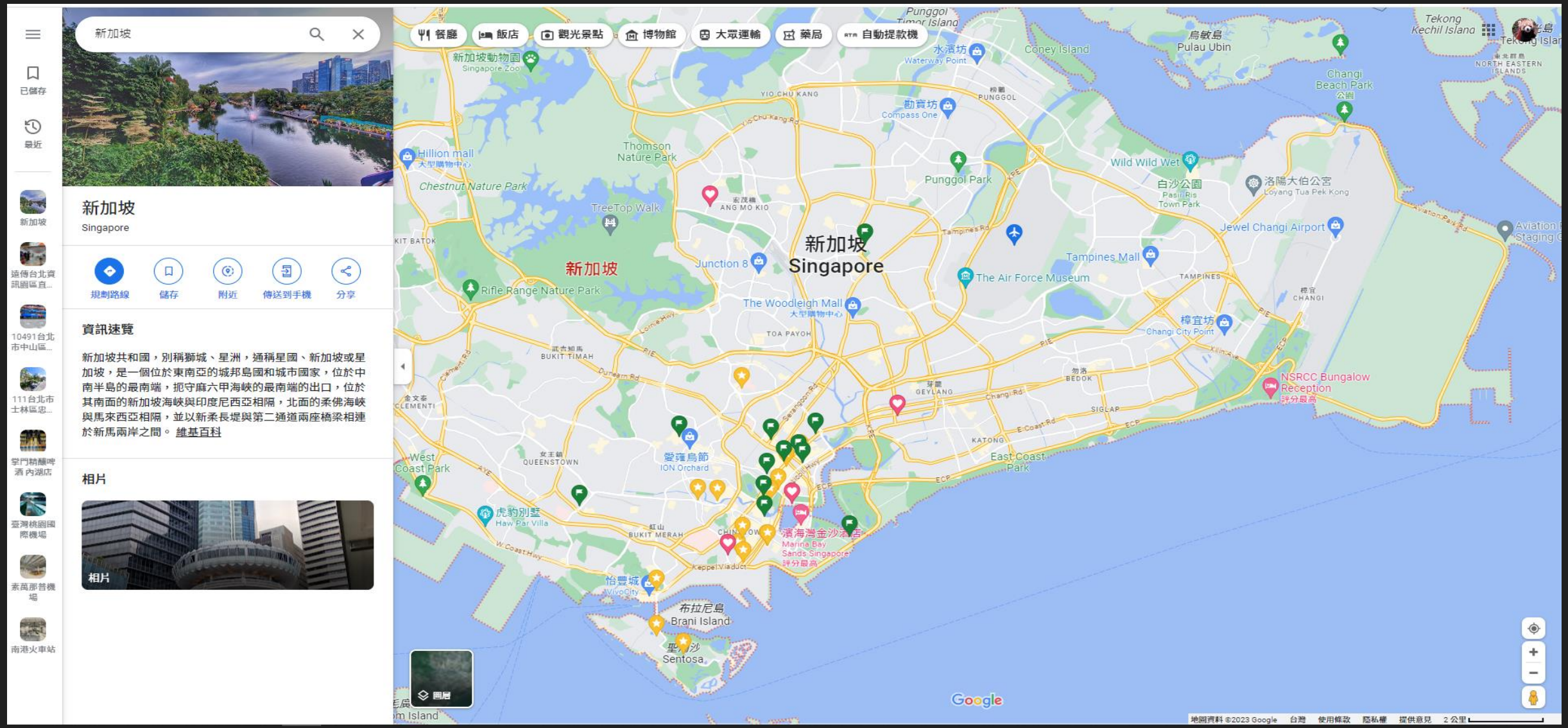
RUCKUS®
COMMSCOPE

用AI打造成功的新世代網路

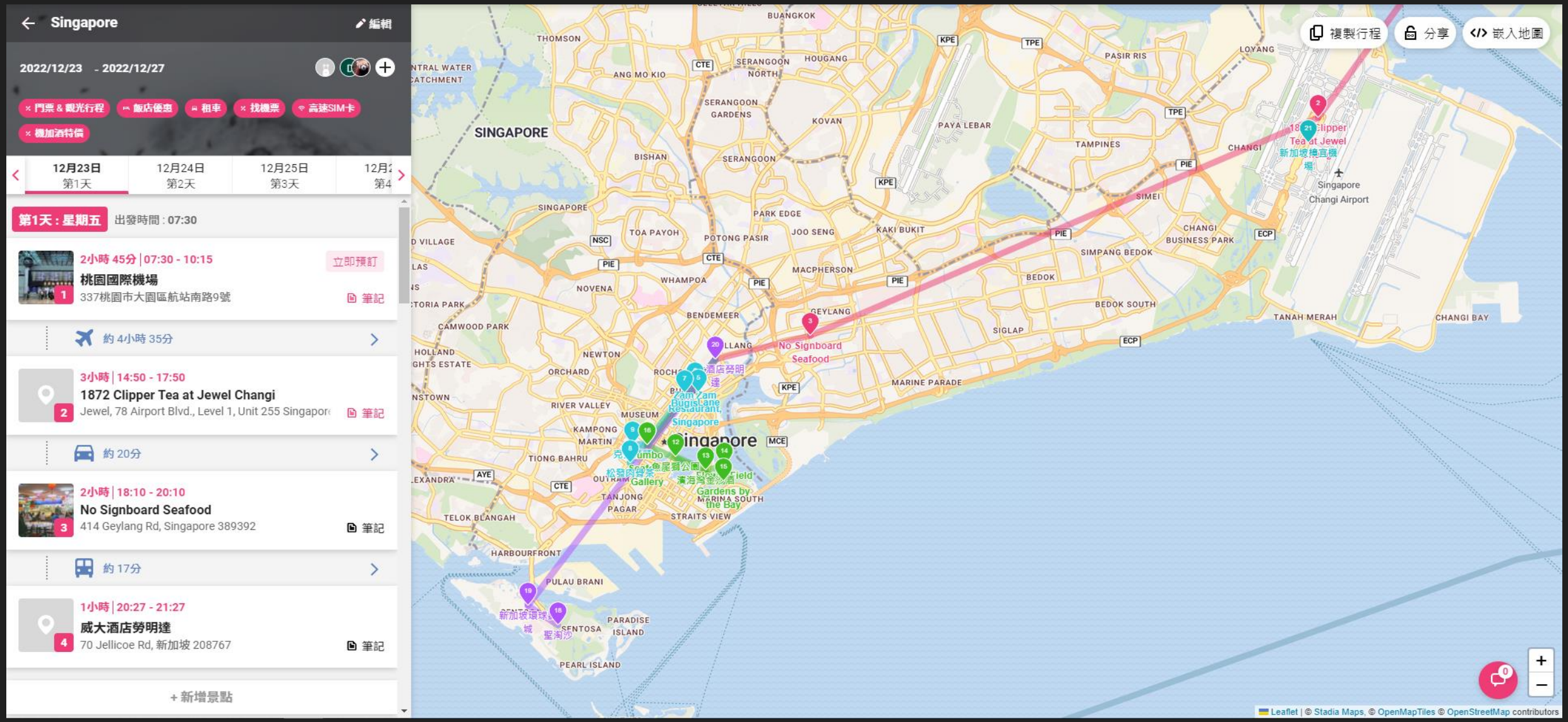
08182023

Kevin Su
Technical Consultant

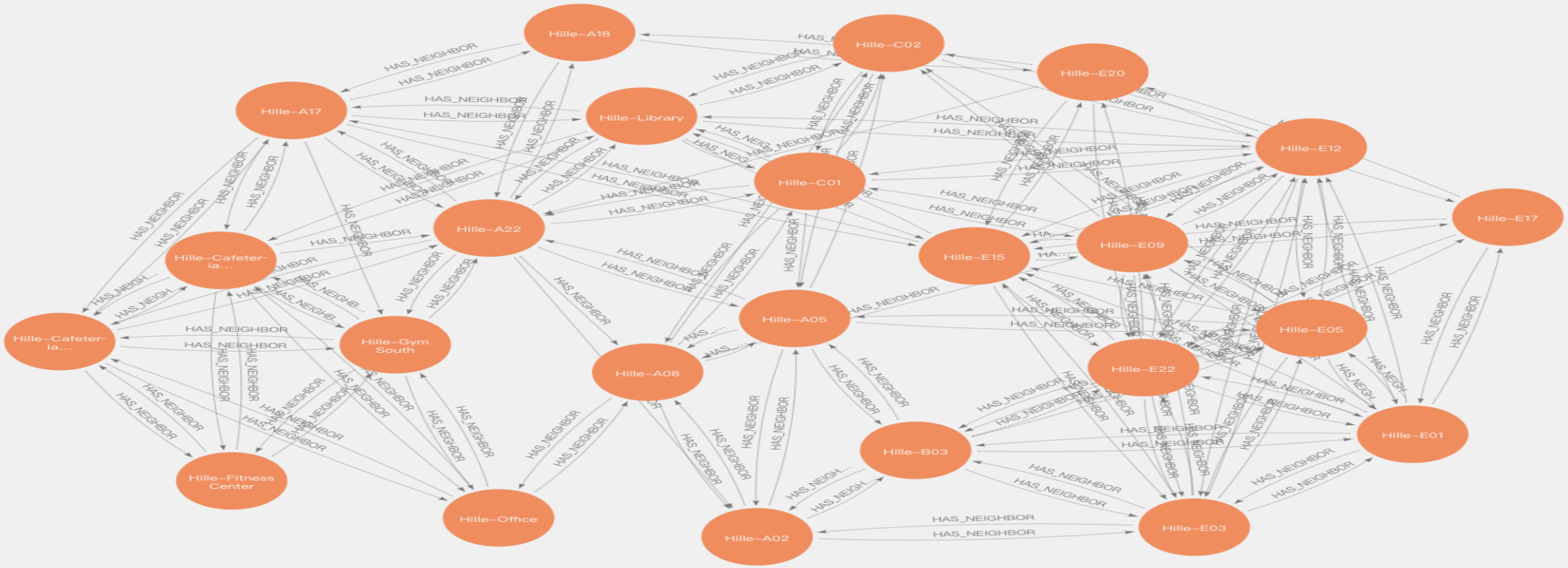
訂定家庭旅遊計畫


新加坡
已儲存
最近
新加坡
Singapore
規劃路線
儲存
附近
傳送到手機
分享
資訊速覽
新加坡共和國，別稱獅城、星洲，通稱星國、新加坡或星加坡，是一個位於東南亞的城邦島國和城市國家，位於中南半島的最南端，扼守麻六甲海峽的最南端的出口，位於其南面的新加坡海峽與印度尼西亞相隔，北面的柔佛海峽與馬來西亞相隔，並以新柔長堤與第二通道兩座橋梁相連於新馬兩岸之間。 維基百科
相片
相片
餐廳
飯店
觀光景點
博物館
大眾運輸
藥局
自動提款機
新加坡動物園
Singapore Zoo
Hillion mall
Chestnut Nature Park
Thomson Nature Park
TreeTop Walk
Rifle Range Nature Park
新加坡
Junction 8
新加坡
Singapore
The Woodleigh Mall
Punggol Park
Coney Island
Pulau Ubin
Wild Wild Wet
Tampines Mall
The Air Force Museum
Jewel Changi Airport
Changi Beach Park
NSRCC Bungalow Reception
East Coast Park
West Coast Park
Marina Bay Sands Singapore
Brani Island
Sentosa
Google

透過線條取代點找出最佳旅遊路徑



透過Graph AI來解決惱人的無線網路問題



Wi-Fi Graph AI的依據

使用豐富的數學工具、技術和演算法，對網路進行定向測量和優化

- **中心性指標 (Google PageRank)**：根據各種定義評估網路中各個 AP 的重要性，例如，受到最大干擾的 AP 或位於最多漫遊路徑中間的 AP。
- **整合性指標**：衡量 AP 之間如何互連，幫助我們識別整個網路中的漫遊路徑。
- **隔離指標**：量化叢集的存在，識別具有不同 AP 密度的部署區域。
- **彈性指標**：測量部署中出現 AP 故障時網路維持連接的能力，確定存在潛在覆蓋漏洞的區域。

