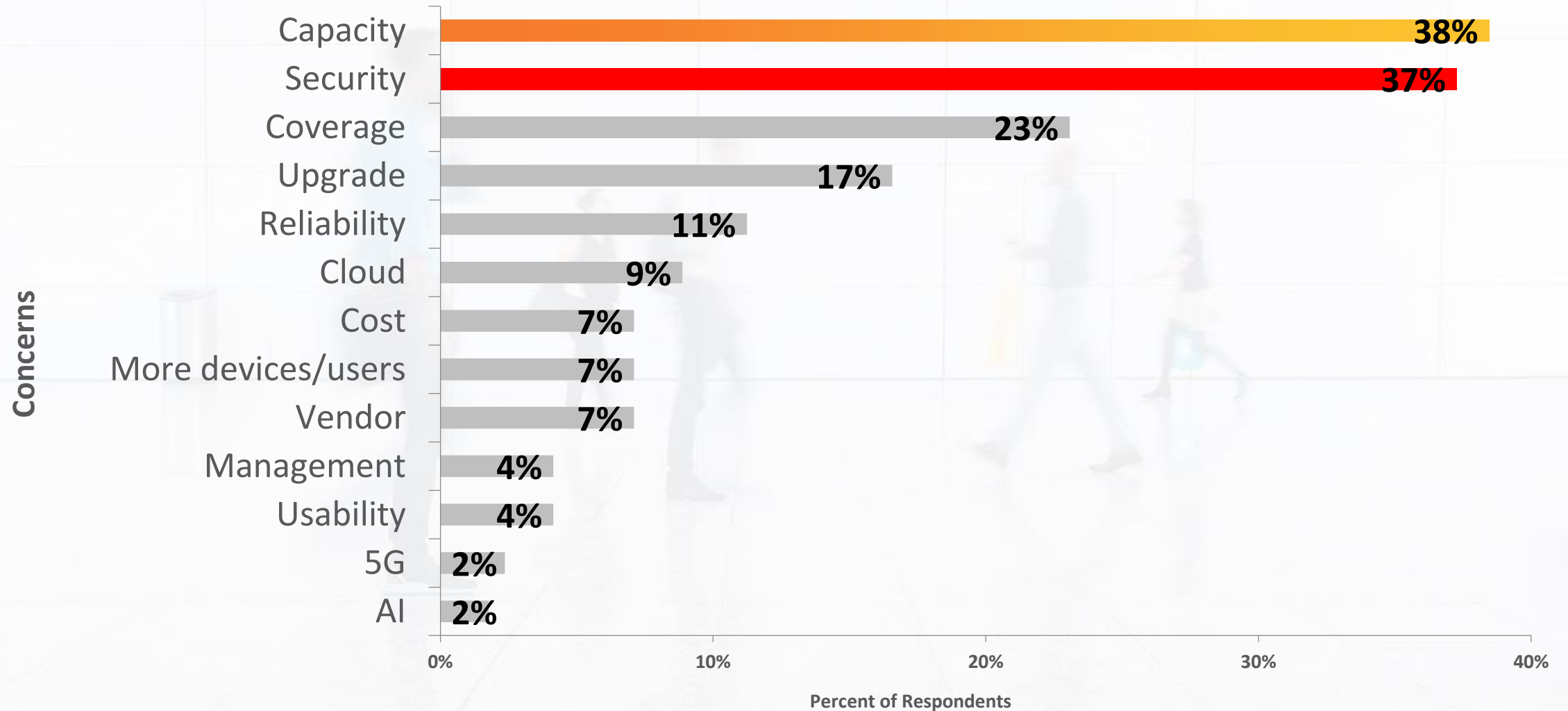


Before 2021

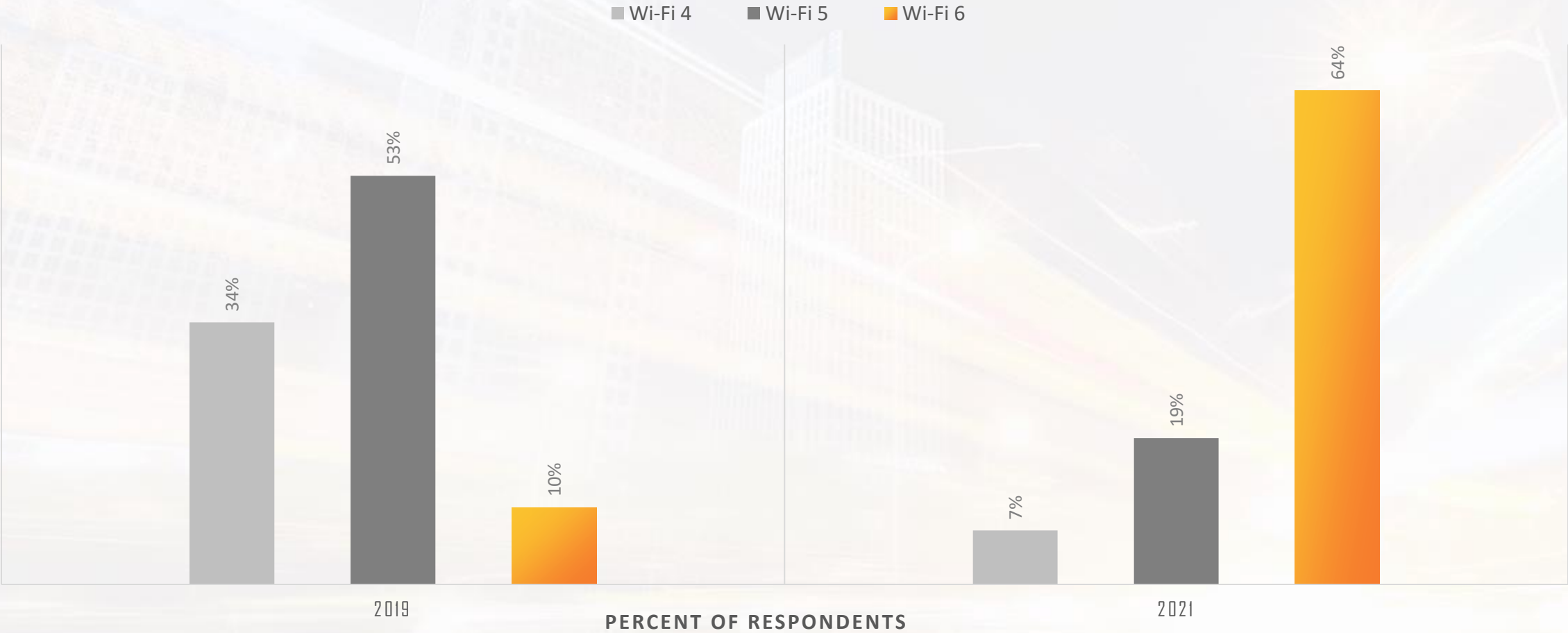


2021

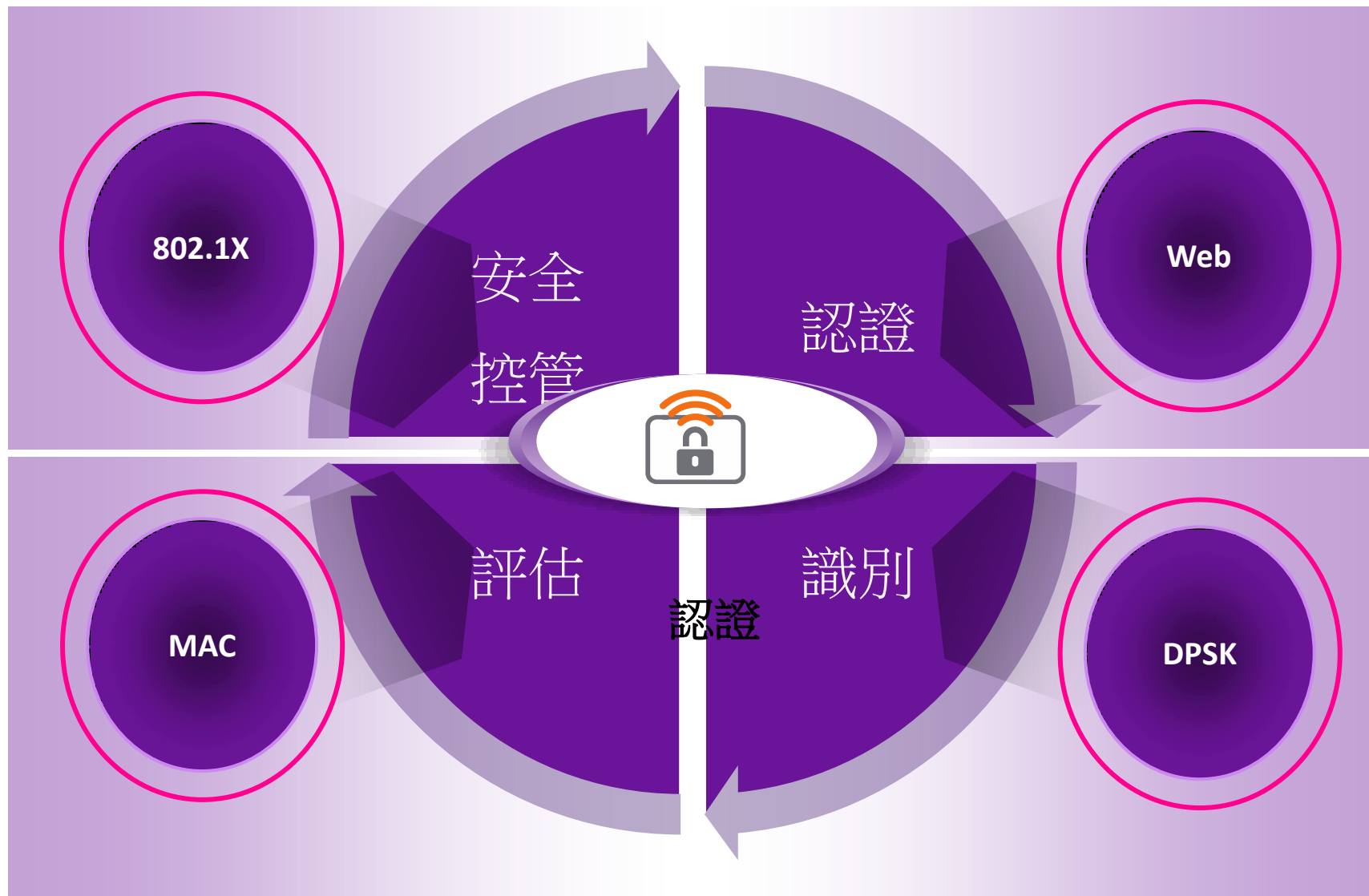
企業最在意的無線網路要素



企業加速轉移到Wi-Fi 6



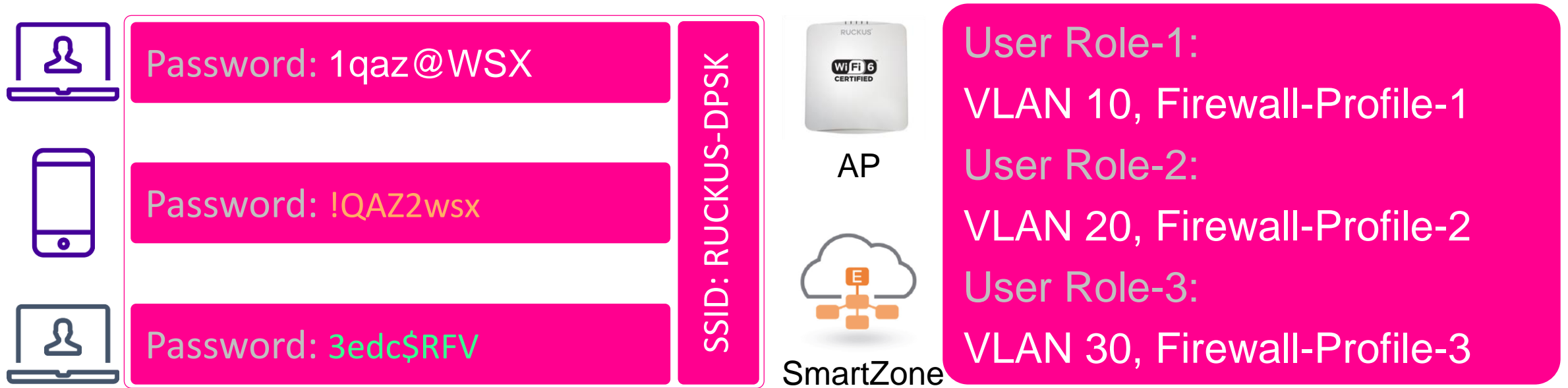
有線無線的端末安全性



認證功能的比較

項目	802.1X 認證	MAC地址認證	網頁認證	DPSK
適用情境	用戶集中且對資訊安全性要求極高的網路	適用於非用戶端裝置的認證，例如印表機和傳真機	訪客或協力廠商存取，並獲取其登入的身分資訊	對資訊安全性要求高的網路，且希望簡單配置
用戶端程式	需要	不需要	瀏覽器	不需要
優點	高安全性	容易設定、無須安裝終端	彈性佈署	容易設定、無須安裝終端和RADIUS
缺點	佈署不易	管理MAC地址麻煩，不適合大規模佈署，MAC地址容易偽冒	低安全性，如使用HTTPS因憑證因素有無法重導顯示認證網頁的問題	行動裝置如手機、平板等，需手動配置

DPSK – Dynamic Pre-Shared Key



- 每個使用者都有獨一無二的DPSK
- 當使用者離職或遺失裝置，可以隨時取消該DPSK
- 同一個SSID可以擁有多個User-Role
- DPSK可以用於一群裝置或是綁定特定的裝置MAC

MAC Randomization issues and how Ruckus solves it.

Apple iOS 14 Before and After

Beta 3

- Random MAC for probing
- Random MAC enabled by default
- Random MAC for each network joined
- MAC address changed every 24 hours

Beta 4 & beyond

- Random MAC for probing
- Random MAC for each network joined
- Random MAC enabled by default
- MAC address used for each network doesn't change;
 - Network is forgotten
- Don't discount the timing change

Apple iOS 15 Will Wreak Havok!

What & When

- Apple = Predictability
- Android = Uncertainty
- Expect mobile OS to go fully random soon
- Expect desktop OS to lag but get there
- Forgetting any network = Random MAC

Operating System	Supports MAC Randomization	Default Status	Network Based per SSID	Time Based. (24 hours)
Apple iOS 13	NO	N/A	N/A	N/A
Apple iPadOS 13	NO	N/A	N/A	N/A
Apple iOS 14	YES	ENABLED	ENABLED	NO**
Apple iPadOS14	YES	ENABLED	ENABLED	NO**
MacOS 10.15/10.16	NO	N/A	N/A	N/A
MacOS 11 Big Sur	NO	N/A	N/A	N/A
Android 9	YES	DISABLED	OPTIONAL	NO
Android 10	YES	Carrier / Vendor Specific	Carrier / Vendor Specific	NO
Android 11	YES	ENABLED ^	ENABLED ^	OPTIONAL
Windows 10	YES	DISABLED	OPTIONAL	OPTIONAL
ChromeOS	NO	N/A	N/A	N/A

** Beta 3 this was enabled, disabled in Beta 4, expect to see it enabled in iOS 15

^ Expect to see the same Vendor/Carrier specifics

Authentication Options

* Authentication Type:
 ☒ Standard usage (For most regular wireless networks)
 ☐ Hotspot 2.0 Access

[Services](#) / [Captive Portal](#) / [LAB_Test](#) / [M](#)

[Configuration](#)
[MACs](#)
[Allowed IP Addresses](#)

Action	MAC address
<input checked="" type="checkbox"/> 10. .136 2a:f8:ce:58:65:1d <div>No Info Provided</div>	<div>2020/08/25 12:06:42</div> <div>2020/08/25 16:06:42</div> <div>online active</div>
<input checked="" type="checkbox"/> 10. .137 d6:17:e9:75:0b:c7 <div>No Info Provided</div>	<div>2020/08/25 12:06:27</div> <div>2020/08/25 16:06:27</div> <div>offline active</div>

Deauthorize

Block

Disconnect
More

search table

Hostname	Device Type	OS Vendor	Model Name	Radio Type	User Name	Channel	MAC Address
