RUCKUS®
COMMSCOPE

AI Driven 校園數位韌性

Calvin Su

Technical Consultant

校園面臨的挑戰

缺乏整體網路的可視性

IT常被瑣碎的網路申告弄得焦頭爛額

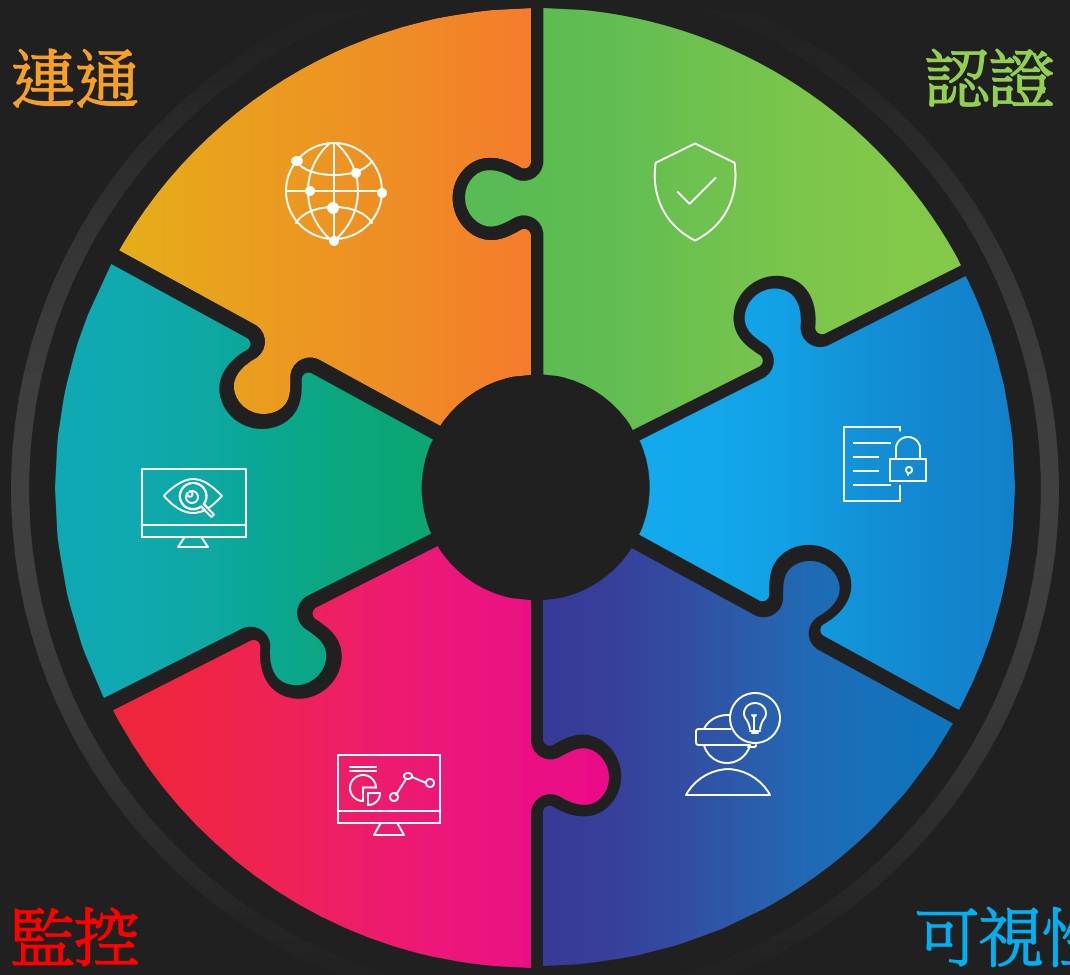
無法分類該優先處理的事件導致用戶體驗下降

不斷變化的需求

連通

認證

安全事件應變



安全政策-角色存取控管

監控

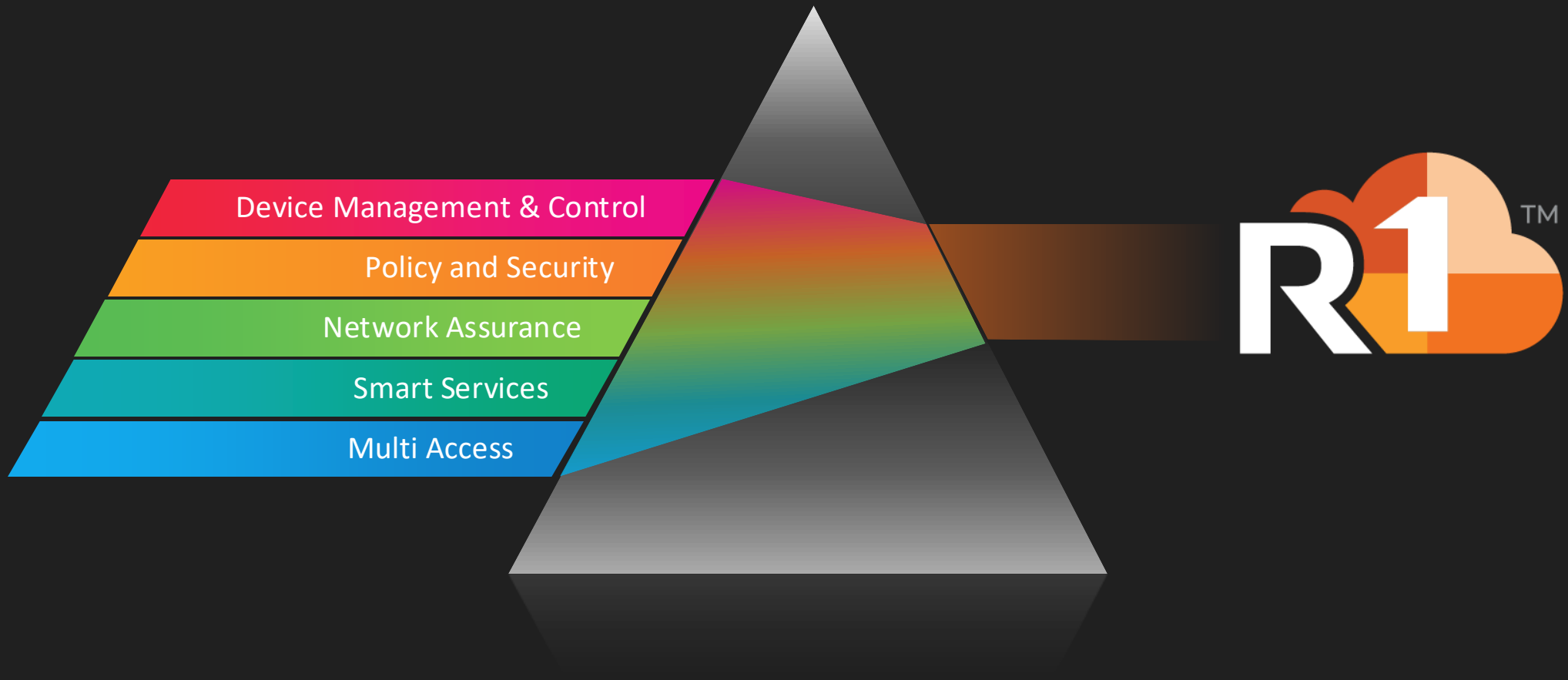
可視性

單一解決方案

RUCKUS One

Simplified experience unifying our portfolio into

one software platform

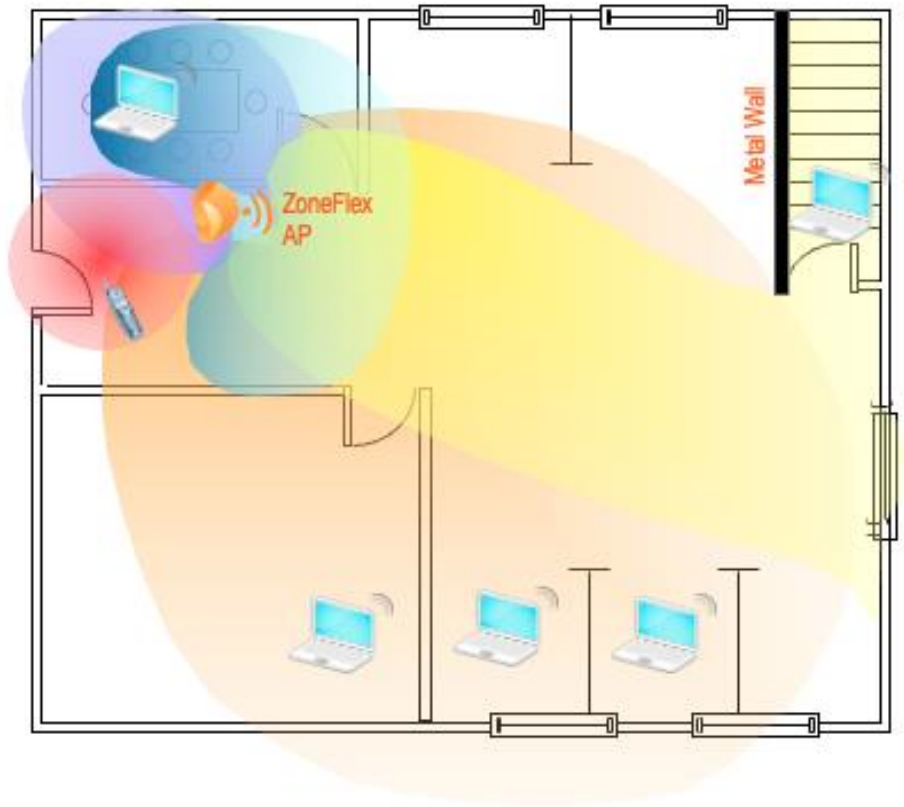


Ruckus BeamFlex：提升連線效能和可靠度

他牌

Ruckus

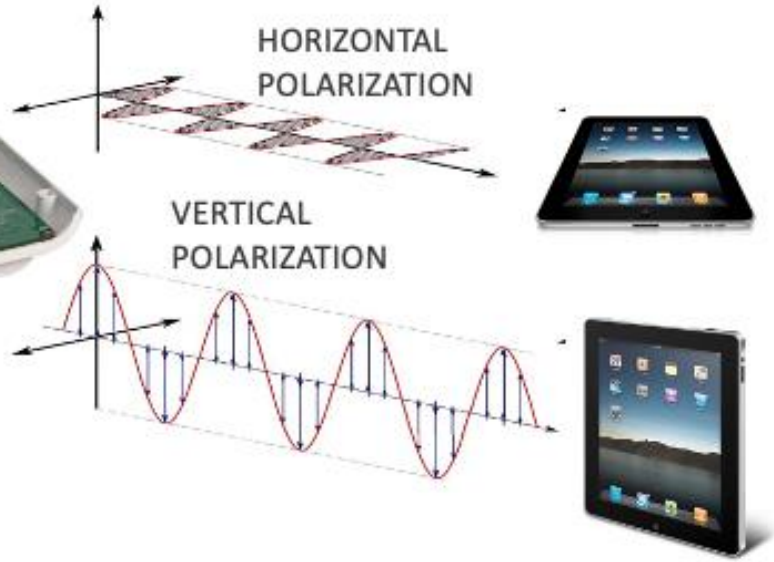
- 智慧天線將無線訊號指向用戶端設備
- 自動依據用戶端狀況（移動，加入，變化）進行最佳訊號調適
- 自動迴避干擾源
- 操控訊號繞過無法穿越的區域
- 智慧天線能夠讓基地台之間更加協調
- 自動化調整指定方向發射功率及頻道切換