新世代無線的來臨優化頻道愈趨重要

2.4 GHz Channels

60 MHz

Qty	ISM Band			
	Channel	1	6	11
3	Center Freq	2.412	2.437	2.462

5 GHz Channels

500 MHz

Qty	Frequency																									
					DFS Channels				DFS Channels																	
														TDWR												
	Radio Band	U-NII-1				U-NII-2a				U-NII-2c (Extended)												U-NII-3				
	Center Freq	5.180	5.200	5.220	5.240	5.260	5.280	5.300	5.320	5.500	5.520	5.540	5.560	5.580	5.600	5.620	5.640	5.660	5.680	5.700	5.720	5.745	5.765	5.785	5.805	5.825
25	20 MHz	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	144	149	153	157	161	165
11	40 MHz	38		46		54		62		102		110		118		126		134		142		151		159		
5	80 MHz	42				58				106					122			138				155				
2	160 MHz	50								114																

165 was ISM, now U-NII-3

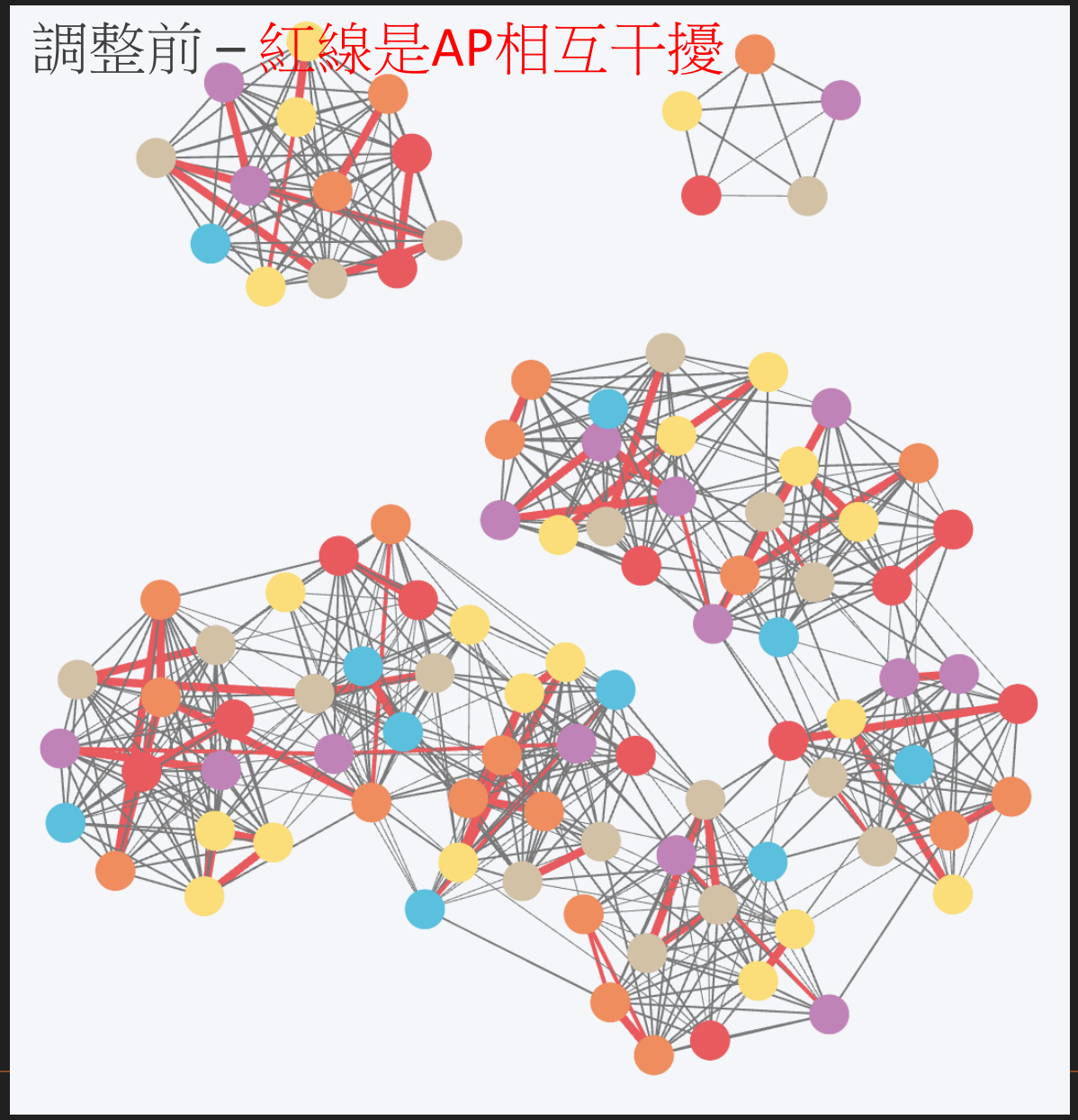
6 GHz Channels

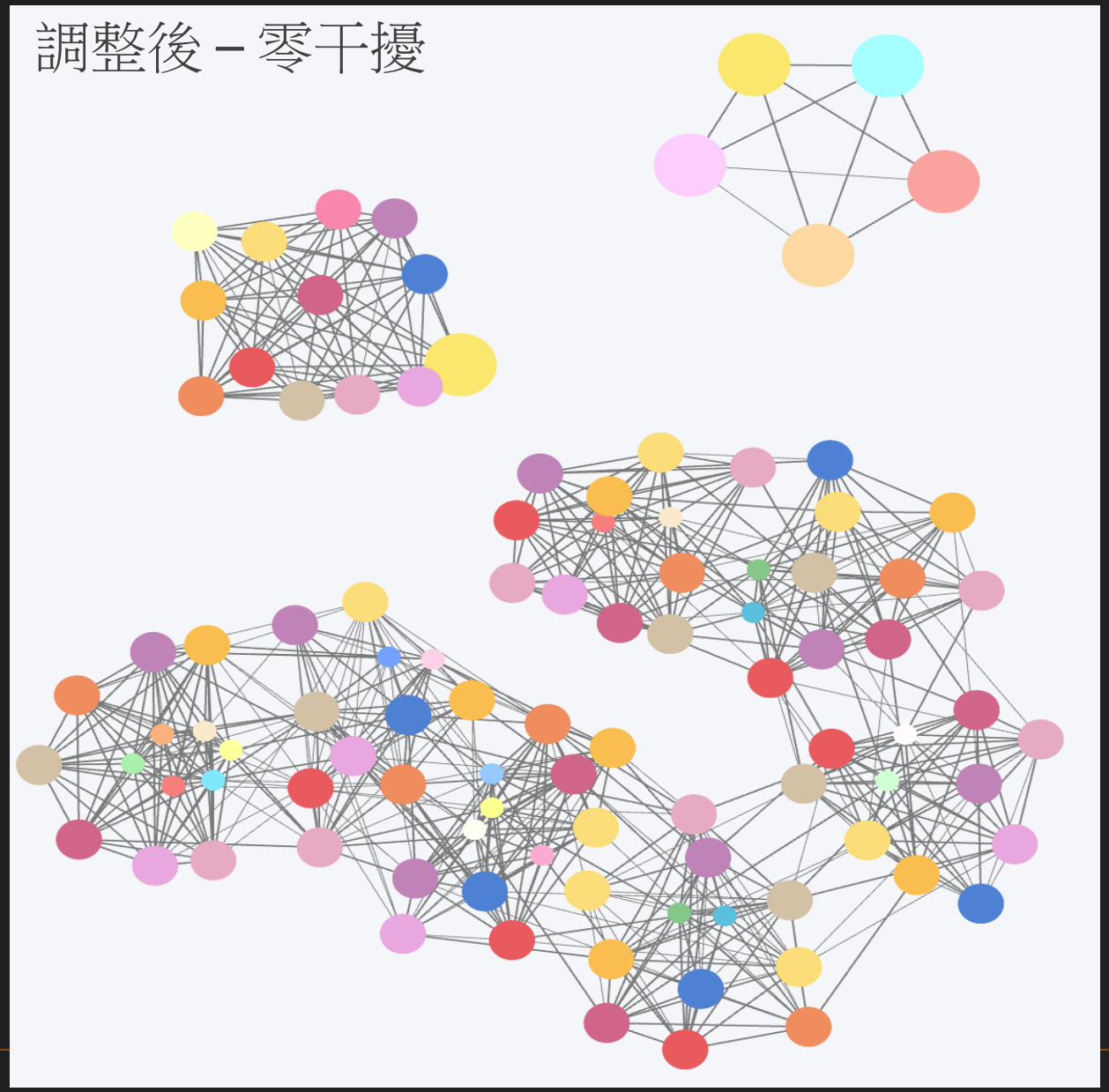
500 MHz

[redacted]

Qty	Low Power Indoor	5925	5dBm/MHz - Net EIRP 18dBM																							
	Radio Band	UNII-5																								
	Center Freq	5.955	5.975	5.995	6.015	6.035	6.055	6.075	6.095	6.115	6.135	6.155	6.175	6.195	6.215	6.235	6.255	6.275	6.295	6.315	6.335	6.355	6.375	6.395	6.415	
24	20 MHz	1	5	9	13	17	21	25	29	33	37	41	45	49	53	57	61	65	69	73	77	81	85	89	93	
12	40 MHz	3		11		19		27		35		43		51		59		67		75		83		91		
6	80 MHz	7				23				39				55				71				87				
3	160 MHz	15								47								79								