XBOXONE	Unknown	Unknown	Unknown	a/n/ac	N/A	149	1C:1A:DF
Heathers-iPad	Smartphone	iOS	iOS	a/n/ac	N/A	149	34:12:98:
Kathys-iPhone	Smartphone	iOS	iOS	a/n/ac	N/A	124	60:7E:C9:
TIZEN	Unknown	Unknown	Unknown	g/n	N/A	1	8C:79:F5:
iPad	Smartphone	iOS	iOS	g/n	N/A	11	A4:F1:E8:
HP75AEF6	Unknown	Unknown	Unknown	a/n	N/A	36	CE:92:F7:
Galaxy-S10	Smartphone	Android	Android	b/g/n	N/A	8	D4:53:83:
DESKTOP-JVK6SJE	Unknown	Unknown	Unknown	b/g/n	N/A	1	EC:1A:59:
MoBetterWiFi	Laptop	macOS	Mac OS X	a/n/ac	N/A	149	F4:5C:89:

Security Impact

- MAC Authentication
- Captive Portal
- Block List
- 802.1X
- DPSK





x2:XX:XX:XX:XX:XX

x6:XX:XX:XX:XX:XX

xA:XX:XX:XX:XX:XX

xE:XX:XX:XX:XX:XX

1 Device = Multiple IPs



1	██████20	00:1e:06:██████	(Wibrain)	homeassistant	Home Assistant Odroid Server	n/a	n/a	online	static	 
1	██████32	00:90:a9:██████	(Western Digital)	mycloud	My Cloud NAS	n/a	n/a	online	static	 
✓	20	00:1e:06:██████	(Wibrain)	homeassistant	Home Assistant Odroid Server	2020/08/25 12:06:27	2020/08/25 16:06:27	offline	active	   

Reserved DHCP

IP Based ACL / Firewall

States	Protocol	Source	Port	Destination	Port	Gateway	Queue	Schedule	Description
✓ 0 / 0 B	IPv4 *	192.168.1.50	*	192.168.10.0/24	*	*	none		Allow MacBook Air Access to LAB subnet

Configuration	MACs	Allowed IP Addresses	Allowed Hostnames	Vouchers	File Manager
---------------	------	----------------------	-------------------	----------	--------------

IP Addresses	Description	Actions
↔ 1 ████████1	Office ICX-7150	 

→ = All connections to the address are allowed, ← = All connections from the address are allowed, ↔ = All connections to or from are allowed

Allowed IP Addresses

DHCP Impact:
Unknown MAC means
random IP

- Random IP breaks:
 - Reserved DHCP
 - Captive Portal Bypass
 - Layer 3 Firewall or ACLs
 - DHCP Pool Exhaustion

x2:XX:XX:XX:XX:XX
x6:XX:XX:XX:XX:XX
xA:XX:XX:XX:XX:XX
xE:XX:XX:XX:XX:XX

Troubleshooting

- Identify Clients?
- RUCKUS Analytics
- Client Operation
 - Band Steering?
 - Band Balancing?

x2:XX:XX:XX:XX:XX

x6:XX:XX:XX:XX:XX

xA:XX:XX:XX:XX:XX

xE:XX:XX:XX:XX:XX

Clients Details


These clients consume 100 % (3.341 GB) of all user traffic (3.341 GB).

Top 10 Clients

Index	Hostname	IP Address	Username	Sessions	Rx User	Tx User	User Traffic	
1	Galaxy-Tab-A-2017		5c5181c1aac9	1	18.79 MB	1.458 GB	1.477 GB	
2	Unknown		12b83365a078	2	13.53 MB	916.6 MB	930.1 MB	
3	android-c15d8aba23...		b4f7a1ae2c97	2	55.73 MB	526.5 MB	582.3 MB	
4	Jim-Palmer-Air		1040f38a098e	12	8.029 MB	316.9 MB	325 MB	
5	Galaxy-A20		d28ab9acb3ab	2	26.6 MB	29.77 MB	56.37 MB	
6	JimPalmeriPod		acbc320add46	1	929.3 kB	14.49 MB	15.4 MB	
7	Galaxy-A20		16adc9b7a7d0	3	2.258 kB	13.59 kB	15.85 kB	

1 of 1

Summary



Unknown

IP Address:

MAC Address:

OS:

Manufacturer:

Last Known Status:

Current/Last AP:

44

12:B8:33:65:A0:78

Windows (Mobile) 8/8.1/10

Unknown

Disconnected

Downstairs AP

如何解決MAC Randomization帶來的問題

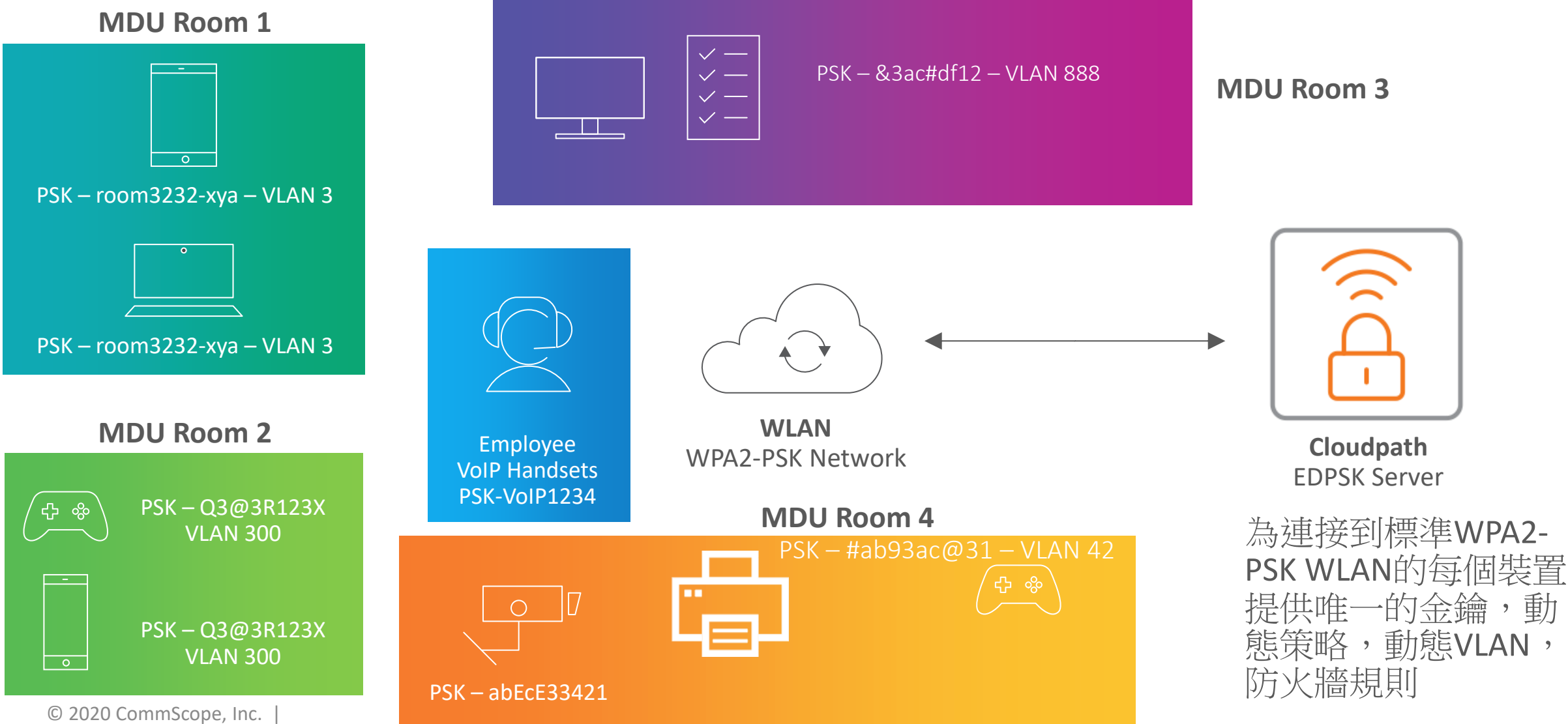
- 連線前停用MAC專用位址
- 使用802.1x認證
- 使用eDPSK/Group DPSK

eDPSK概觀

- Ruckus是動態預先共享金鑰技術的先驅，並且是第一個開發OTA配置的廠商。
- 與共享的PSK相比，DPSK顯著增強了Wi-Fi安全性和可管理性。
- DPSK可以與RBAC（VLAN，速率限制，L3-L7策略）綁定在一起，以提供完整的設備策略管理。
- 儘管不像802.1X身份驗證那樣完全基於標準，但由於它利用WPA2（目前），因此可以與更多的設備相容。
- DPSK的使用是一個很大的成長領域：包括MDU，學生住宿，飯店，可管理的商業辦公室，醫療保健，物聯網設備等。
- 無線控制器對可管理的DPSK數量上有限制，而eDPSK是透過RADIUS，因此理論上沒有限制



External DPSK帶給使用者的好處



Cloudpath Key Features

Onboarding Portal

Self-service portal automatically provisions devices for the Wired and Wireless networks



802.1X Based

PKI policy-enabled certificates tie User, Device & Policy together
PEAP/MSChapV2



Enrollment Record

Tracks who, what, & when is onboarded and authenticated



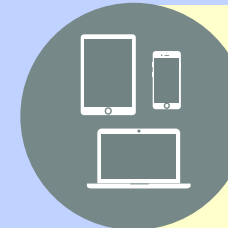
Policy Controls

eDPSK, auto-VLANs, ACLs, Policies based On User/Groups, Devices & Browser/OS, Policy Engine



Broad Device Support

iOS, Android, ChromeOS, Mac OS X, Windows & Linux



Reliability

Eliminate password-related disconnects, support costs, and security problems



MDU Portal – Use Case

MDU Device Examples:

1. Phones
2. Tablets
3. Lighting
4. Gaming Machines
5. Desktops
6. Speakers
7. Printers
8. Laptops
9. Thermostat
- 10. Hydroponics**
11. Smart plugs
12. Cameras


How do we connect these devices, give them a secure network and ensure communication between these devices?

How do we solve headless devices?

Customer Experience: Access Tenant Portal Via QR Code/URL/App

`https://na1.cloudpath.net/training/demo/venue?token=abcdefghijklmnop`



NetworkFuse.io Tenants


networkFuse.io
Connect to NetworkFuse-WiFi
Selina Lo

Unit Wi-Fi





Wi-Fi Passphrase:

.....



Filter



Type to Search

Roku	Living Room	
Nest	Family Room	
Samsung Fridge	Kitchen	
Hydroponics	Balcony	

Guest Wi-Fi


Guest Wi-Fi Passphrase:

.....