多極化陣列天線 (BeamFlex+)

多極化陣列天線

自動對應用戶設備方向,以達最佳傳輸效率



Device orientation accounts for up to **5x performance differential** among products

IEEE 802.11 wireless LAN standards

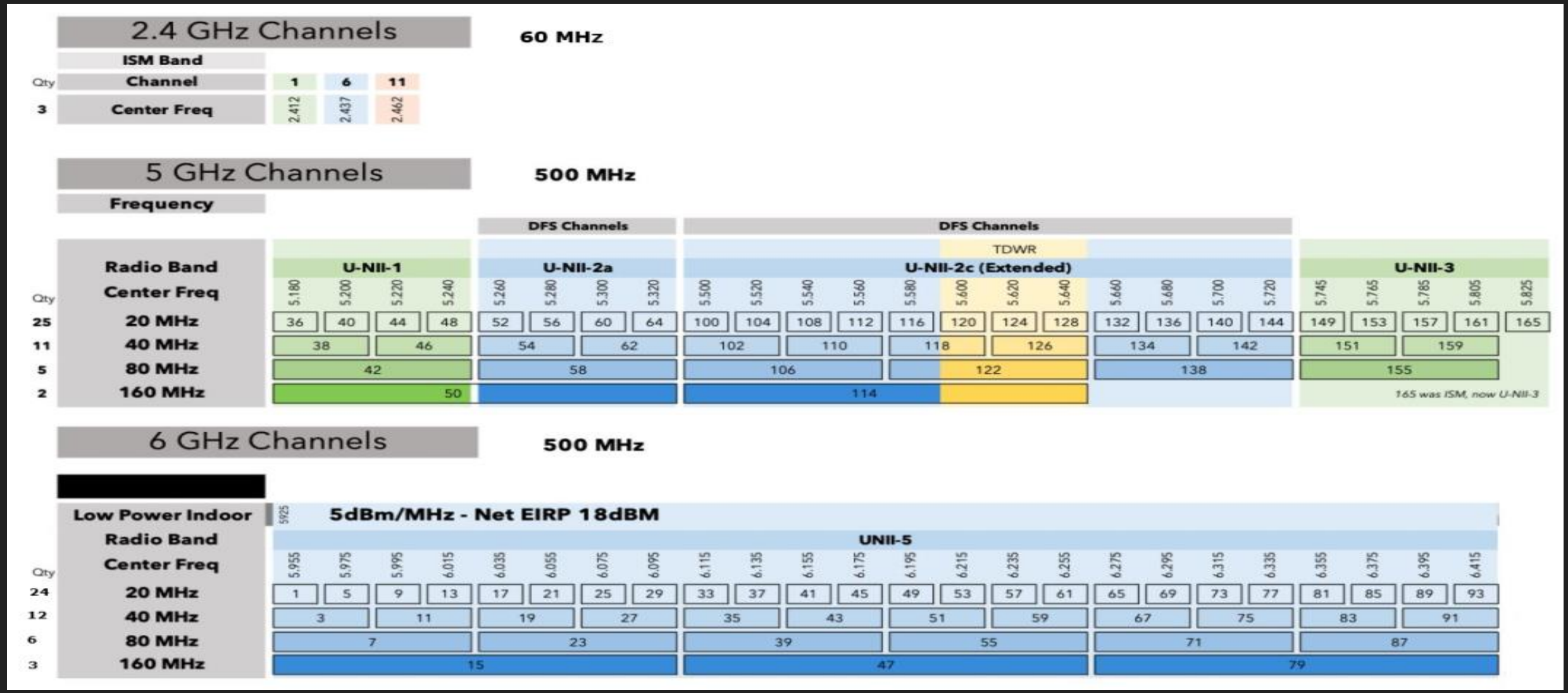
Wi-Fi 7應用案例

- 擴增實境/虛擬實境 (AR/VR)
- 視訊會議（線上課程與直播教學）
- 高密度場域 – 會議中心/運動場
- 全校高密度線上測驗
- IoT/Operational Technology

Wi-Fi 7適用於下列三大需求：

- **低延遲 – (影響延遲的因素如下：)**
  - 距離 - FSPL
  - 速度 - MCS Rate
  - 頻道競爭 - CCI
- **高可靠**
- **高傳輸**

新世代無線的來臨優化頻道愈趨重要



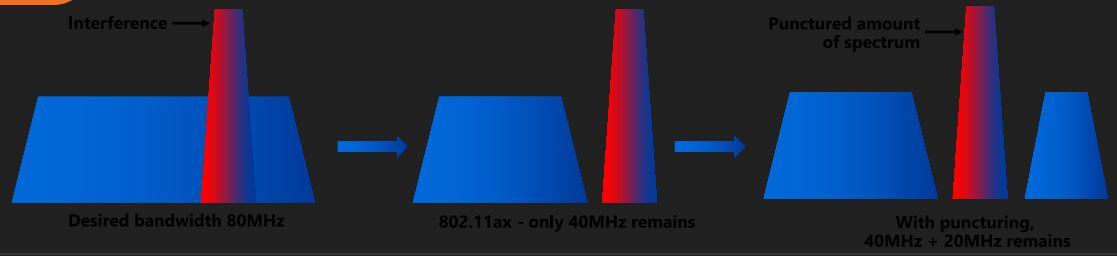
WiFi 7 的重要技術

Extremely High Throughput

Standard	Wi-Fi 6/6E	Wi-Fi 7
Max Speed with 1 Spatial Stream	1.2 Gbps	2.9 Gbps
Max Speed with 2 Spatial Streams	2.5 Gbps	5.8 Gbps
Max Speed with Max # of Spatial Streams	9.6 Gbps	46.4 Gbps

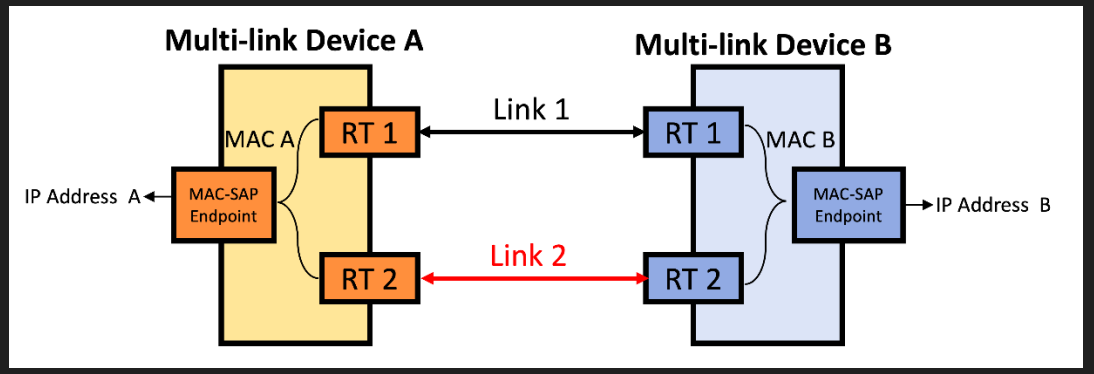
Punctured Transmission

- Increased channel availability
- Better throughput
- Lower latency



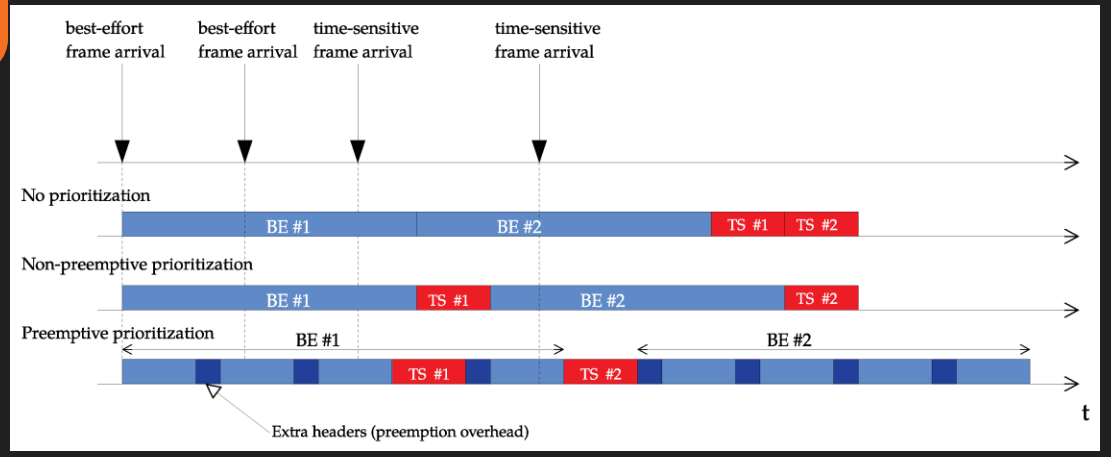
Multi-Link Operation

- Link redundancy (resilience)
- Link aggregation (throughput)
- Link selection (latency)



Enhanced Quality of Service

- Time Sensitive Networking (TSN)
- Deterministic Low Latency



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未來就在你眼前

AR / VR 的需求

- 720P 每秒 7~8 mbps

AR/VR ->28 ~ 32 mbps

AR/VR ->56 ~ 64 mbps

- 1080P 每秒 10~11mbps

AR/VR ->40 ~ 44 mbps

AR/VR ->80 ~ 88 mbps

- 4K 每秒 25mbps

AR/VR ->100 mbps

AR/VR ->200 mbps

RUCKUS WiFi 7 結合 Vision Pro 教學

RUCKUS Wi-Fi 6/6E/7 AP Portfolio

Indoor

R850
Wi-Fi 6: **8x8** (5G) 4800Mbps + **4x4** (2G) 1148Mbps
IoT: BLE & Zigbee selectable **Ethernet:** 5GE

R750
Wi-Fi 6: **4x4** (5G) 2400Mbps + **4x4** (2G) 1148Mbps
IoT: BLE & Zigbee selectable **Ethernet:** 2.5GE

R650
Wi-Fi 6: **4x4** (5G) 2400Mbps + **2x2** (2G) 574Mbps
IoT: BLE & Zigbee concurrent **Ethernet:** 2.5GE

R550
Wi-Fi 6: **2x2** (5G) 1200Mbps + **2x2** (2G) 574Mbps
IoT: BLE & Zigbee selectable **Ethernet:** 1GE

R350 & R350e
Wi-Fi 6: **2x2** (5G) 1200Mbps + **2x2** (2G) 574Mbps
IoT: No onboard IoT **Ethernet:** 1GE

R760
Wi Fi 6E

Wi-Fi 6E: 4x4 (6GHz) 4800Mbps + **4x4** (5GHz) 2400Mbps + **4x4** (2GHz) 1148Mbps
IoT: BLE & Zigbee selectable **Ethernet**: 10GE
LPI and SP modes* supported