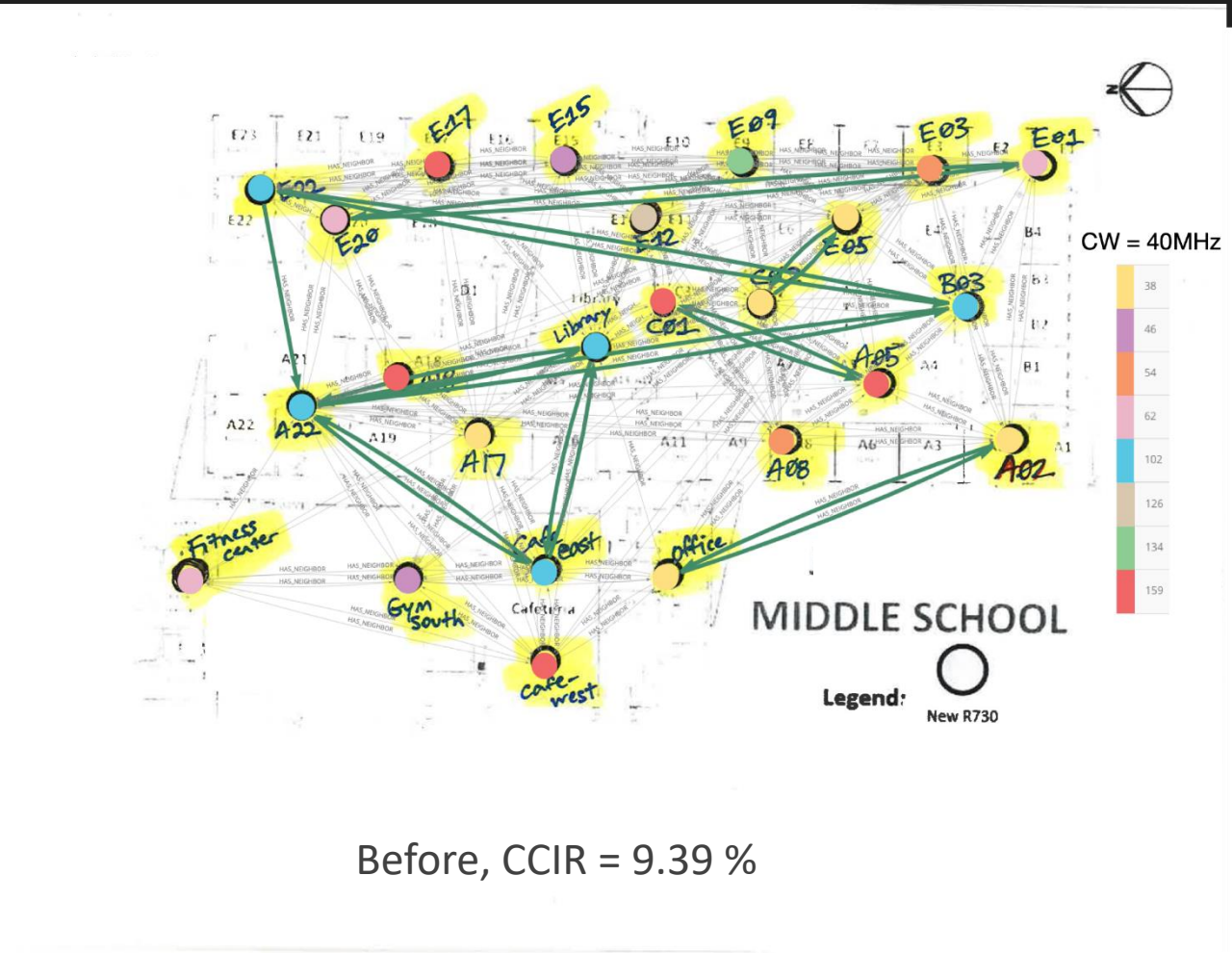
RUCKUS AI-Driven Cloud RRM



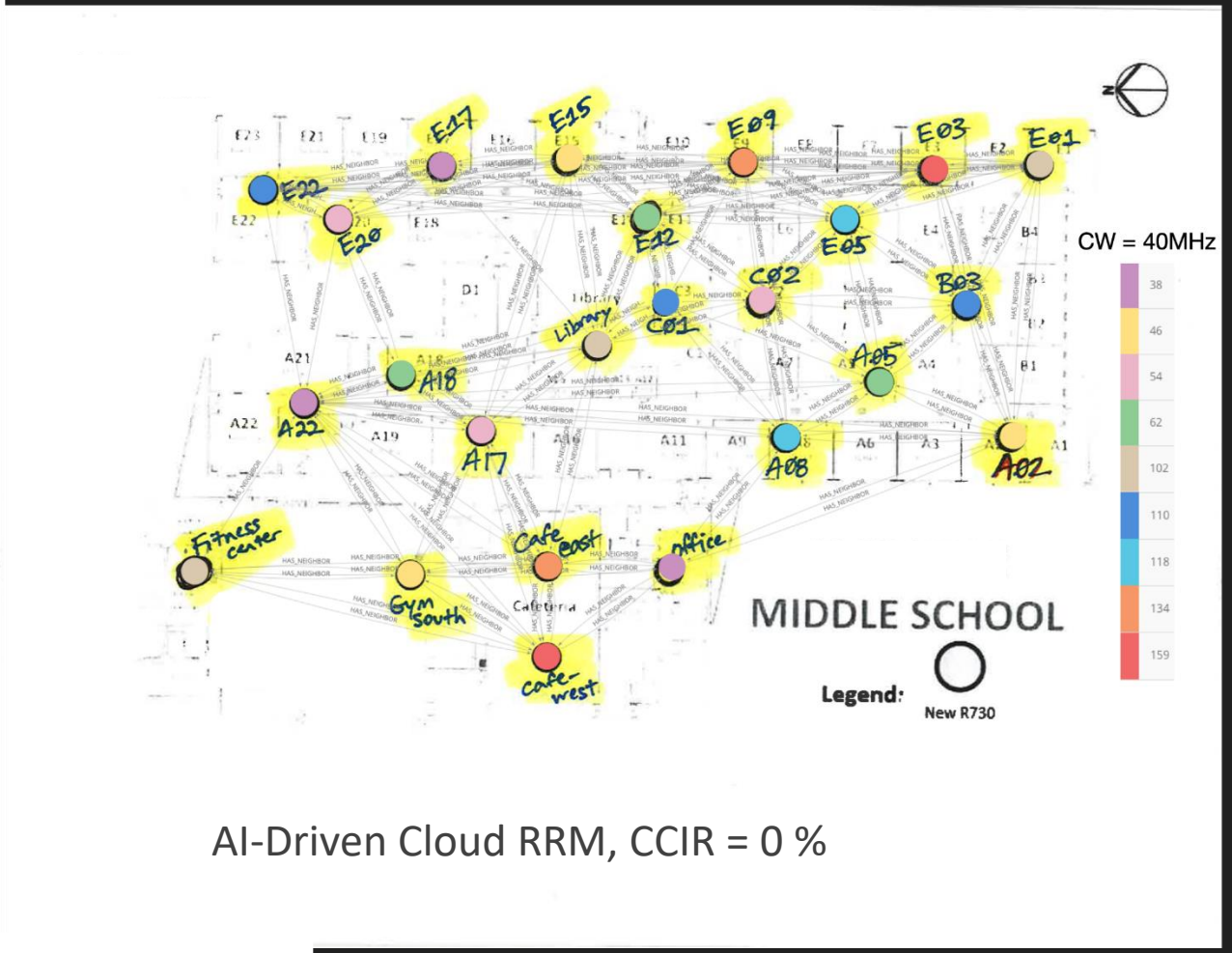


實際案例

學校無線網路案例



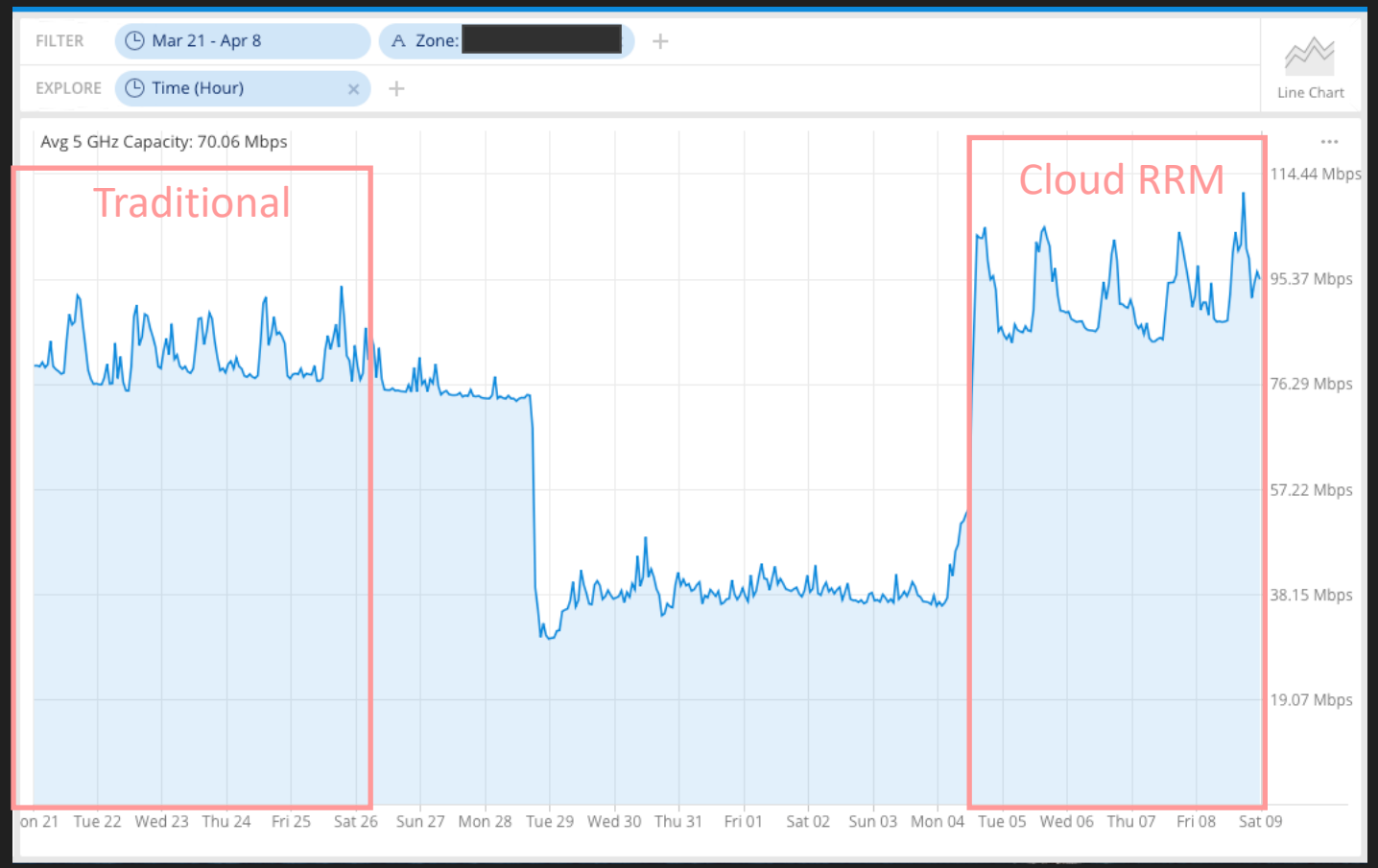