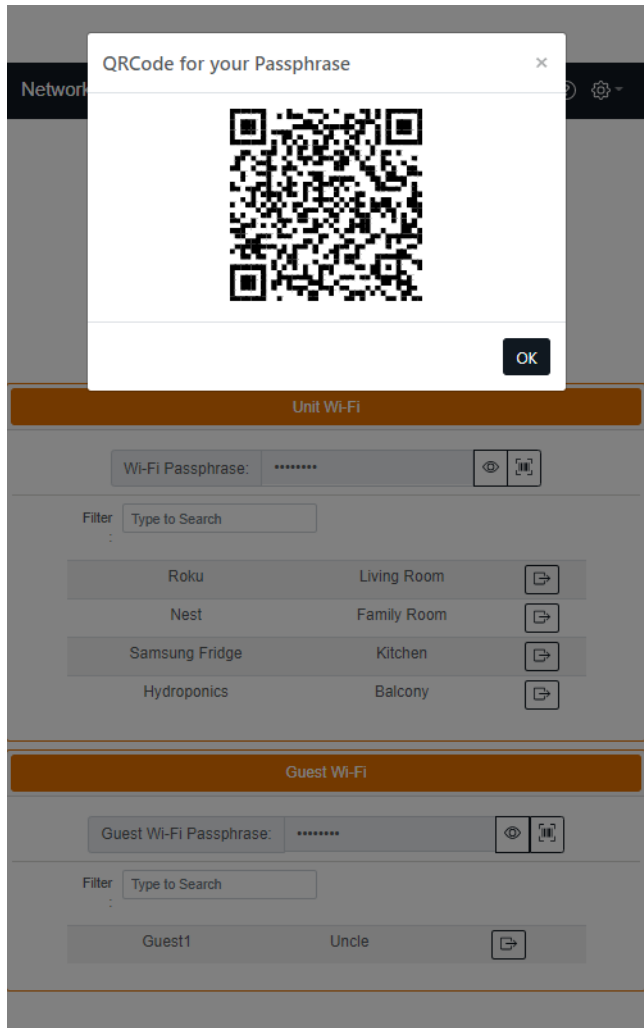


Filter

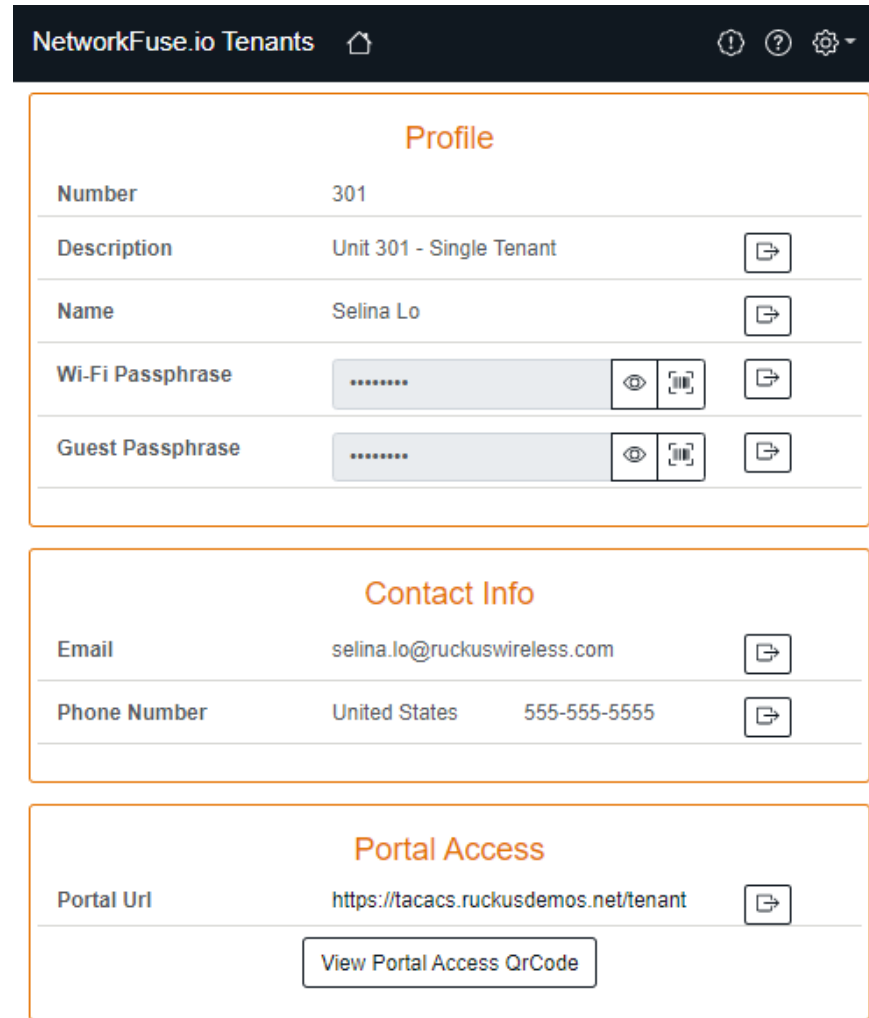
Type to Search

Guest1	Uncle	
--------	-------	---

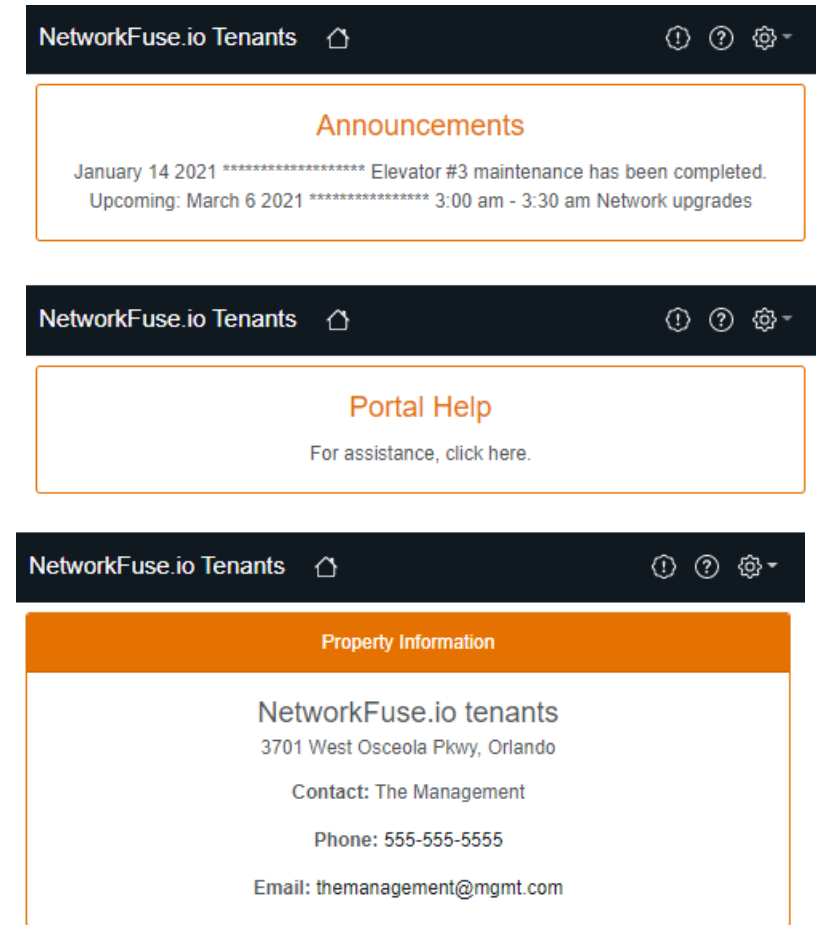




- Customer self service
- Modern UI, scalable for any device
- View DPSK in a QR code for easily onboarding devices

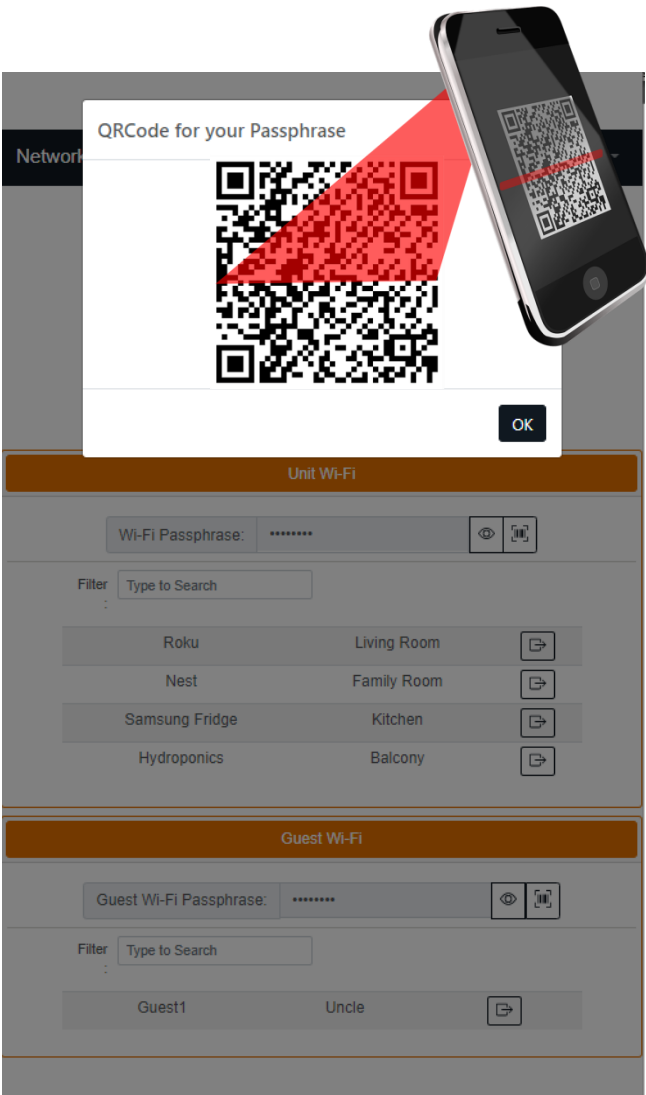


- Customers can self Manage their own portal
- Change DPSK passphrases, email, phone numbers
- Download a QR code for portal access
- Change their secret token



- See announcements
- portal assistance
- property information
- Auto logs out after idle time

Scan From Screen or Print it off



Use iPhone/Android device to take a picture of the QR code.

Once scanned, this prompts the user to join the network.

The QR Code already contains the WLAN profile, including SSID, Security, and DPSK!

Device Joins the Network, no need to configure the WLAN on the end device!

Which one is yours?
Choose your wireless network. Press to refresh the list.

Add wireless network

dorm1

Network "dorm1": Password

27523268

Show password



Everything is good

Your console is connected to the Internet.

Continue

Current Network Status

dorm1

IPv4

NAT Type: Open

All services are available

COMMScope®
RUCKUS®

Cloudpath Enrollment System

Dashboard

Welcome

Connections

Enrollments

DPSKs

Show: **Connections** Disconnects **All**

					dorm1	
Controls	Status	IP Address	MAC Address	Username	SSID	Duration
	Connected	192.168.10.111	CE:7E:4E:A1:54:FB	KS-Building-01_601	dorm1	15 seconds ago
	Connected	192.168.10.110	86:95:C9:EC:39:C4	KS-Building-01_501	dorm1	48 seconds ago

Results 1 - 2 of 2. 15

Property Information

KS-Building-01

Contact: Kevin Su

Phone: +886975725000

Email: kevinసు@seclub.com

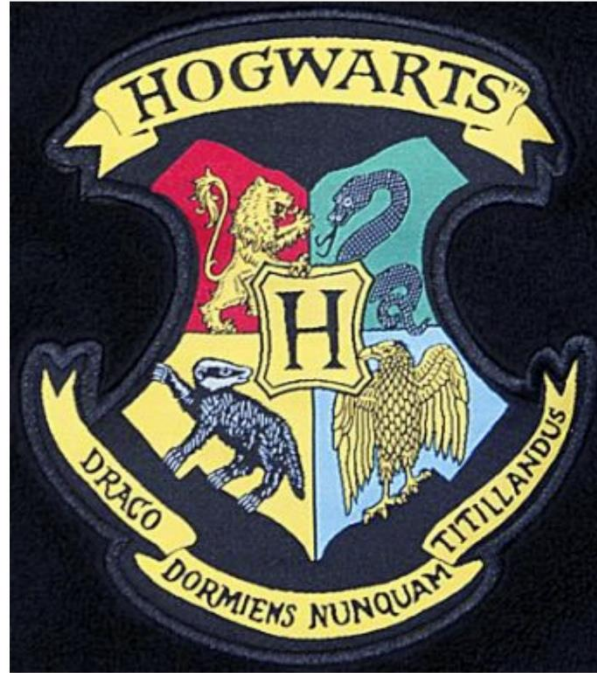
今天 下午8:18

A Unit at KS-Building-01 has been assigned to you. Wi-Fi Passphrase: xatbuymz. Guest Wi-Fi Passphrase: jxhcztbc. Portal may be accessed at: <https://ruckus.seclub.tw/tenant?&auth=CPNENCv2%3ABC%7C4377DA9C-3303-4469-90FF-69EB8FA749DF%7CUfv5OIVPhxShYxE4LTOPZg%3D%3D%3AXWpxv3fBdoXzKzQJCU4euQ%3D%3D&property=Property-34654423-9471-461b-8784-ab3837b1bbf1&api=BQ2NJbAmAi6p> Sent on behalf of Ruckus Wireless

8:50

訊息

ruckus.seclub.tw

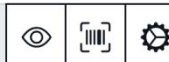


Kevin Su

Wi-Fi

Wi-Fi Passphrase:

.....



Filter:

Type to Search

a2c9d8a8af73



Guest Wi-Fi

8:50

訊息

ruckus.seclub.tw

QRCode for your Passphrase



OK

Kevin Su

View Your Wi-Fi passphrase QRCode

Wi-Fi Passphrase:

.....

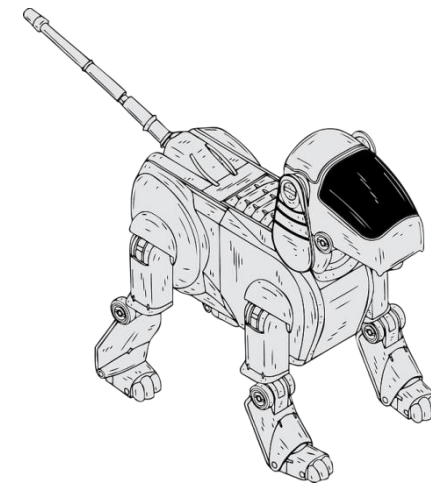


Filter:

Type to Search



整合第三方與自動化



Partner Systems



GUI is accessible via API calls:

- Create/Edit/Delete a Property
- Create/Edit/Delete/Suspend a DPSK
- Create/Edit/Delete/Suspend a Unit
- Bulk upload Units
- Create/Edit/Delete a DPSK pool
- Create/Edit/Delete Policies

Cloudpath Customer Reference

Key Metrics:

- 800,000+ End Users
- 2500 Sites
- 38,000 Access Points
- 10,000 ICX Switches
- Completion December 2024 (5 Year Roll Out)



Ministry of Education of New Zealand

27,417 followers

4d • 🌐

[+ Follow](#) ...

We are pleased to announce [Exeed NZ](#) have been awarded the contract for replacing school network hardware as part of the Te Mana Tūhono work programme.

Exeed is a New Zealand IT distributor focused on supplying a range of top technology brands, including [CommScope](#)'s Ruckus.

Schools will receive new hardware from Ruckus that enables the wireless network to handle multiple simultaneous connections more efficiently using the Wi-Fi 6 technology. Our continued focus is ensuring schools have access to high-speed internet that's reliable, resilient, and safe. [Network for Learning \(N4L\)](#) will be upgrading schools with the new hardware.