* Contingent on AFC rule ratification

R770
Wi Fi 7

Wi-Fi 7: 2x2 (6GHz) 5765Mbps + **4x4** (5GHz) 5765Mbps + **2x2** (2GHz) 689Mbps
IoT: BLE & Zigbee selectable **Ethernet**: 10GE
LPI and SP modes* supported
GA: Q4, 2023

R670
Wi Fi 7

Wi-Fi 7: 2x2 (6GHz) 5765Mbps + **2x2** (5GHz) 2882Mbps + **2x2** (2GHz) 689Mbps
IoT: BLE & Zigbee selectable **Ethernet**: 5GE
LPI and SP modes* supported
GA: Q3, 2024

Indoor Wall Plate

H550
Wi-Fi 6: **2x2** (5G) 1200Mbps + **2x2** (2G) 574Mbps
IoT: BLE & Zigbee concurrent **Ethernet:** 1GE

H350
Wi-Fi 6: **2x2** (5G) 1200Mbps + **2x2** (2G) 574Mbps
IoT: BLE & Zigbee selectable **Ethernet:** 1GE

Outdoor

T750 & T750se
Wi-Fi 6: **4x4** (5G) 2400Mbps + **4x4** (2G) 1148Mbps
IoT: BLE & Zigbee selectable **Ethernet:** 2.5GE

T350 & T350se
Wi-Fi 6: **2x2** (5G) 1200Mbps + **2x2** (2G) 574Mbps
IoT: BLE & Zigbee selectable **Ethernet:** 1GE
(No onboard IoT for T350se)

T670
Wi Fi 7

Wi-Fi 7: 2x2 (6GHz) 5765Mbps + **2x2** (5GHz) 2882Mbps + **2x2** (2GHz) 689Mbps
Ethernet: 5GE
SP modes* supported
GA (Omni): Q3 2024