Before, CCIR = 9.39 %



AI-Driven Cloud RRM, CCIR = 0 %

CCIR= Co-Channel Interference Ratio

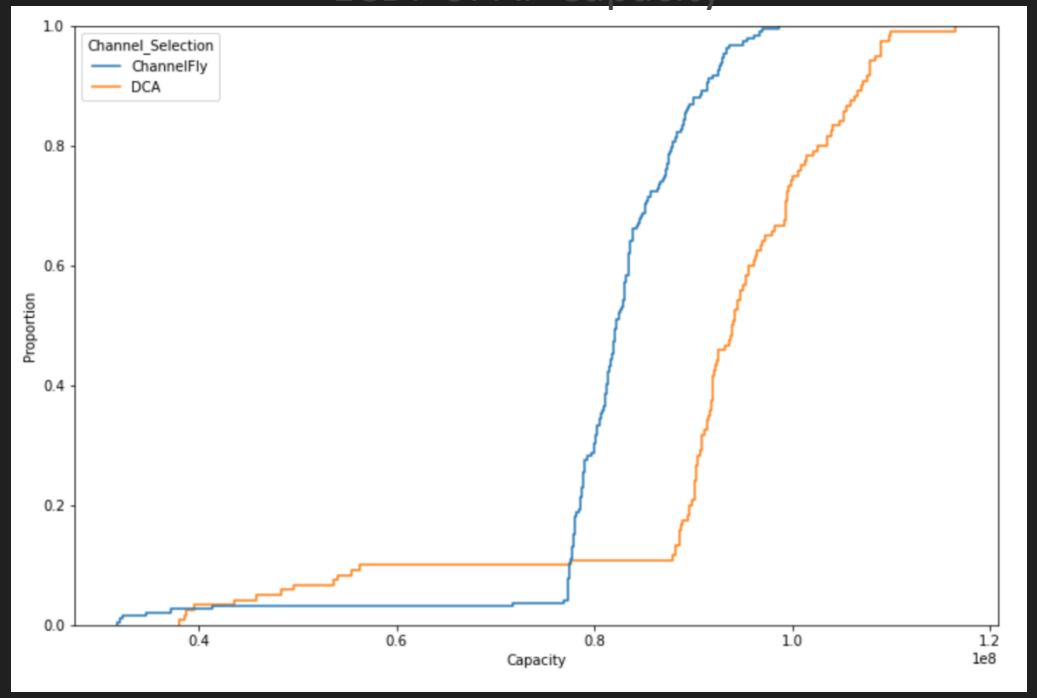
AP Capacity: 18% Boost From AI-Driven Cloud RRM