: N4L

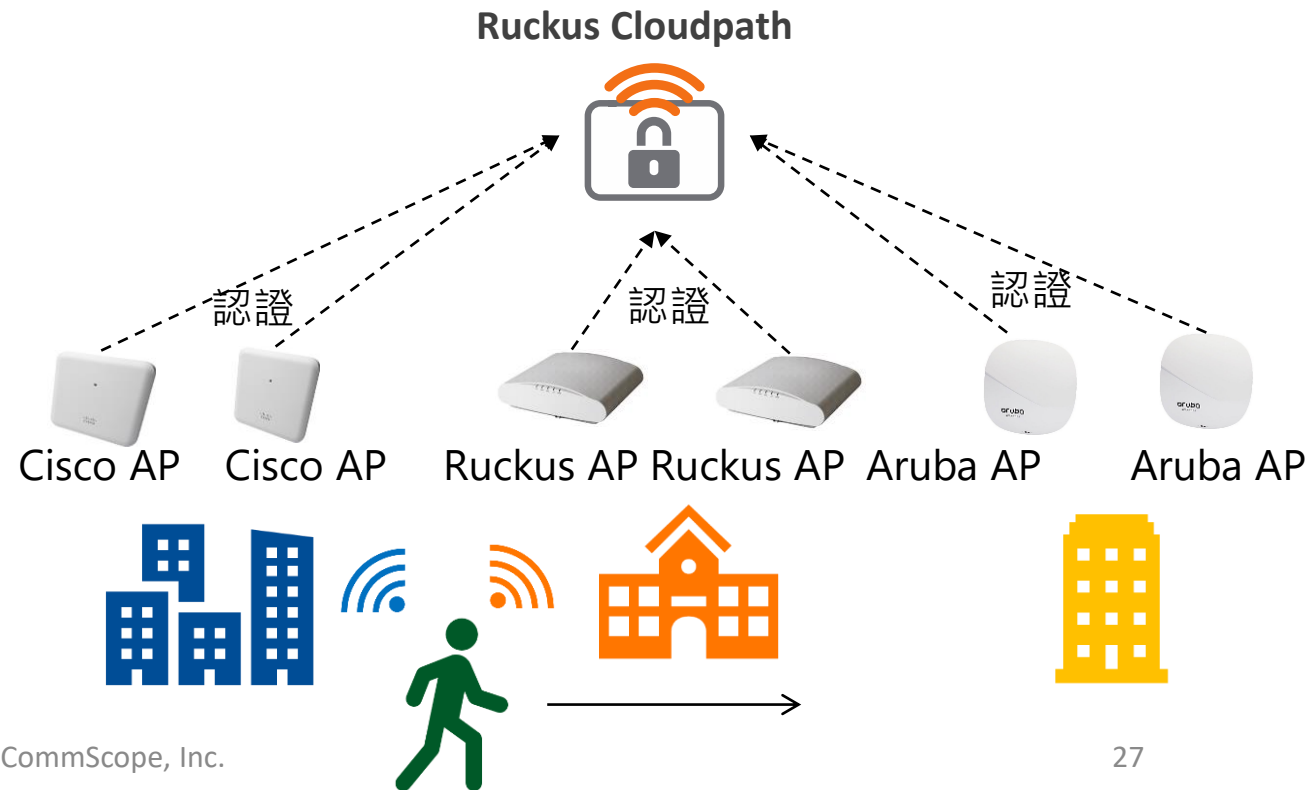


某大學無線汰換及擴充

- 即有無線網路
 - Cisco AP x 170
 - Aruba AP x 28
- 需求與挑戰
 - 使用都完成認證後,漫遊連接至即有不同廠牌AP,不需重新認證
 - 教職員每三個月才需重新認證
 - 學生每日只需認證一次
- 競爭對手
 - Aruba
 - Cisco
- Why Ruckus
 - Ruckus具較佳的無線效能及涵蓋率
 - Ruckus Cloudpath具簡單認證管理及較低的總持有成本 (by User)

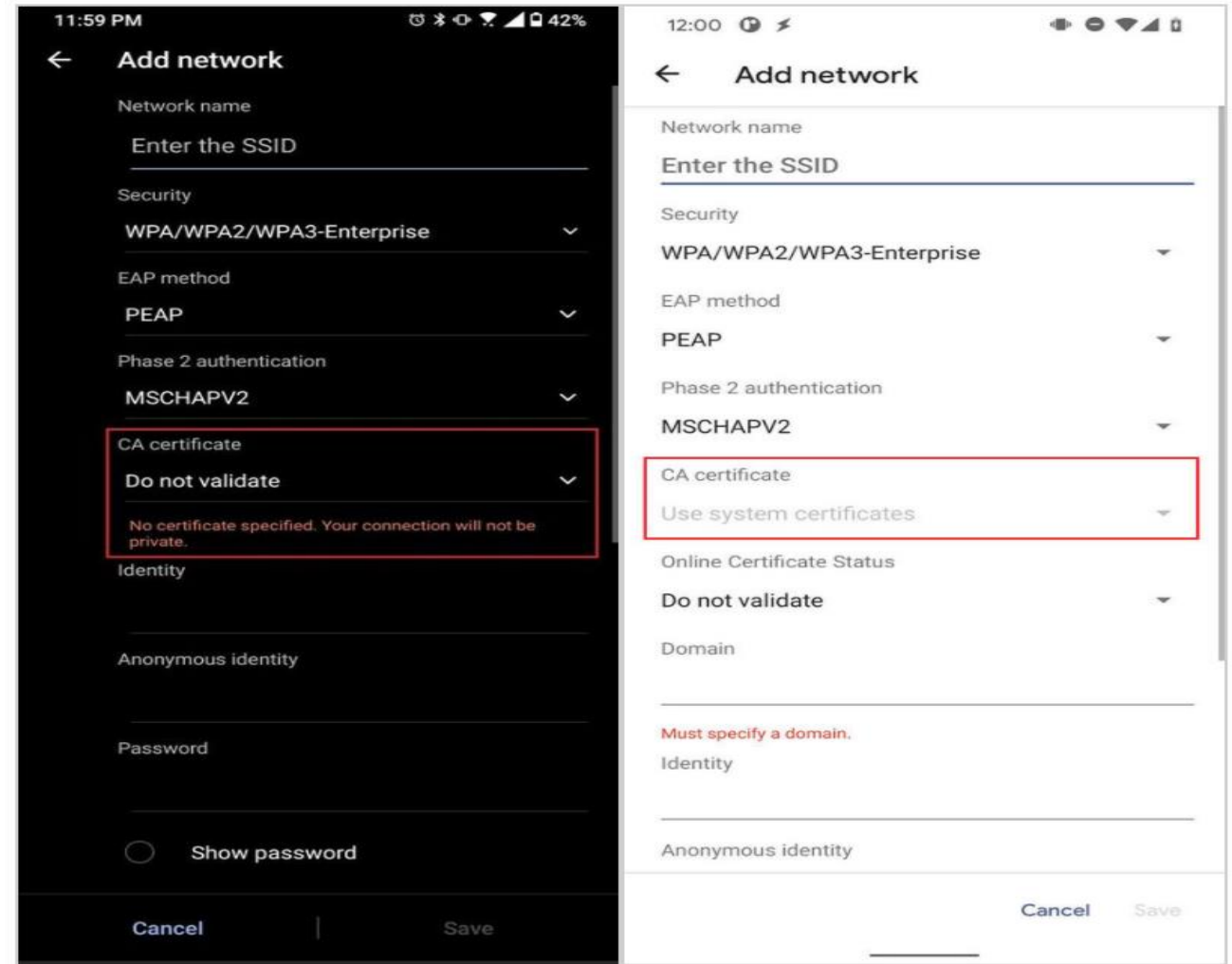
Ruckus Solutions:

- 第一期汰換擴充
 - Cloudpath 5,000u
 - R720 x20, T610 x9
 - SCI
- 宿舍無線
 - H510 AP x260
- 第二期擴充
 - R730 (8x8 WiFi6) x 3, R720 x 19, T610 x 3



Android 11 Security Update affects EAP authentication

Android 11 break enterprise Wi-Fi connection



<https://www.xda-developers.com/android-11-break-enterprise-wifi-connection/>

如何解決

- 不更新Android
- 網路管理員指導用戶如何安裝根CA證書及如何配置服務器域名
- 網路管理員創建一個應用，該應用使用Android的WiFi建議API為用戶自動配置
- 使用Passpoint (hotspot 2.0)
- 使用EAP-TLS

Download CA and Upload to Google Disk

← → ↻ 🏠 不安全问题 | 192.168.10.11/certsrv/certcarc.asp

應用程式 Ruckus My Applications IPv6 由 Safari 匯入 新增資料夾 Wi-Fi HD Downlo

Microsoft Active Directory Certificate Services – se400-SE400-AD-CA

Download a CA Certificate, Certificate Chain, or CRL

To trust certificates issued from this certification authority, [install this CA certificate](#).

To download a CA certificate, certificate chain, or CRL, select the certificate and encoding method.

CA certificate:

Current [se400-SE400-AD-CA]

Encoding method:

☒ DER
☐ Base 64

[Install CA certificate](#)
[Download CA certificate](#)
[Download CA certificate chain](#)
[Download latest base CRL](#)
[Download latest delta CRL](#)

雲端硬碟

在雲端硬碟中搜尋

新增

我的雲端硬碟 > CA

檔案

我的雲端硬碟
與我共用
近期存取
已加星號
垃圾桶

儲存空間 (已使用 82%)
目前使用量: 14 GB (儲存空間配額: 17 GB)
[購買儲存空間](#)

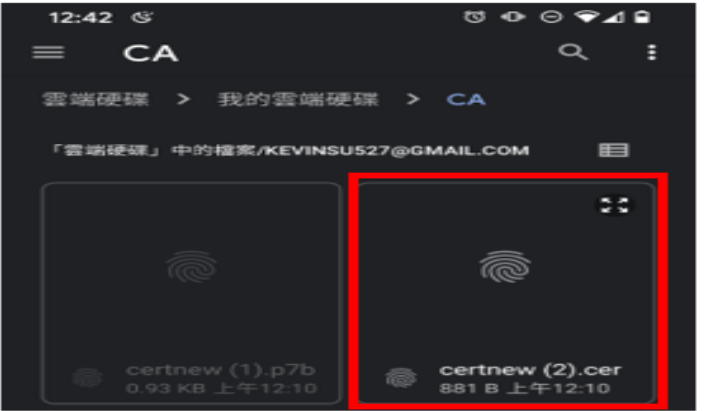
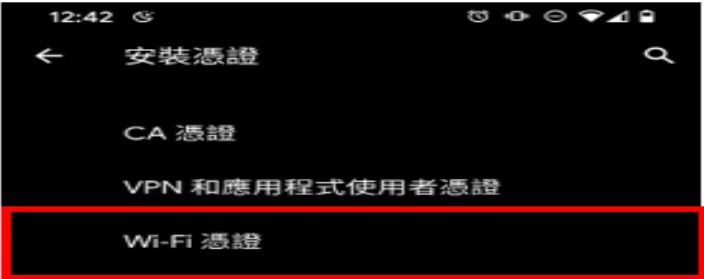
certnew (2).cer