RUCKUS One – All in One Manage

Wi-Fi and Switching
SmartZone | RUCKUS Cloud | Unleashed

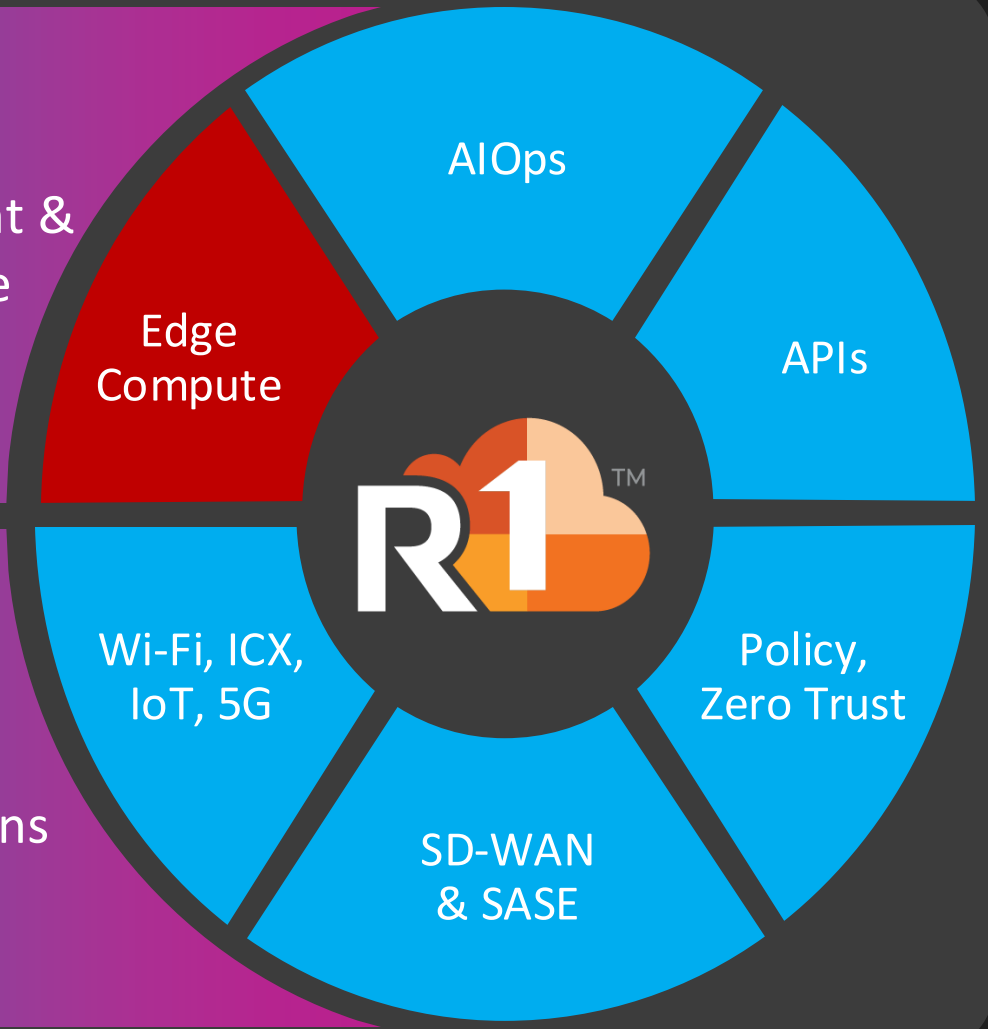
IoT
Solutions and Services | 3rd Party

Security & Policy
Cloudpath | Edge solutions

AI & Analytics
RUCKUS AI

Unified
Management & Assurance

Flexible
Subscriptions



RUCKUS 全系列解决方案

Software & SaaS

Security & Policy

Cloudpath

Network Intelligence

RUCKUS AI

Location

SPoT

Tools for partners

Intangi / Yagna

Control & Management

Physical Appliance

SmartZone
ZoneDirector

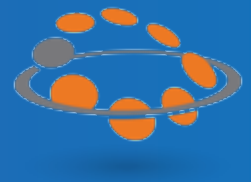
Virtual Appliance

SmartZone

Cloud-managed

RUCKUS ONE Converged

Controllerless



RUCKUS Unleashed

IoT Controller

IoT Suite

Switches

Access

ICX 8100

ICX 8200

Aggregation

ICX 7550

Core

ICX 7850

Access Points

Outdoor

T Series

Indoor

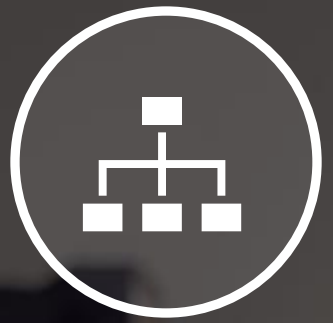
R Series

Specialty

H Series

AI專家輔助您翻轉成主動管理式網路

網路所產生的資料



- 計數器、績效指標、事件以及執行
- 透過API串流傳送

資料、事件、組態處理

- 機器學習資料基準線
- 透過大數據擷取、索引、聚合、儲存

機器智能

整體異常檢測

獨家機器學習演算法

複雜的洞察邏輯

持續變化分析

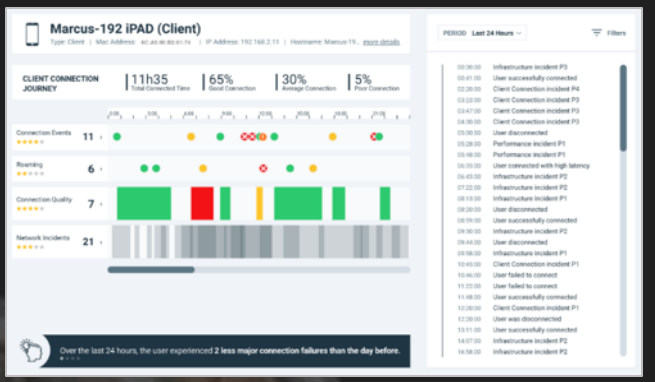
主動可視

- 全時人工智能助理
- 根據用戶影響對事件自動分類
- 依需求通知

RUCKUS AI 功能特色

網路健康狀態

事件等級分類



故障排除

Switch Function：

- **VLAN 錯誤偵測**
- **High Switch Memory Utilization 偵測**
- **PoE 狀態**

報表、儀錶板、資料瀏覽

網路拓樸結構

RUCKUS One – 獨一無二的價值主張

1
單一管理介面

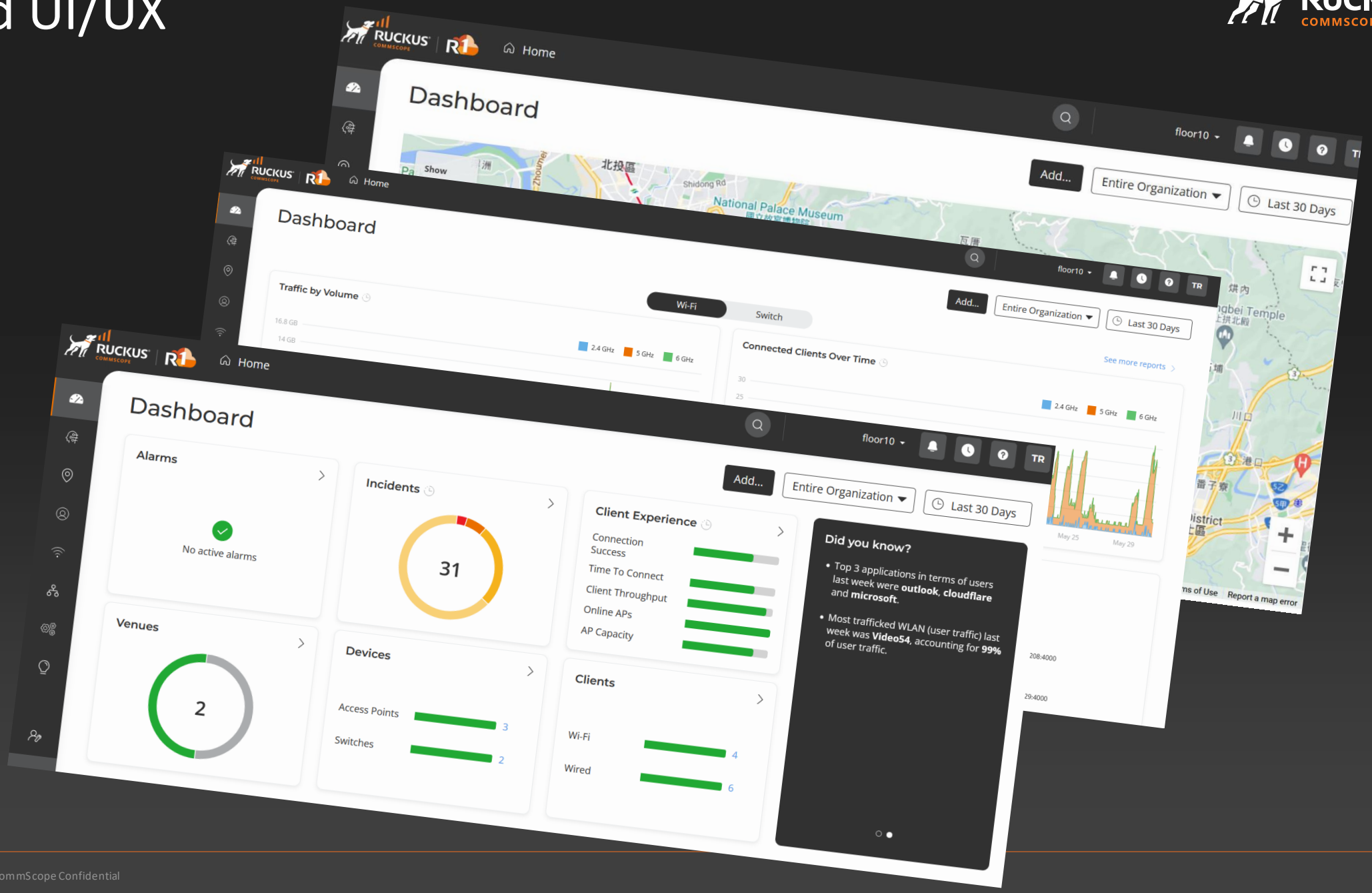
2
高效率

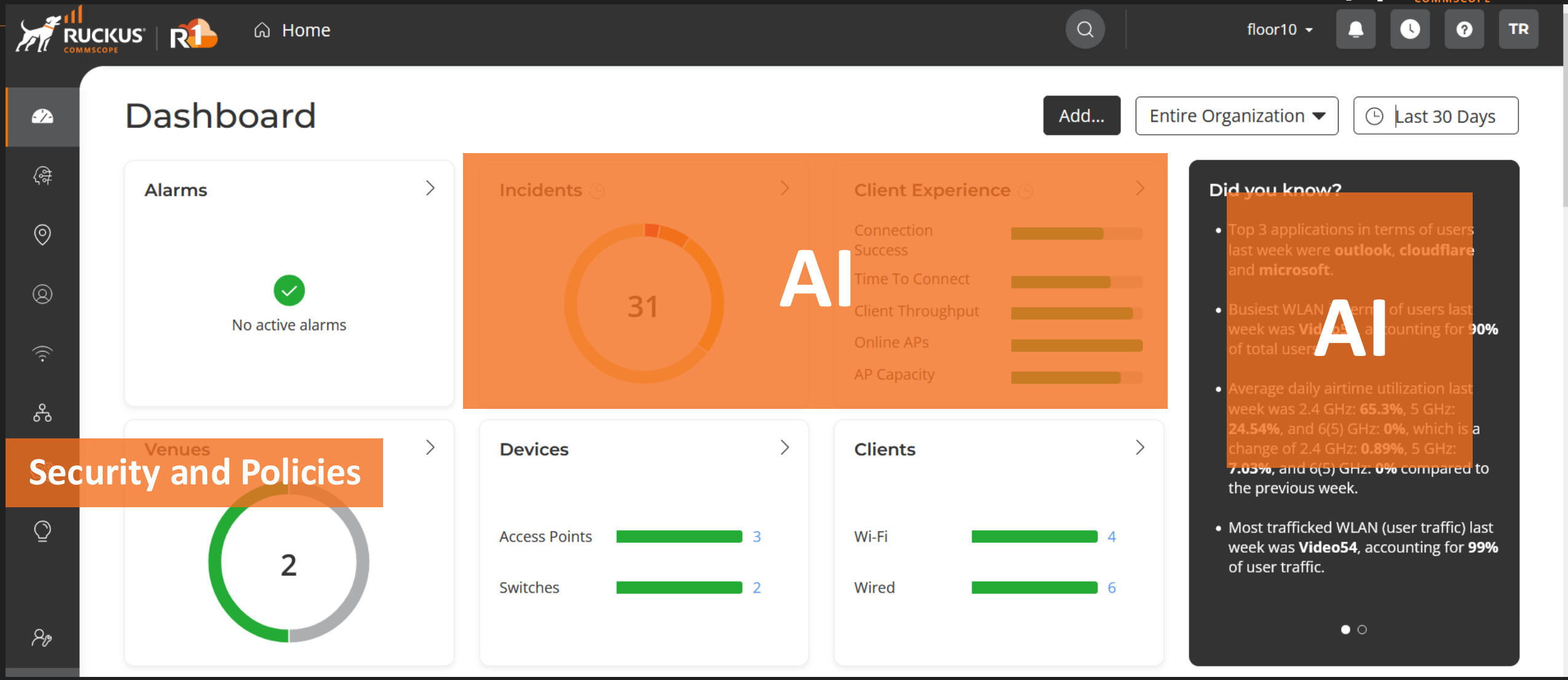
3
簡單的授權機制

4
彈性架構

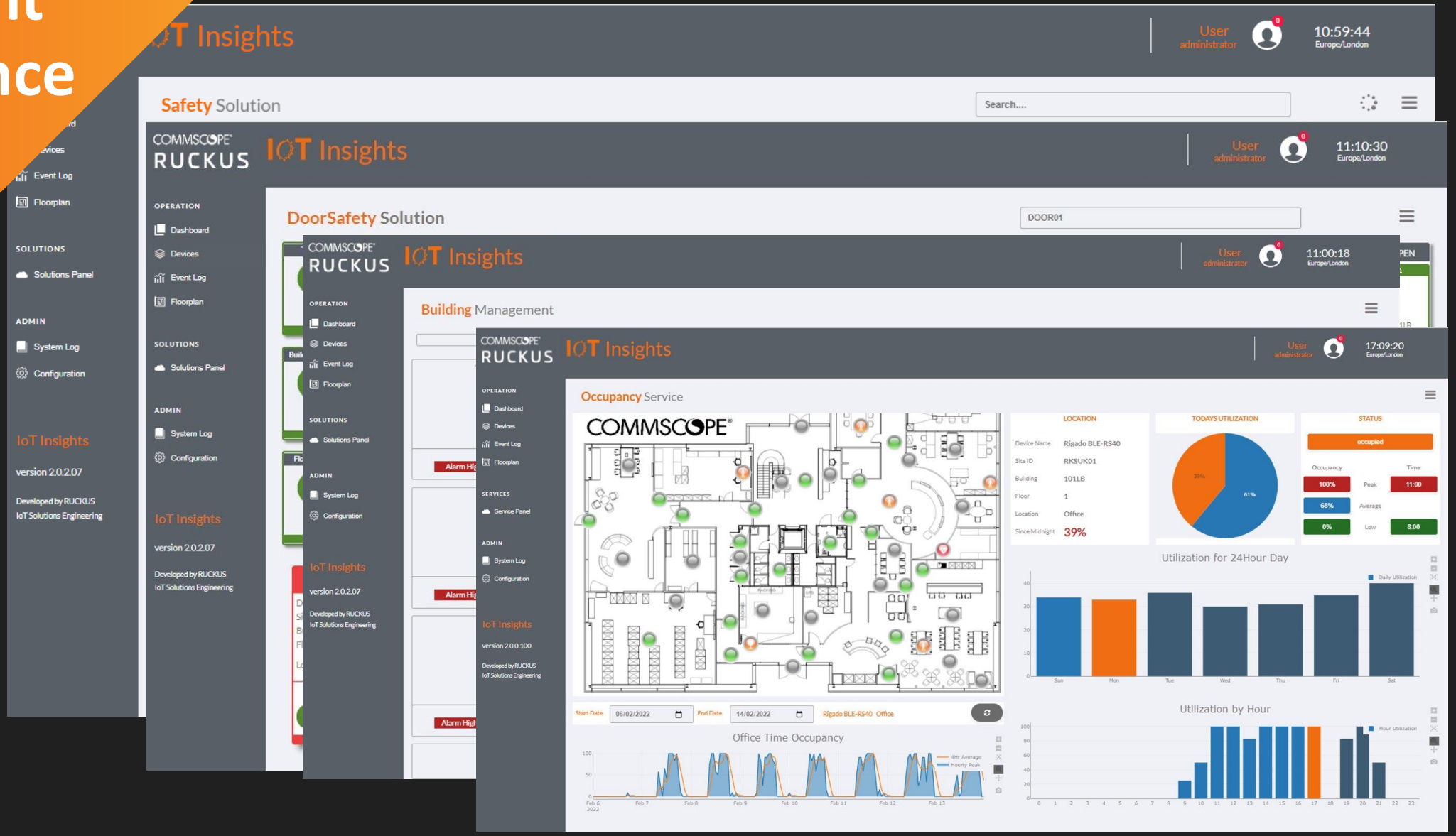
5
容易擴充

Unified UI/UX




RUCKUS COMMSCOPE
R1
Home
floor10
TR
Dashboard
Add...
Entire Organization
Last 30 Days
Alarms
No active alarms
Incidents
31
AI
Client Experience
Connection Success
Time To Connect
Client Throughput
Online APs
AP Capacity
Did you know?
Top 3 applications in terms of users last week were outlook, cloudflare and microsoft.
Busiest WLAN ... of users last week was Vid... accounting for ...0% of total users.
AI
Average daily airtime utilization last week was 2.4 GHz: 65.3%, 5 GHz: 24.54%, and 6(5) GHz: 0%, which is a change of 2.4 GHz: 0.89%, 5 GHz: 7.03%, and 6(5) GHz: 0% compared to the previous week.
Most trafficked WLAN (user traffic) last week was Video54, accounting for 99% of user traffic.
Venues
2
Devices
Access Points 3
Switches 2
Clients
Wi-Fi 4
Wired 6
Security and Policies