AP Capacity

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

ECDF of AP Capacity



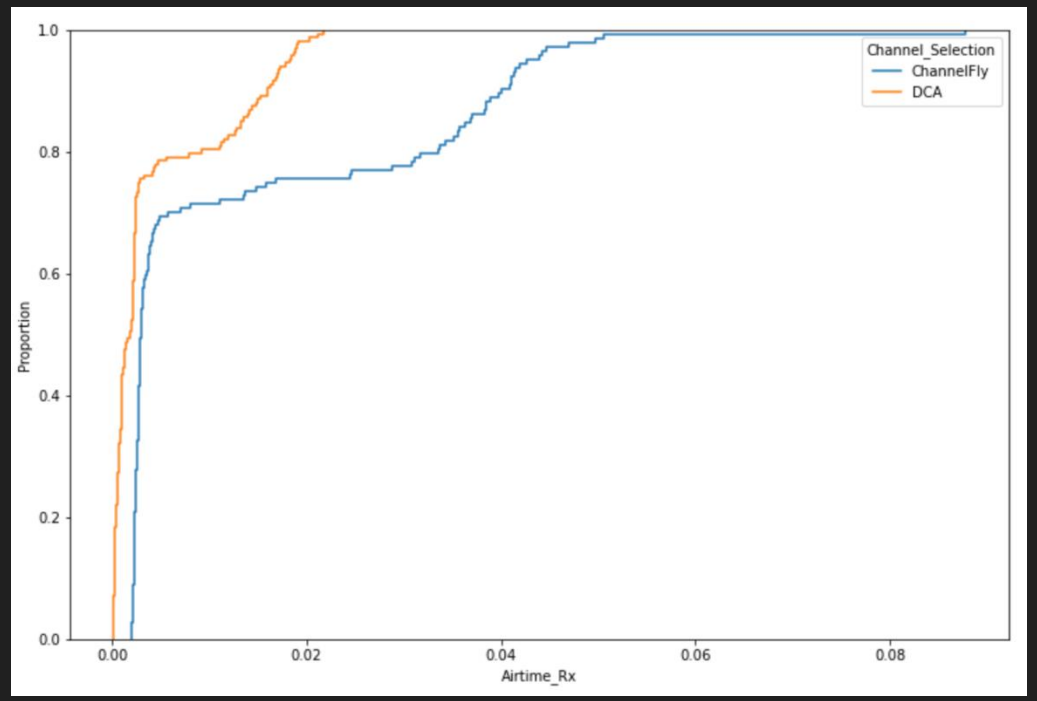
© 2023 CommScope, Inc. | | Comm

Performance Comparison with ChannelFly: Rx Air Utilization

Rx Air Utilization

	ChannelFly	DCA	Improvement
Average	1.23%	0.43%	65.2%
Max	8.78%	2.18%	75.2%

ECDF of Rx Air Utilization



Analytics AI 建議

Analytics US | Search... | Clients | Terry Henry | RUCKUS NETWORKS INC | Admin Brand

Network | Jan 01 2023 19:10 to Jan 08 2023 19:10

Network

Type: Network | APs: 3696 | Clients: 19661 | Switches: 211

Priority	Date	Category	Summary	Scope	Type	Status	Details	Actions
All								

Recommendation Details

AI-Driven Cloud RRM

Current Configuration: Background scanning and Auto for 5 GHz

Recommended Configuration: AI-Driven Cloud RRM for channel planning and channel bandwidth selection

What is the recommendation?

Zone: East Tower Zone is experiencing high co-channel interference in 5 GHz band due to suboptimal channel planning. The channel plan can be optimized by enabling AI-Driven Cloud RRM. This will help to improve the Wi-Fi end user experience.

Why this recommendation?

Based on our AI Analytics, enabling AI-Driven Cloud RRM will decrease the number of interfering links from 137 to 0.

What is the potential trade-off?

AI-Driven Cloud RRM will be applied at the zone level, and all configurations (including static configurations) for channel, channel bandwidth, and Auto Channel Selection mode will be overwritten. DFS channels with excessive radar events will also be automatically restricted from usage. Do note that any unlicensed APs added to the zone after AI-Driven Cloud RRM is applied will not be considered and this may result in suboptimal channel planning in the zone.

Key Performance Indicators

View details

Number of Interfering Links

137

Status Trail

Jan 06 2023 04:57 New

High	Jan 08 2023 03:58	AI-Driven Cloud RRM	More optimal channel plan and channel bandwidth selection on 5 GHz radio	East Tower Zone	Zone	New		
High	Jan 08 2023 03:58	AI-Driven Cloud RRM	More optimal channel plan and channel bandwidth selection on 2.4 GHz radio	West Tower Zone	Zone	New		