RuckusSalesRootCAI.p12

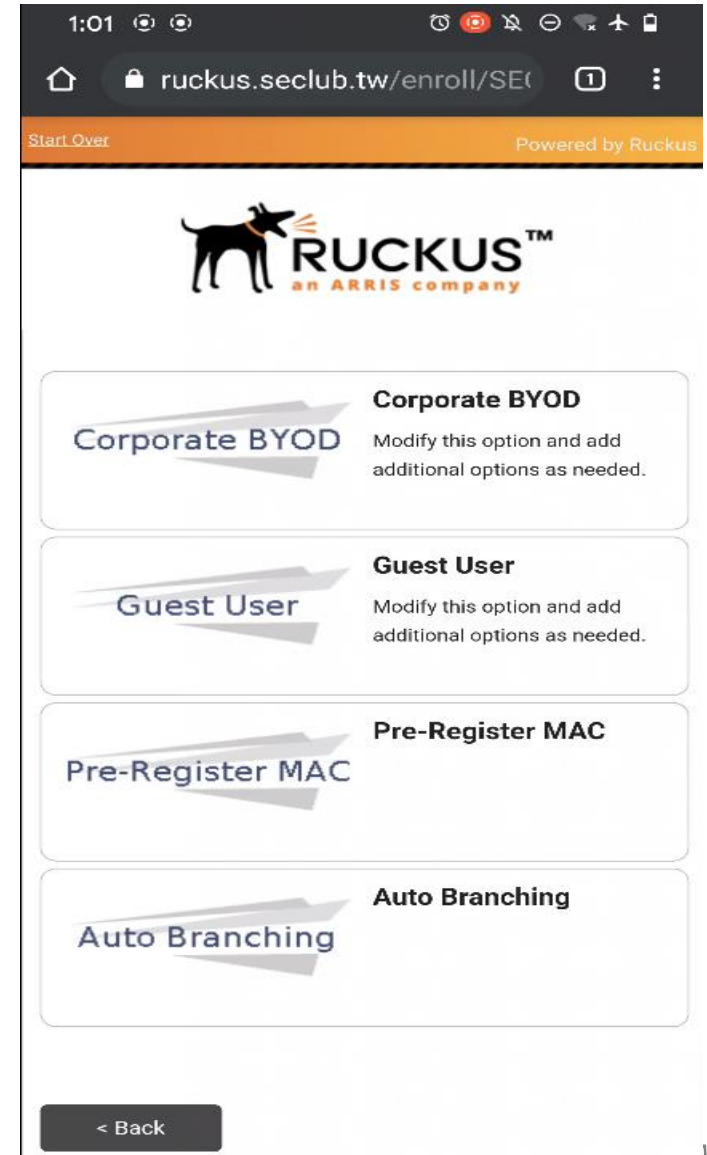
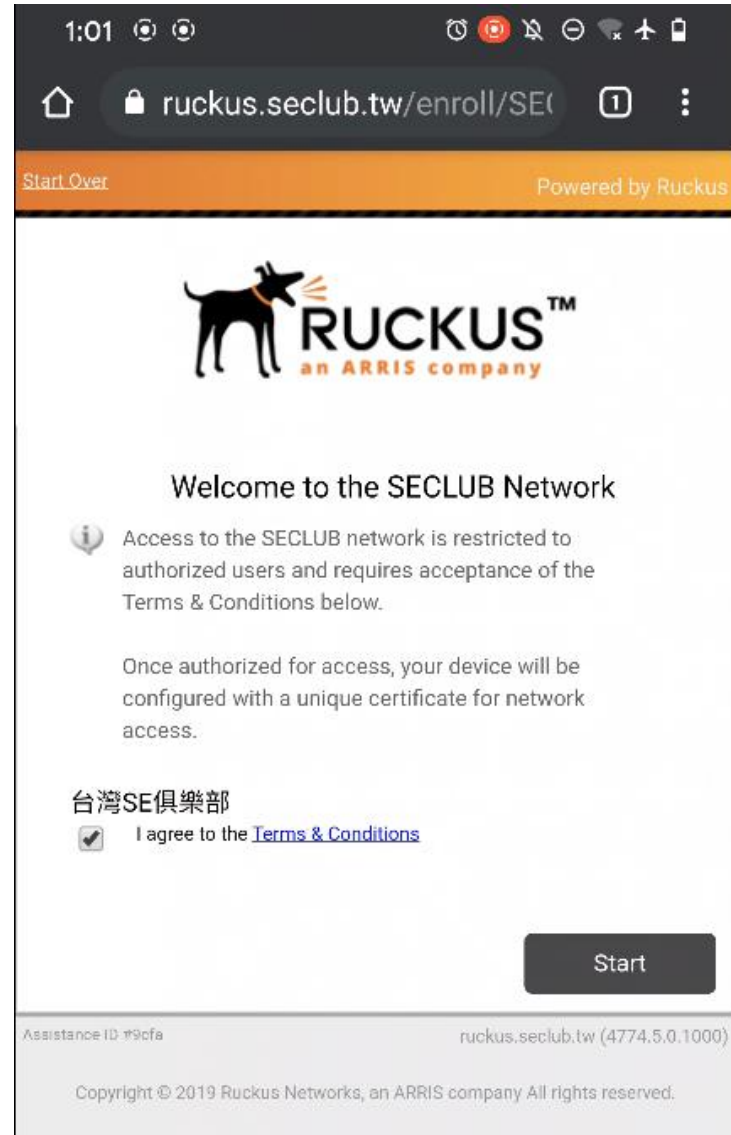
Install CA



Re-configure 802.1x Authentication



Cloudpath EAP-TLS Procedure for Android 11




Cloudpath EAP-TLS Procedure for Android 11

1:01

ruckus.seclub.tw/enroll/SE(

Start Over

Powered by Ruckus



Your username and password are required to access the network.

Username:

Password:

< Back

Continue >

Assistance ID #9cfa

ruckus.seclub.tw (4774.5.0.1000)


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1:01

ruckus.seclub.tw/enroll/SE(


Start Over

Powered by Ruckus



To access the secure network, follow the instructions below based on your computer's operating system.

Android Devices

 **Install The Network**
Click to install the network via the Cloudpath app.

If the app is installed but the button above does nothing, use this alternate option to open the app.

Android versions 6.0 and newer are supported. If you have a device with an older Android version, you will need to configure it manually.

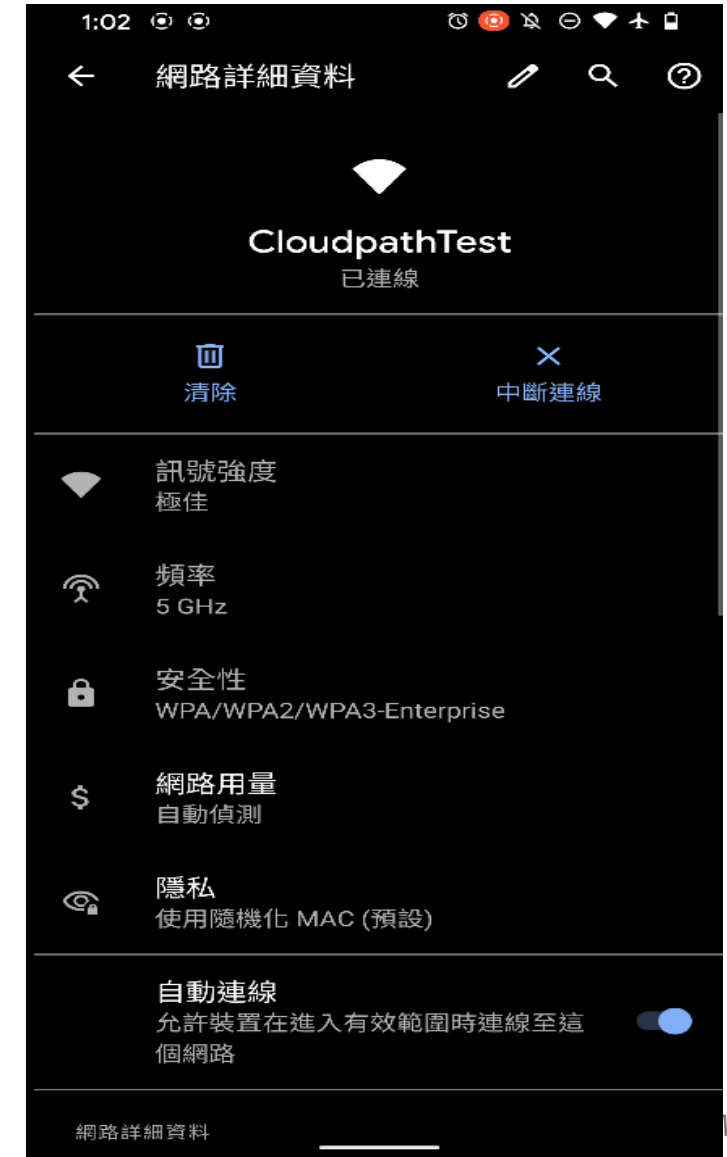
Show all operating systems.

Assistance ID #9cfa

ruckus.seclub.tw (4774.5.0.1000)

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Cloudpath EAP-TLS Procedure for Android 11



COMMScope®

網路智慧管理



1

深度事件檢測

架構於機器學習之上的人工智慧優先序事件偵測

2

用戶故障排除

用一個視窗幫助您把所有的詳細用戶端事件紀錄

3

網路健康儀表板

提供專屬頁面為您監控網路的所有健康度跟效能

4

深度數據領航

提供彈性的資料瀏覽儀表板，只需要輕鬆的拖拉所需

5

全方位的報表

全面，精心策劃的報告可滿足您的所有報告需求

效益

提供網路運作全方位的可視性
加快對網路及用戶端的故障排除
幫助IT團隊改善用戶體驗

事件偵測情境



資訊處組長一早8點進到辦公室。



組長想知道校園網路中是否發生任何問題？希望在問題爆發之前就可以解決掉該問題。



網路中總會發生問題。組長希望對事件進行優先處理，因此他需要知道優先要排除的問題。

Incident Detection - Dashboard

COMMScope
RUCKUS

Dashboard

Analytics

Report

Data Explorer

Admin

Analytics

US

Search...

Search

See Ho Ting | Ruckus Wireless, Inc

?

Clients

APs

Switches

Network Hierarchy

All categories

Jan 26 2020 15:49 to Jan 27 2020 15:49

Connection

Performance

0 Incidents P2

7 Incidents P4

Last 1 Hour

Last 24 Hours

Last 7 Days

3.05

AP Count

NETWORK HISTORY

Jan 27 07:00

New Clients: 10

Impacted Clients: -

Connected Clients: 28

Jan 27 00:00

Jan 27 12:00

INCIDENT TYPES

2

Connection

5

Performance

12

Infrastructure

CRITICAL INCIDENTS

P1 Infrastructure (Service Availab...