IoT Management and Assurance



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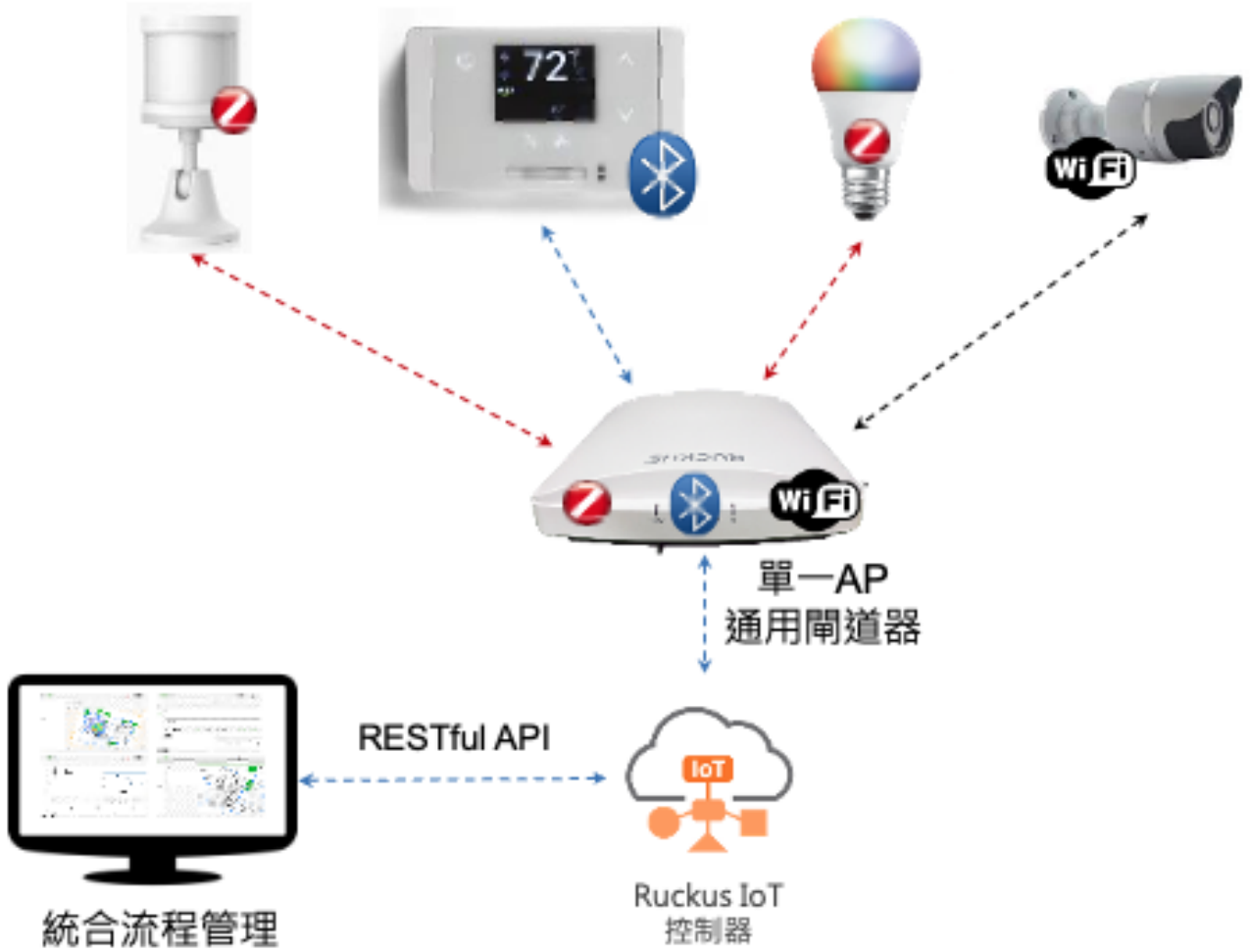
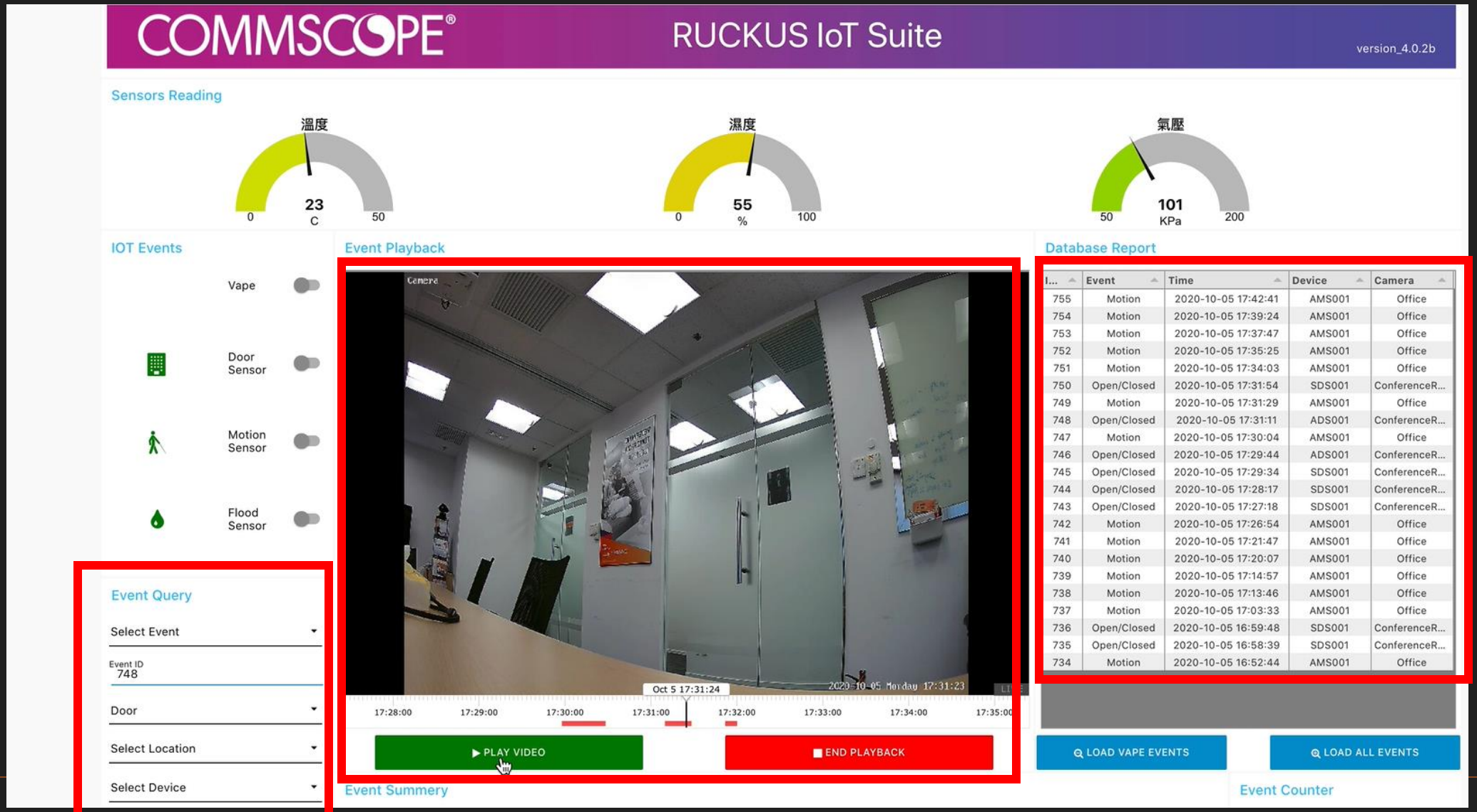
Ruckus IoT整合架構簡化網路