Jan 27 2020 14:30

P1 Infrastructure (Service Availab...

Jan 27 2020 14:30

P1 Infrastructure (Service Availab...

Jan 27 2020 14:30

P1 Infrastructure (Service Availab...

Jan 27 2020 14:30

P1 Infrastructure (Service Availab...

Jan 27 2020 14:30

Network

density-vsze-cluster

Free text search for clients, APs, switches, controllers, domains, zones, AP groups. Extremely useful and powerful.

Click on incident severity to filter/unfilter view based on priority.

Click here to go to a list view of incidents.

Overview of where the incidents are across the entire network.

Click to drill-down

Mouseover for label

Mouseover to see number of clients.

List of incidents.

Scroll and click to go to specific incident directly

Incident Detection – Incidents List

COMMScope
RUCKUS®

Dashboard

Analytics

Incidents

Health

Client Troubleshoot

Report

Data Explorer

Admin

Analytics

US

Search...

Clients

See Ho Ting | Ruckus Wireless, Inc

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All categories

Network

Jan 26 2020 17:26 to Jan 27 2020 17:26

Network

Type: Network | APs: 3053 | Clients: 107

Total Incidents

6

Click on bars to filter/unfilter

P1

12

P2

0

P3

0

P4

6

Count

80

60

40

20

0

Jan 26 18:00

Free text search incident

Network

Today

Last 24 Hours

Last 7 Days

Last Month

Custom

December 2019

January 2020

Su Mo Tu We Th Fr Sa

24 25 26 27 28 29 30

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30 31

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30 31

17 32

17 32

Dec 01 2019 17:32 - Jan 27 2020 17:32

Cancel

Apply

own into lent

Severity

Date

Duration

Description

Scope

Type

Details

✓ All

P1

P2

P3

P4

Jan 27 2020 14:30

30m

Clients with low RSS are unusually high in AP Group: West Side, impacting 25% of connected clients.

Group: West Si...

Per

3

West Side

✓ All

SZ Cluster

Domain

Zone

AP Group

Access Point

Jan 27 2020 13:25

3m

Association

Point: EC:8C:A2:18:11:00

Connection

Association

100%

1

EC:8C:A2:18:11:00

vsz34 (SZ Cluster) > 08-US-CA-D8-Ramesh-Home (Domain) > 08-US-CA-Z8-Ramesh-Home (Zone)

Jan 27 2020 12:18

6m

Time to connect

AlphaNet...

Connection

Time To Connect

60%

9

Zone

Jan 27 2020 09:00

30m

Clients with low RSS are unusually high in AP Group: West Side, impacting 25% of connected clients.

Performance

Coverage

33.33%

4

West Side

AP Group

Jan 27 2020 07:00

4h

Clients with low RSS are unusually high in AP Group: West Side, impacting 25% of connected clients.

Performance

Coverage

70.57%

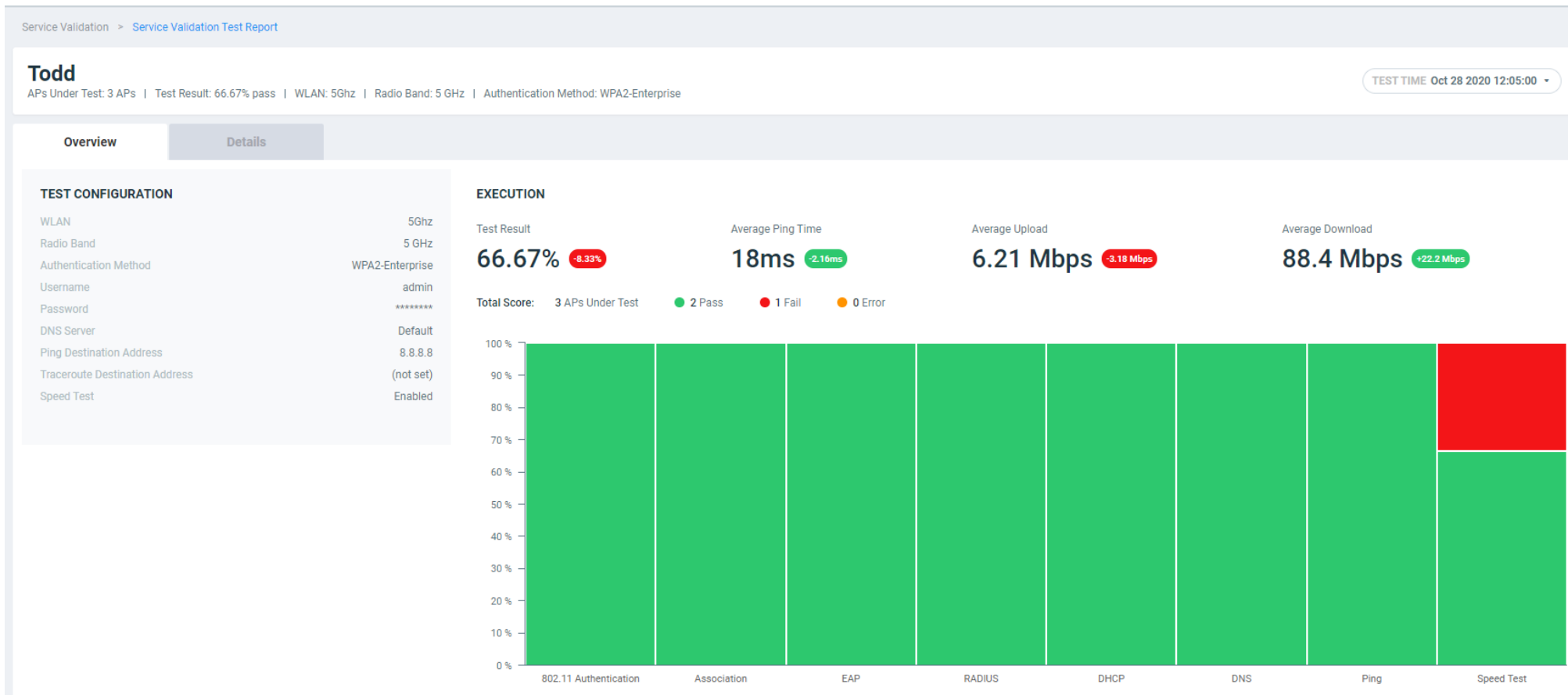
11

West Side

AP Group

42

What is Service Validation?



- Conveniently orchestrate network tests from cloud
- No extra hardware sensor or test equipment needed
- Test WLAN, LAN and WAN connectivity
- Test EAP, RADIUS, DHCP, DNS, Ping, Traceroute, Speed Test (upload/download)
- Service Validation is available for both Cloud and SZ customers

SV Test Details

- In Details page test result for each AP in every stage is shown
- At the top right in the test time widget, admins can see when the test was run.
- Click on failure to see details of where the test failed
- If a test was run multiple times, prior test results are available from here.

SARAVANAN-FT
APs Under Test: 7 APs | Test Result: 85.71% pass | WLAN: SARAVANAN-1x | Radio Band: 2.4 GHz | Authentication Method: WPA2-Enterprise

TEST TIME Feb 01 2021 21:45:22

OverviewDetails

AP Name	AP MAC	802.11 Auth	Association	EAP	RADIUS	DHCP	DNS	Ping	Traceroute	Upload	Download
RuckusAP	60:D0:2C:1F:18:B0	Pass	Pass	Pass	Pass	Fail	N/A	N/A	N/A	N/A	N/A
MLISA-R610-Switch1	B4:79:C8:04:DB:F0	Pass	Pass	Pass	Pass	Pass	Pass	86.4ms		29.6 Mbps	23.2 Mbps
MLISA-R610-Switch2	D8:38:FC:1E:B1:10	AssociationEAPRADIUSDHCPDNSPingTraceroute									
MLISA-R720-Switch1	1C:3A:60:0C:09:C0	Pass	Pass	Pass	Fail	N/A	N/A	N/A			23.4 Mbps
MLISA-Switch2-R710	18:48:0D:1C:A2:40										21.2 Mbps
RuckusAP	B4:79:C8:12:8C:50										22 Mbps
SARAVANAN-AP-MLISA-1...	38:FF:36:12:85:40										15 Mbps
											22.4 Mbps

Connection Event Details

DETAILS

AP MAC60:D0:2C:1F:18:B0

AP NameRuckusAP

SSID SARAVANAN-1x

Radio2.4 GHz

Failure TypeDHCP Failure

ReasonSTA Deauth (Leaving)

802.11 Authentication Request

802.11 Authentication Response

802.11 Association Request

802.11 Association Response

EAP Request

EAP Response

RADIUS Access Request (RADIUS_REQ_PROXY)

RADIUS Access Challenge

Client Device

Access Point (60:D0:2C:1F:18:B0)

Control Plane

Broadcast

VLAN mismatch Insight

Incidents > Incident Details

Incident Details

P1

VLAN mismatch found in Switch Group: Density

DETAILS

3

east-icxstack-density

west-density-7650-stack

ICX7150-C12-Switch

Impacted switches

Out of 4 switches

1

VLAN 1

Impacted VLANs

Out of 6 VLANs

IMPACTED SWITCHES

Local Device	Local Device MAC	Local Port	Mismatch VLAN	Peer Port	Peer Device	Peer Device MAC
east-icxstack-density	60:9C:9F:FE:56:42	1/1/8	1	eth1!88bc	E03-R750_EastOfFoxhound	1C:3A:60:3B:DD:70
west-density-7650-stack	60:9C:9F:52:C9:86	1/1/29	1	eth1	W06-R650-Chihuahua	20:58:69:3B:CB:70
west-density-7650-stack	60:9C:9F:52:C9:86	2/1/18	1	eth1!88bc	W03-R550-Terrier	B4:79:C8:3E:87:20
ICX7150-C12-Switch	78:A6:E1:2E:CF:FE	1/1/1	1	eth1!88bc	W04-05_Nextto_Amrit_T75...	28:B3:71:05:14:30

east-icxstack-density

1/1/8

VLAN 1001

VLAN 1

✓ No matched VLANs

E03-R750_EastOfFoxhound

eth1!88bc

VLAN 1

P1 Incident, Identifies switch group, IT can take action

INCIDENT INFO


Incident Category	Infrastructure
Incident Sub-Category	VLAN Mismatch
Type	Switch Group
Scope	Density
Duration	15m
Event Start Time	Feb 02 2021 16:45
Event End Time	Feb 02 2021 17:00

Insight is evaluated every 2hrs (15 mins is used for internal testing)

No matched VLANs found

High Switch Memory Utilization Insight

Incidents > Incident Details

 Incident Details P1

High memory utilization detected in Switch: D52_RACK_ICX755048ZP_Standalone (28:B3:71:29:8C:B6)

P1 Incident, High memory utilization identified, IT can take action



Anomalous memory utilization detected. Time to 50% threshold mem projected

INCIDENT INFO	
Incident Category	Performance
Incident Sub-Category	Memory
Type	Switch
Scope	D52_RACK_ICX755048ZP_Standalone (28:B3:71:29:8C:B6)
Duration	1h
Event Start Time	Feb 01 2021 21:00
Event End Time	Feb 01 2021 22:00

Scope, Duration, Event, Start and End Time.