- AP 同時支援WiFi + IoT
- 單一通用閘道器，連接各廠商IoT設備
- 減少佈線 = 減少交換器數量
- 統合管理，整合容易
- 節省總體持有成本

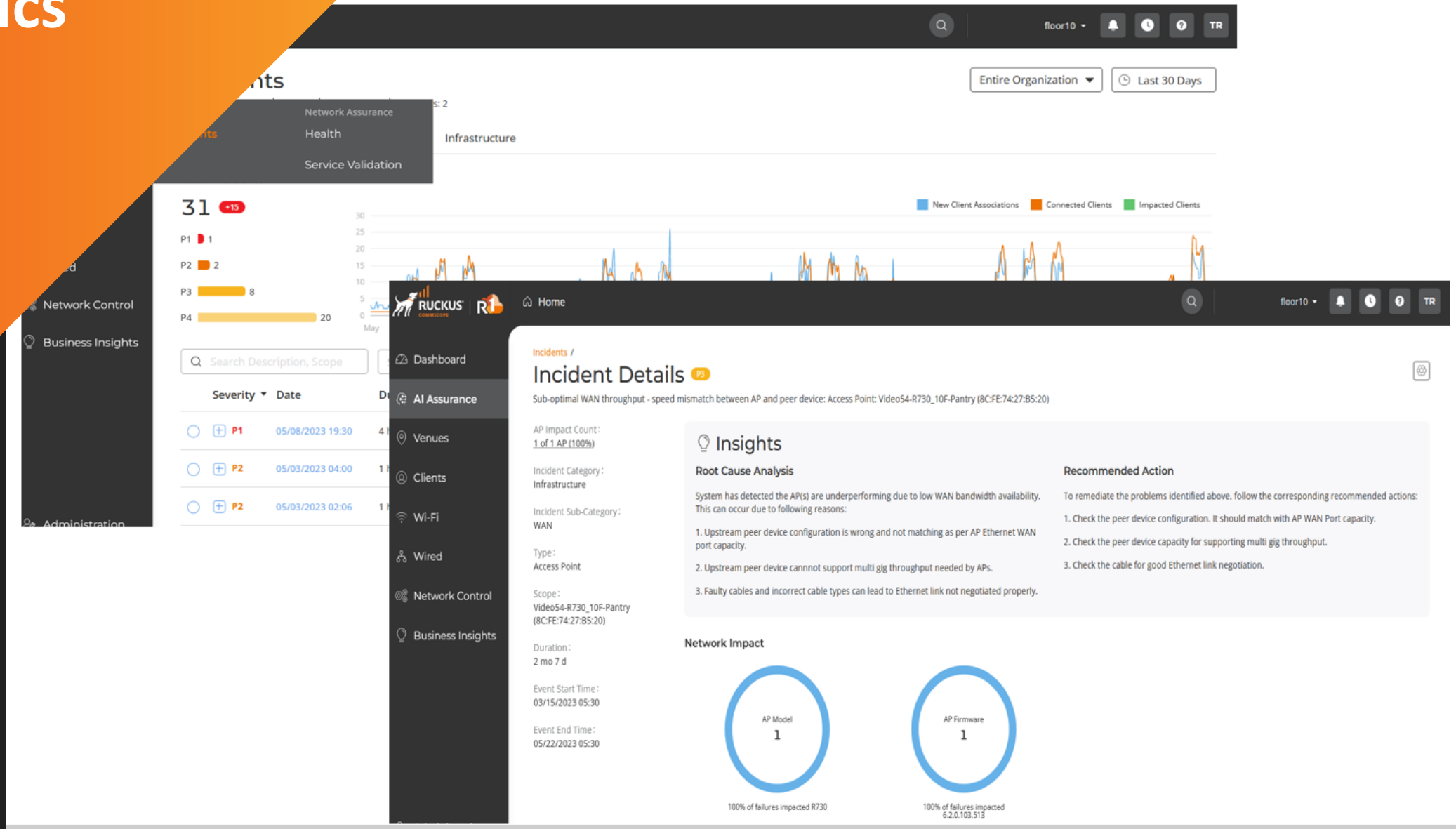


安全監控環境-事件與規則引擎整合

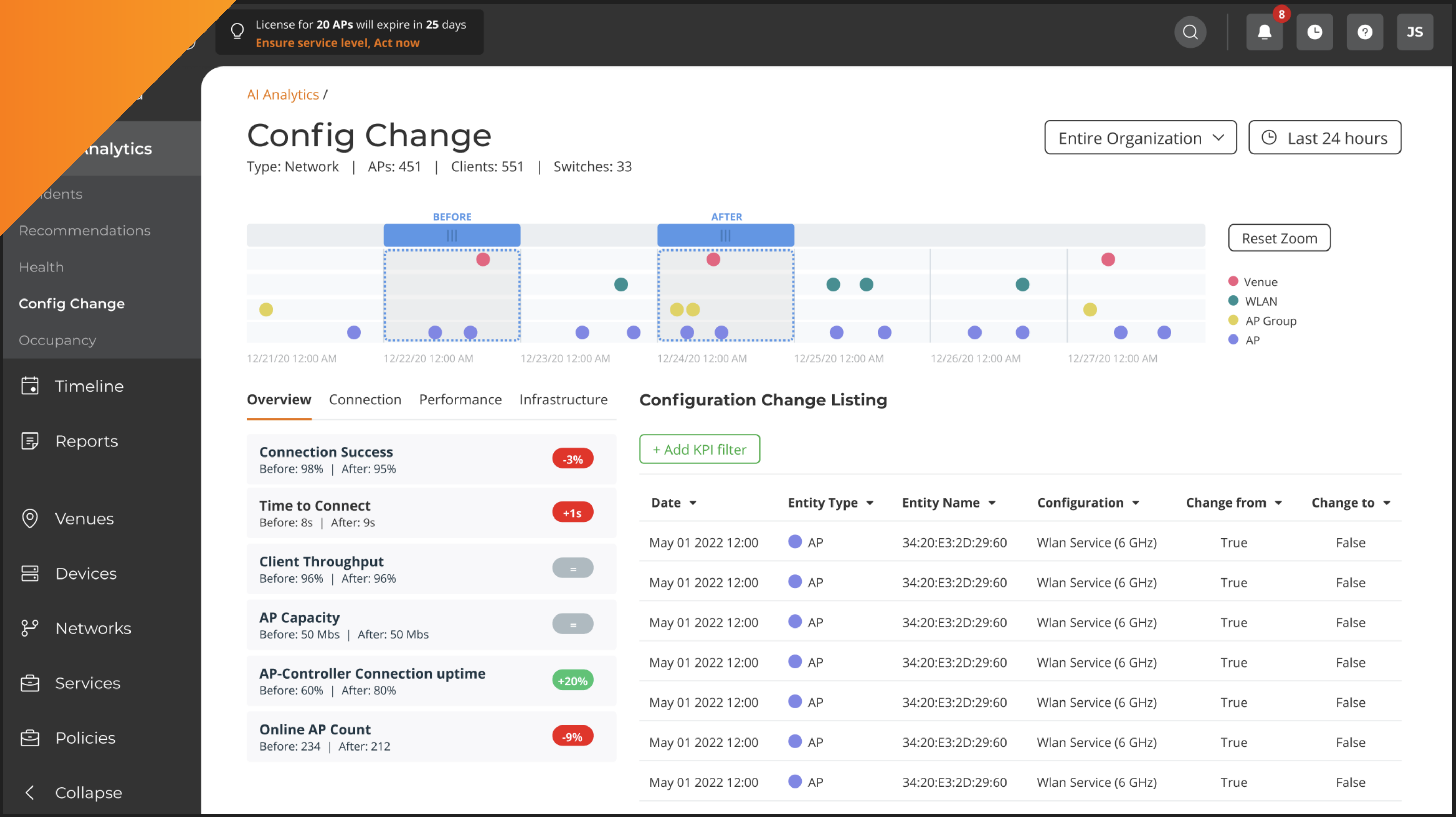
傳感器事件與監視器連動整合記錄



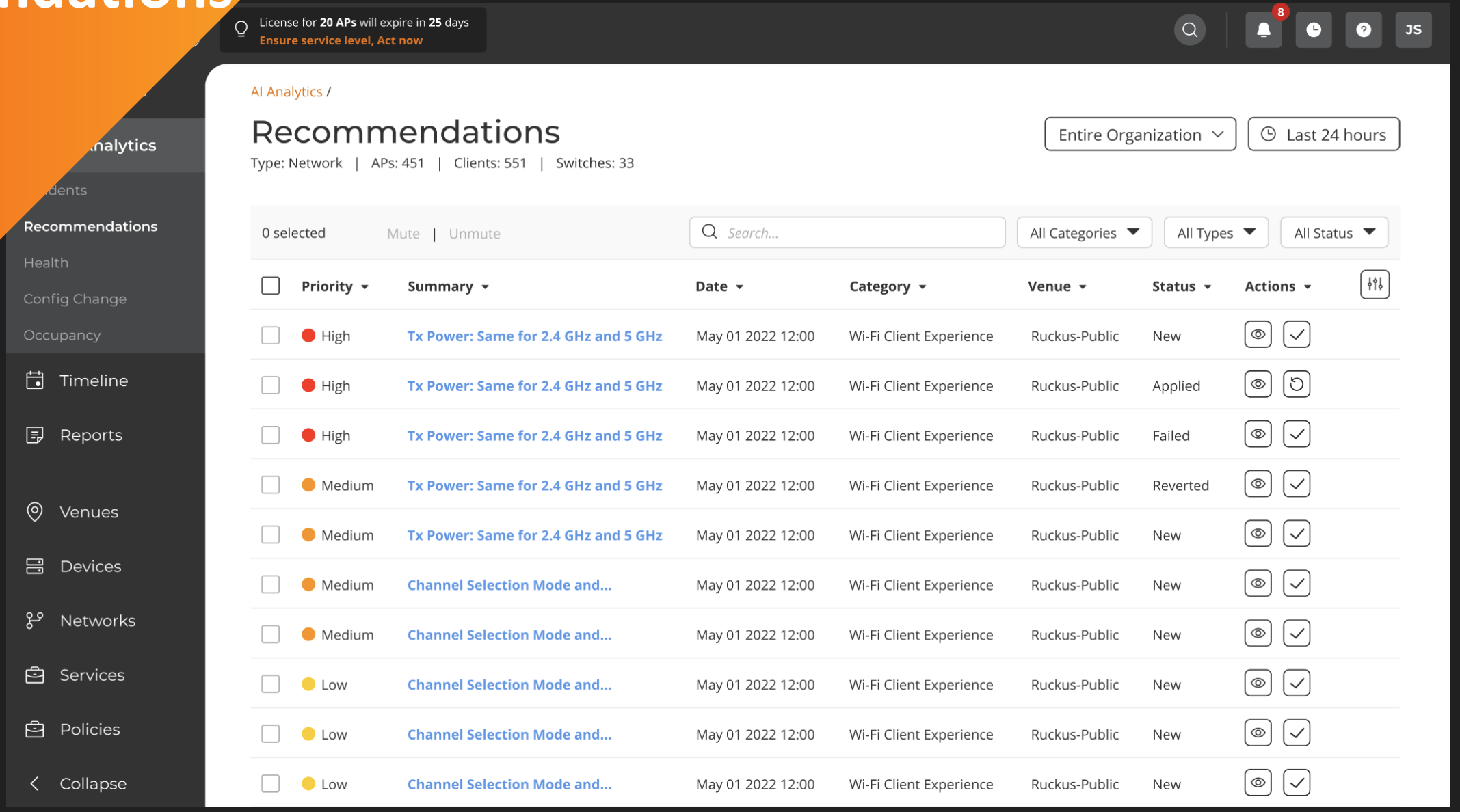
Incident Analytics



Configuration Change Analysis



AI Recommendations



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AI Recommendations

License for **20 APs** will expire in **25** days
Ensure service level, Act now

8 JS

- Analytics
  - Incidents
  - Recommendations
  - Health
  - Config Change
  - Occupancy
- Timeline
- Reports
- Venues
- Devices
- Networks
- Services
- Policies
- Collapse

AI Analytics / Recommendations /

Tx Power: Same for 2.4 GHz and 5 GHz

Mute Apply

Priority
High

Date
May 01 2022 12:00

Category
Wi-Fi Client Experience

Venue
Ruckus-Public

Status
New

Recommendation Details

2.4 GHz TX Power Adjustment

Current Configuration	**Full**
Recommended Configuration	**-1dB**

What is the recommendation?

Venue: Ruckus-Public is configured with the same transmit power on both 2.4 GHz and 5 Ghz. Reducing the transmit power on 2.4 GHz will reduce co-channel interference and encourage clients to use 5 GHz.

Why is the recommendation?

Encourages client association to 5 GHz and reduces co-channel interference.

What is the potential trade-off?

2.4 GHz clients at the edge of Wi-Fi coverage may receive poor signal or lose connectivity.

Key Performance Indications

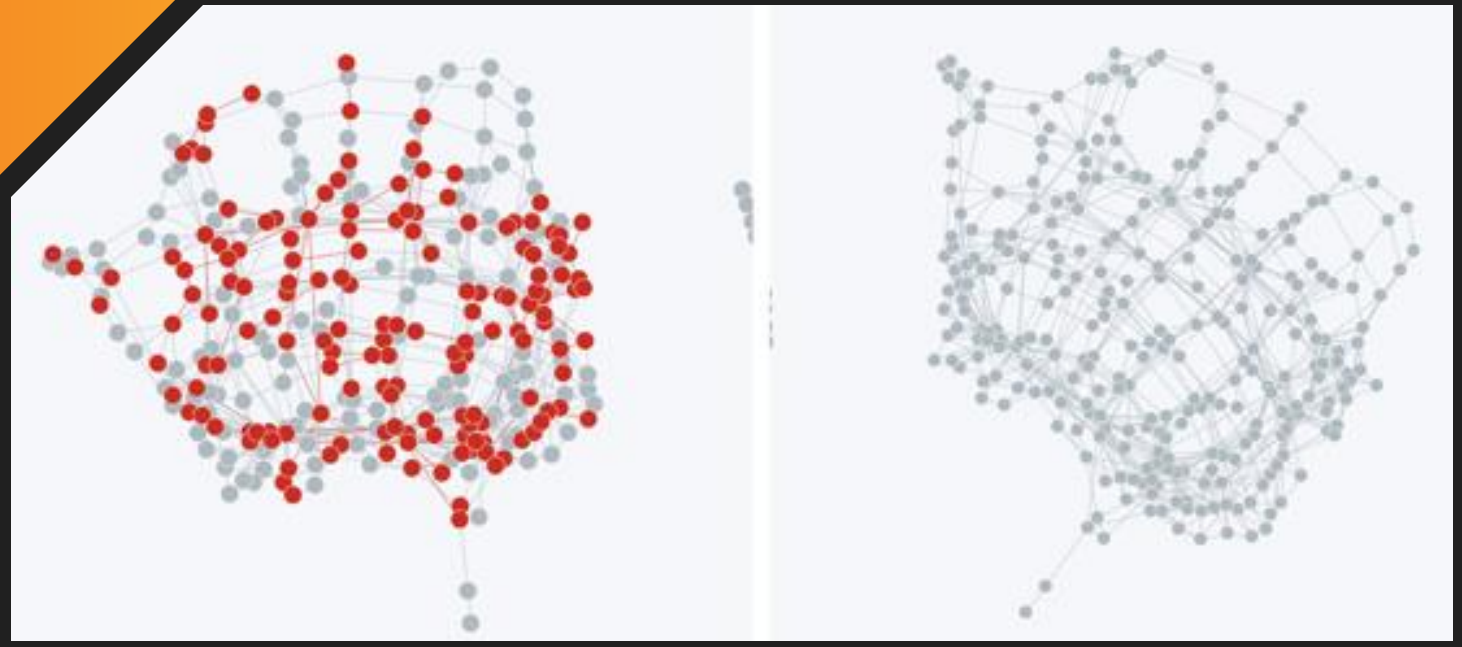
Co-channel Interference
9.12%

Session time on 2.4 GHz
64.13%

Status Trail

Jul 27 2021 04:00	New
Jul 28 2021 22:00	Apply Trigger
Jul 28 2021 22:01	Applied
Jul 20 2021 21:00	Revert Trigger
Jul 20 2021 21:01	Reverted

AI-Driven Cloud RRM



Greater AP Capacity

Higher client throughput

Lower Airtime Utilization

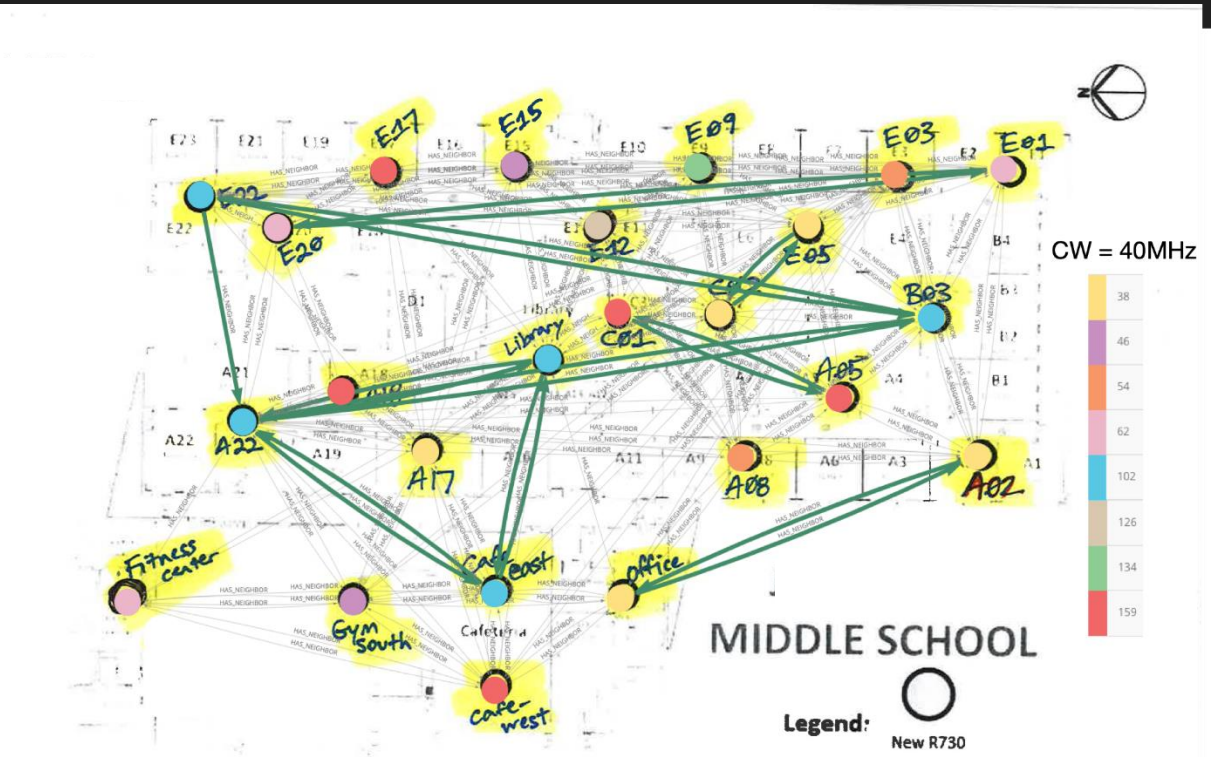
Higher Reliability

Operate APs at **MAX** capability

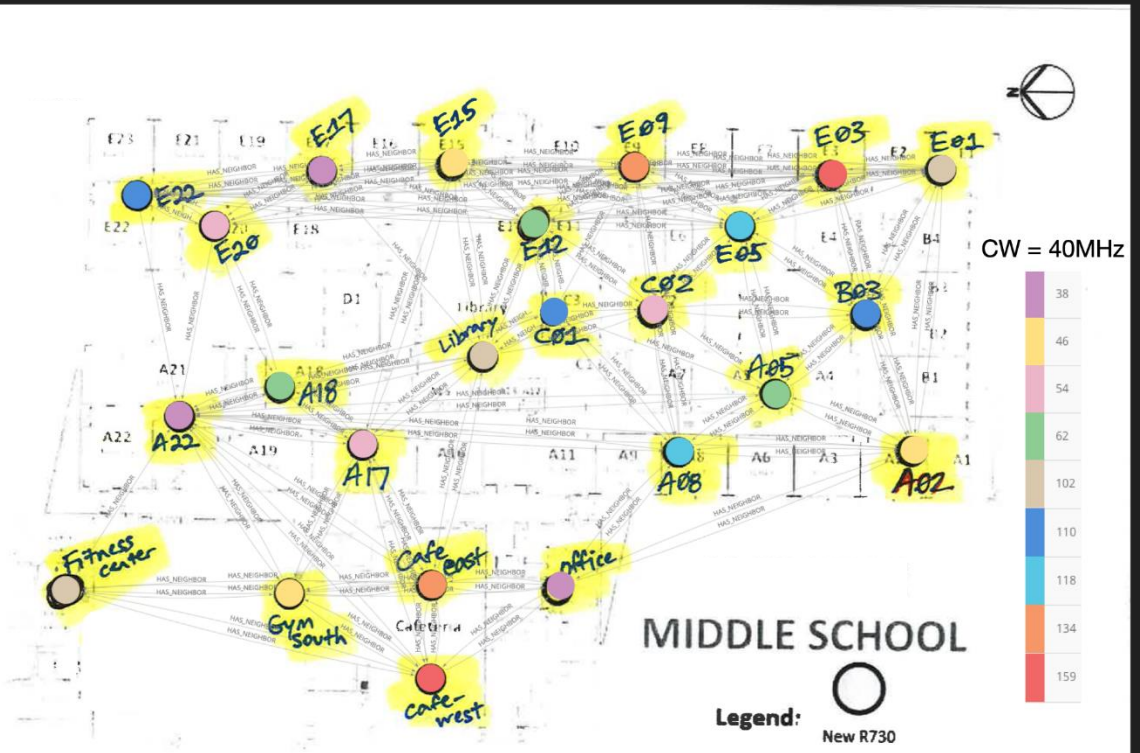
Proactive, Network Performance Optimization

Biggest advancement in Radio Management since BeamFlex!

學校無線網路案例



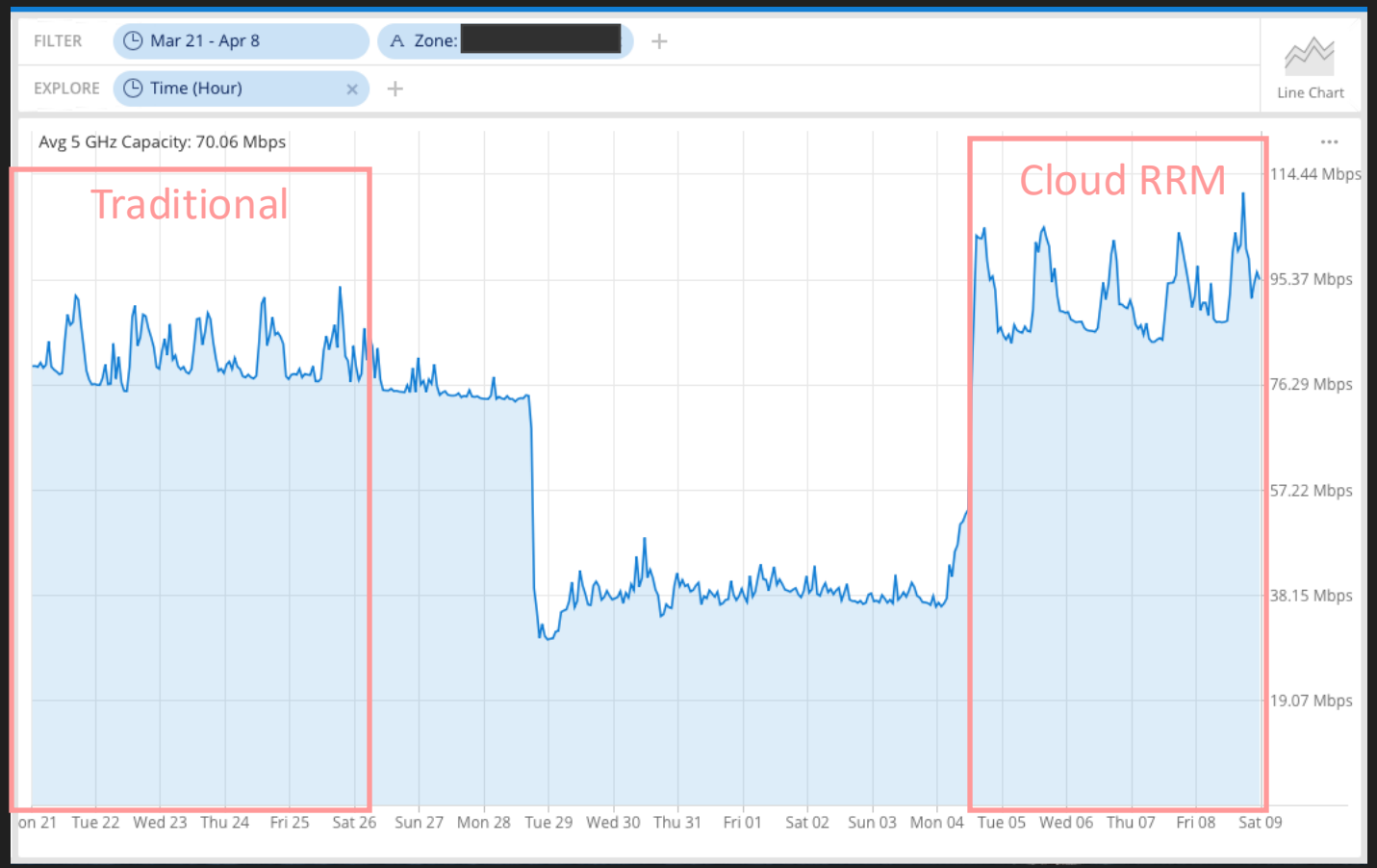
Before, CCIR = 9.39 %



AI-Driven Cloud RRM, CCIR = 0 %

CCIR= Co-Channel Interference Ratio

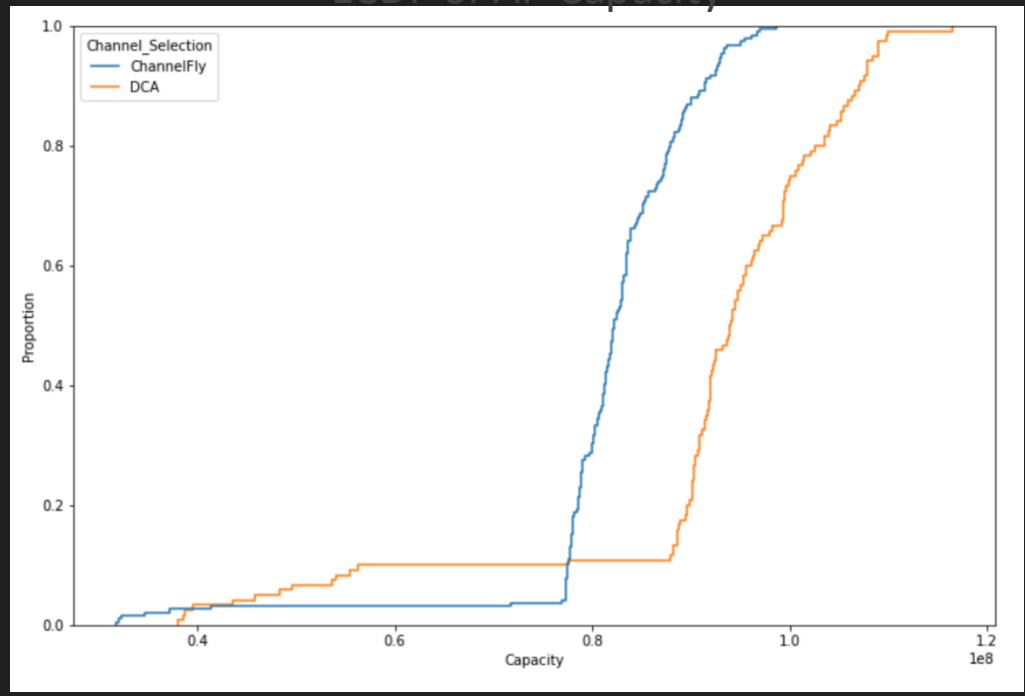
AP Capacity: 18% Boost From AI-Driven Cloud RRM