Start Time: Event Detected

End Time: Memory will Exceed 90% threshold

PoE Insight – PoE power denied in Switch Group





Incident Details

P1

PoE power denied in Switch Group: Prashanth

P1 Incident, PoE power denied in Switch Group, IT can take action

DETAILS	
<div>1</div> <div>  D52_RACK_ICX7250_Standalone </div> <div> Impacted switch Out of 3 switches </div>	<div>1</div> <div>  1/1/2 </div> <div> Impacted PoE port 17 connected power devices </div>

Impacted Switch name and count
Impacted Port count

Switch Name	Switch MAC	Port Number
D52_RACK_ICX7250_Standalone	78:A6:E1:20:E2:18	1/1/2
D52_RACK_ICX7250_Standalone	78:A6:E1:20:E2:18	1/1/2
D52_RACK_ICX7250_Standalone	78:A6:E1:20:E2:18	1/1/2

Each row represents impacted port number.

Port Number format:
Stack Unit Number / Module / Port Number

用戶端故障排除情境



資訊處組長一早8點進到辦公室



看到主任發給他的email，問他為什麼昨天下午開會時無法連接到WiFi。傳統組長必須針對個別WiFi用戶端進入故障排除模式，方能了解問題。



組長希望使用一個簡單的管理介面來了解主任在昨天所發生的狀況。

Client Troubleshooting

COMMSCOPE
RUCKUS

Dashboard

Analytics

Incidents

Report

Data Explorer

Admin

Analytics

US

Search...

RUCKUS NETWORKS, INC

?

Categories

Jan 23 2020 10:17 to Jan 24 2020 10:17

00:CD:FE:A4:8E:6F (iPhone, Unknown)

Type: Client | IP Address: 10.32.190.185 (3) | OS Type: iOS (2) | Username: rkaliaperumal (2) | SSID: area52

7h 49m

Total Connected Time

82.68%

Good Connection

16.85%

Average Connection

0.16%

Poor Connection

Connection Events

55

Roaming

2

Throughput Estimate / Avg MCS (Downlink): -63 dBm / 28 dB / 4.5 Mbps

Connection Quality

0

Network Incidents

0

Jan 24 02:00

Jan 24 03:00

Jan 24 04:00

Jan 24 05:00

Jan 24 06:00

Jan 24 07:00

History

Jan 24 2020 02:02:28

EAP Failure: Time

Client associated

Jan 24 2020 02:02:40

Client associated

Client roamed

Jan 24 2020 02:02:50

Client roamed @ C

Client roamed @ C

Jan 24 2020 02:06:29

Client roamed @ C

DHCP Failure: Tim

Jan 24 2020 02:09:38

DHCP Failure: Tim

Client associated

Jan 24 2020 02:10:42

Client associated

Client disconnected

Jan 24 2020 02:10:58

Client disconnected

Client disconnected

Jan 24 2020 02:11:16

Client disconnected

Client disconnected

Jan 24 2020 02:11:33

Client disconnected

Client disconnected

Jan 24 2020 02:13:41

Client disconnected @ Cube 262 East#14 ...

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:13:58

Client associated (802.11) @ Cube 262 Ea...

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:15:28

Client associated (802.11) @ Cube 262 Ea...

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:15:38

Client disconnected @ Cube 262 East#14 ...

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:15:45

Client associated (802.11) @ Cube 262 Ea...

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:20:33

Client associated (802.11) @ Cube 262 Ea...

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:20:42

Client disconnected @ Cube 262 East#14 ...

Client associated

Client roamed

Client disconnected

Connection failure

Incident

Apply

Captures all connection and roaming events on a time axis.

Mouse scroll to zoom in and out.

Click and hold to shift the charts left and right.

Click on any event and the list on the right will highlight and sync automatically.

Mouseover for details. Click to drill-down into the AP

List of all connection and roaming events. Notice that all events are color-coded.

Client Troubleshooting – Visual Connection Diagnostics

00:CD:FE:A4:8E:6F (iPhone, Unknown)

Type: Client | IP Address: 10.32.190.185 (3) | OS Type: iOS (2) | Username: rkaliaperumal (2) | SSID: area52

HEALTH SUMMARY

7h 49m

Total Connected Time

82.68%

Good Connection

16.85%

Average Connection

0.16%

Poor Connection

Connection Events

55

Success

17

Failure

13

Success events, failure events, slow connection events, disconnect events

Click on any failure events to view the VCD

Connection Event Details

DETAILS

AP MAC

F8:E7:1E:22:AD:B0

AP Name

Cube 287 East#13

SSID

area52

Radio

5 GHz

Failure Type

EAP Failure

Reason

STA Disassoc

802.11 Authentication Request

802.11 Authentication Response

802.11 Reassociation Response

802.11 Reassociation Request

EAP Request

802.11 Disassociation (Disassociation_STA)

Client Device

Access Point (F8:E7:1E:22:AD:B0)

History

Jan 24 2020 02:15:38

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:15:45

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:15:58

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:20:33

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:20:42

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:28:17

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:28:27

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:28:59

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:29:11

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:29:25

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 02:29:35

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 02:32:31

Client associated (802.11) @ Cube 262 Ea...

Jan 24 2020 03:46:52

EAP Failure: STA Disassoc @ Cube 287 E...

Jan 24 2020 03:47:04

Client roamed @ Cube 287 East#13 (F8:E...

Jan 24 2020 04:24:17

DHCP Failure: Timeout Expired @ Cube 16...

Jan 24 2020 04:27:09

Client associated (802.11) @ Cube 287 Ea...

Jan 24 2020 07:04:00

DHCP Failure: Timeout Expired @ Cube 16...

Jan 24 2020 07:05:05

Client associated (802.11) @ Cube 166 Ea...

Jan 24 2020 07:05:21

EAP Failure: STA Disassoc @ Cube 262 Ea...

Jan 24 2020 07:05:22

Client roamed @ Cube 262 East#14 (74:3...

Jan 24 2020 07:05:22

Client disconnected @ Cube 262 East#14 ...

Jan 24 2020 07:06:06

Client associated (802.11) @ Cube 166 Ea...

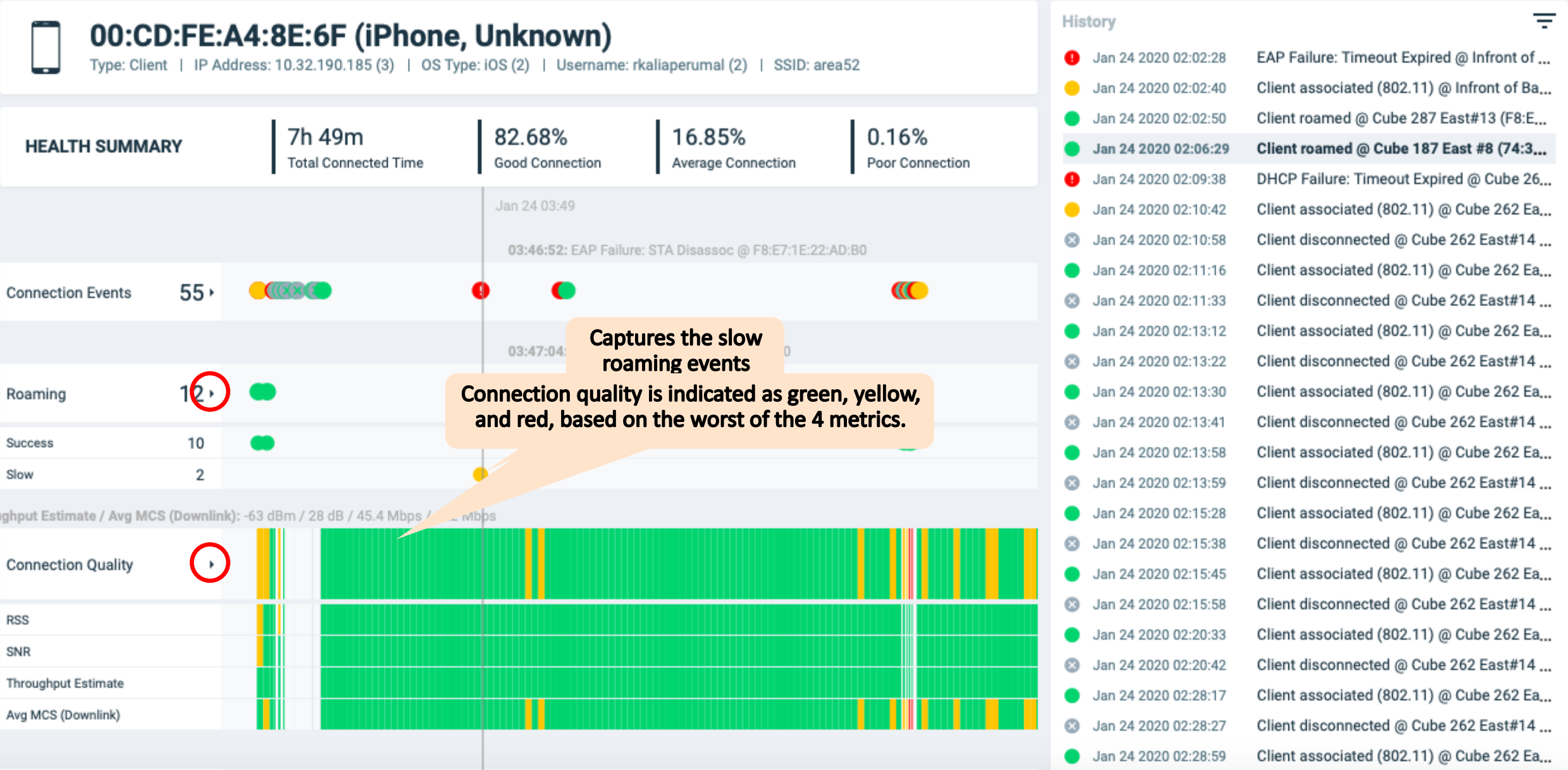
Jan 24 2020 07:06:36

Client disconnected @ Cube 166 East #9 (...)

Jan 24 2020 07:06:39

Client associated (802.11) @ Cube 166 Ea...

Client Troubleshooting – Roaming & Connection Quality



Captures the slow roaming events

Connection quality is indicated as green, yellow, and red, based on the worst of the 4 metrics.

總結



Thank You
Q&A

Kevin Su

Technical Consultant