AP Capacity

	Traditional	Cloud RRM	Improvement
Average	85.11Mbps	91.68Mbps	7.72%
Max	98.68Mbps	116.58Mbps	18.14%

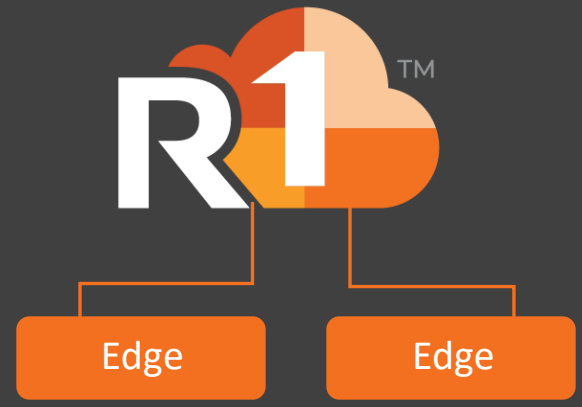
ECDF of AP Capacity



Flexible Deployment Options

Pure Cloud

Hybrid

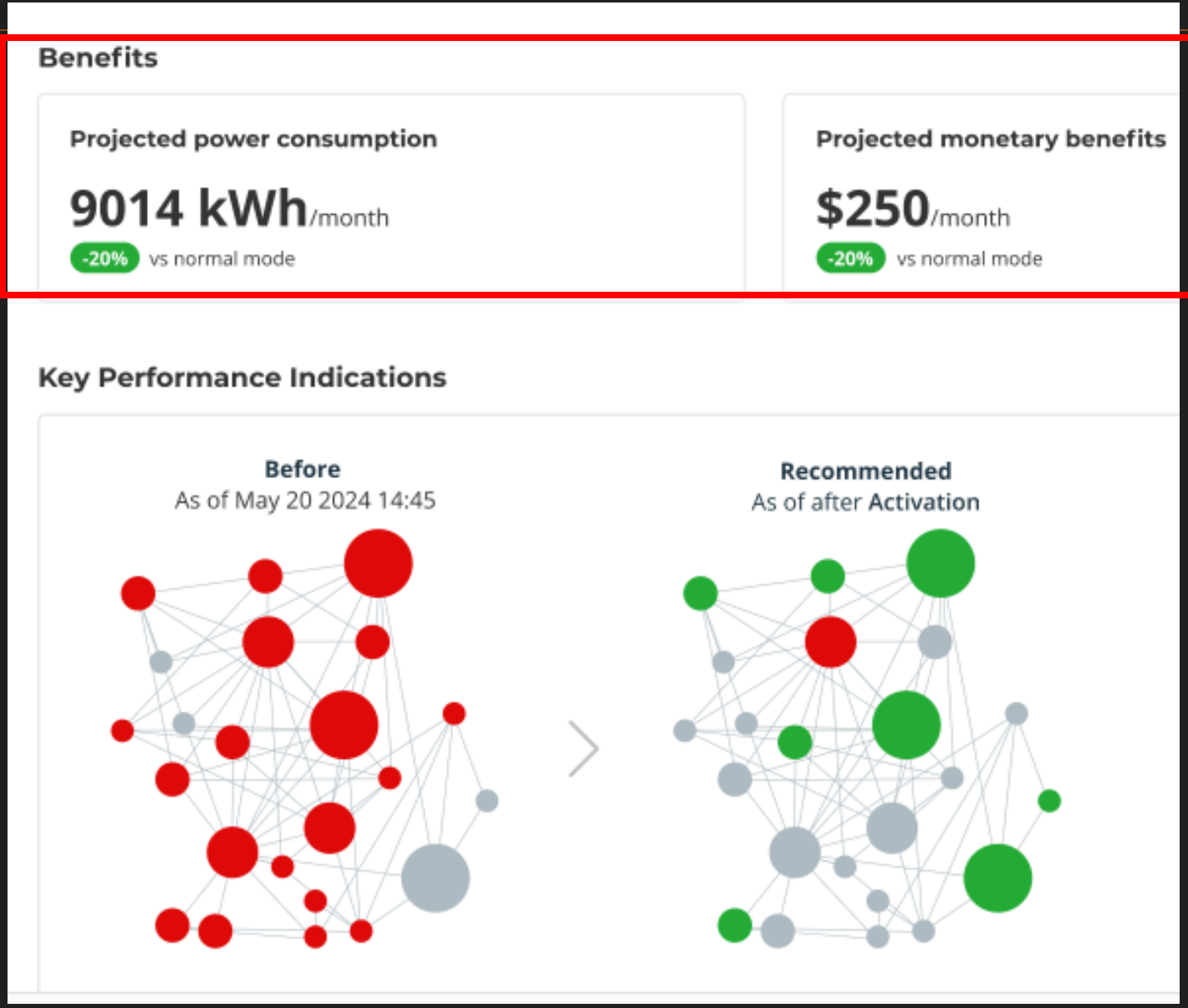


ESG 節能控管

大數據分析 結合智慧能源管理

EcoFlexAI : 節能 or 極重要 Mission Critical

- ESG – Green networking
- **EcoFlexAI** 節能和永續發展的一步 (Sustainability)
- **Energy Efficiency:**
- 根據網路流量動態調整用電量，顯著降低低活動時段的能耗
- **Cost Savings:** 透過減少網路設備的能耗來降低營運費用



Indoor 2 x 2 AP 比較表(500 x AP + 3年使用)

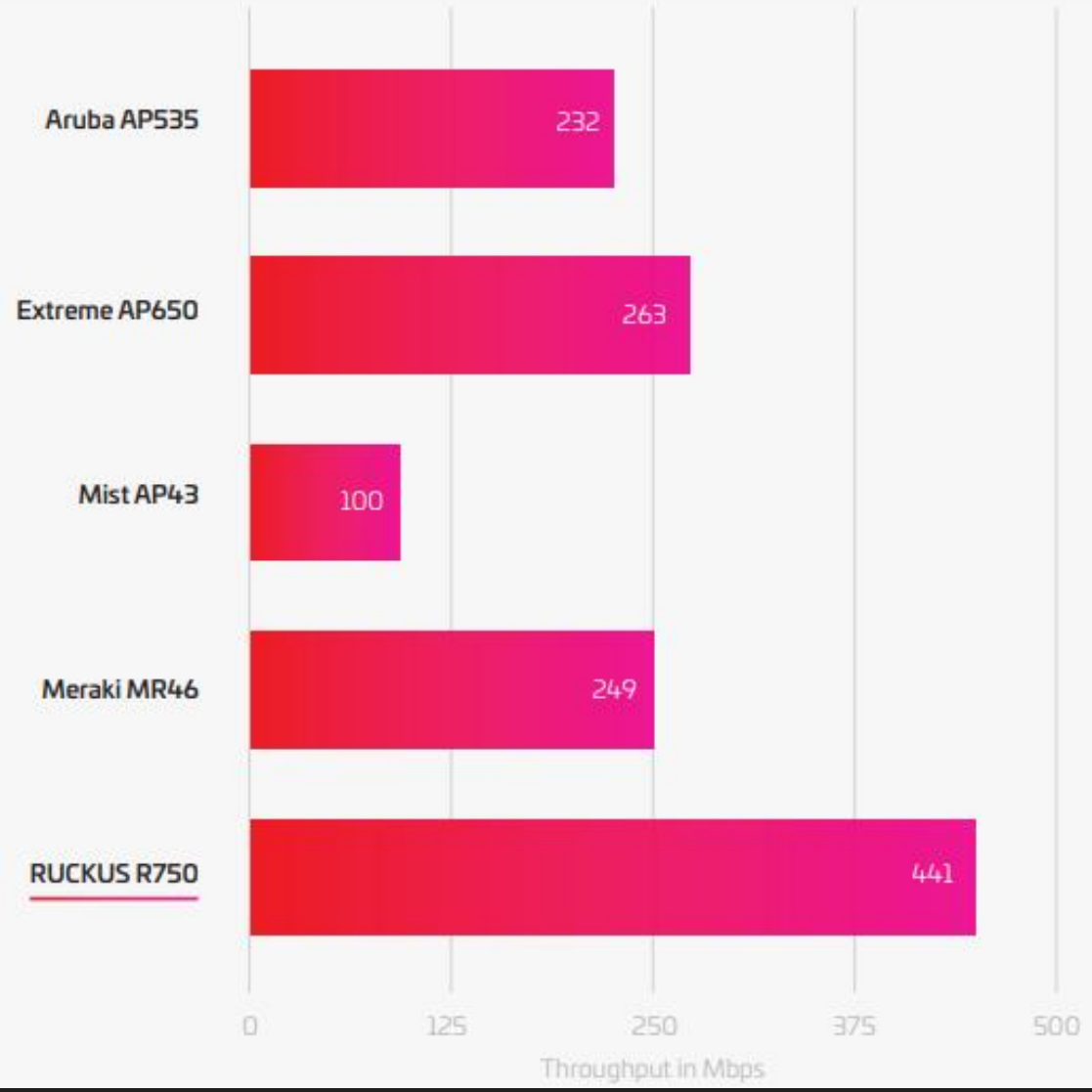
	RUCKUS R350	友商A	友商E
Minimum POE	9.07	13.5	12
Average Idle Minimum	7.1	6.2	-
Maximum POE	12.62	16.5	15
最少 AP 耗電量/Hour	0.00907	0.0135	0.012
最少 AP 耗電量/Day			0.288
最少 AP 耗電量/Year			105.12
最大 AP 耗電量/Hour			0.015
最大 AP 耗電量/Day	0.30288	0.396	0.36
最大 AP 耗電量/Year	110.5512	144.54	131.4

節省 15% - 23%

優秀的傳輸速率

Network throughput

Throughput is a measure of the aggregate data traffic flowing between the AP and all of the clients in the network. A higher number is better, as it indicates that the AP can accommodate more users, devices and applications.



RUCKUS 地端 + 雲端 讓您達成數位韌性

Hardware

Wi-Fi 7& ICX

AI-Driven Software

RUCKUS Intelligent Net

(training in the cloud)

- BeamFlex+ | ChannelFly
- WiFi 7
- Auth
- Forwarding

- AI-driven RRM
- Intent AI
- ESG AI
- Assurance AI

AI Driven 校園數位韌性

RUCKUS®
COMMSCOPE

Thank You