RUCKUS One

網路管理的難題

花太多的時間在網路維運和除錯上

過多的系統和介面容易造成更多的人為失誤，進而影響網路正常運行

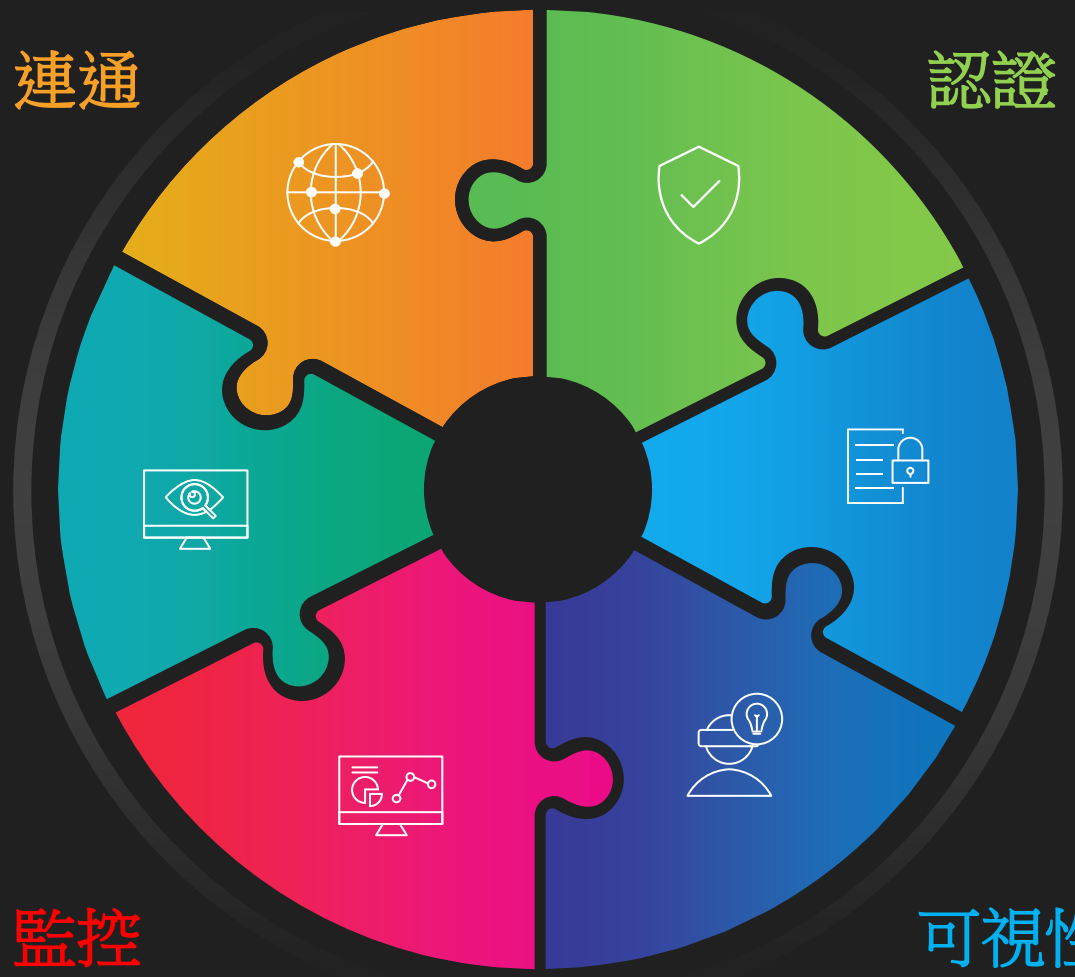
安全性風險與日俱增

缺乏網路可視性及洞察力

沒有整合的物聯網解決方案造成網路資源分散

 © 2023 CommScope, Inc. | CommScope Confidential

不斷變化的需求



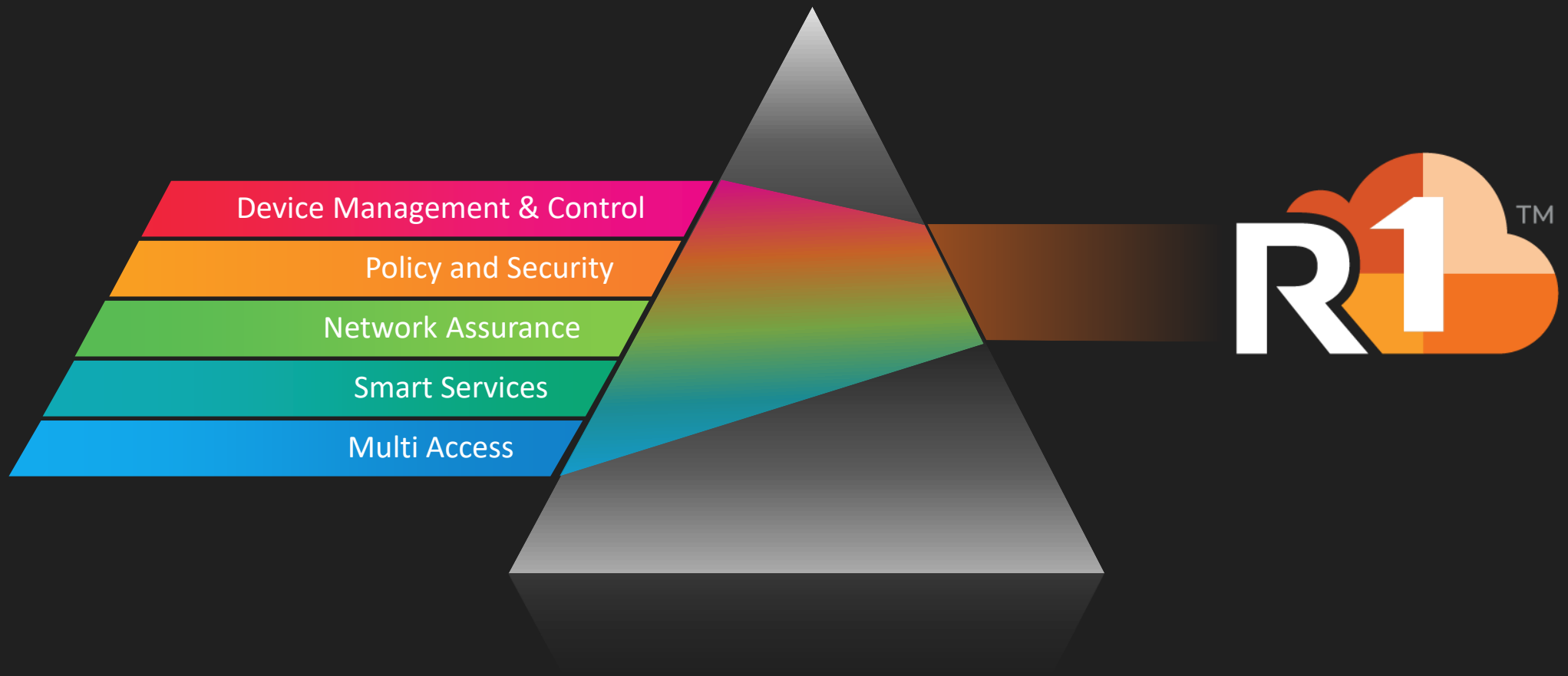
單一解決方案

 © 2023 CommScope, Inc. | CommScope Confidential

RUCKUS One

Simplified experience unifying our portfolio into

one software platform



 | © 2023 CommScope, Inc. | CommScope Confidential

RUCKUS One – 獨一無二的價值主張

1
單一管理介面

2
高效率

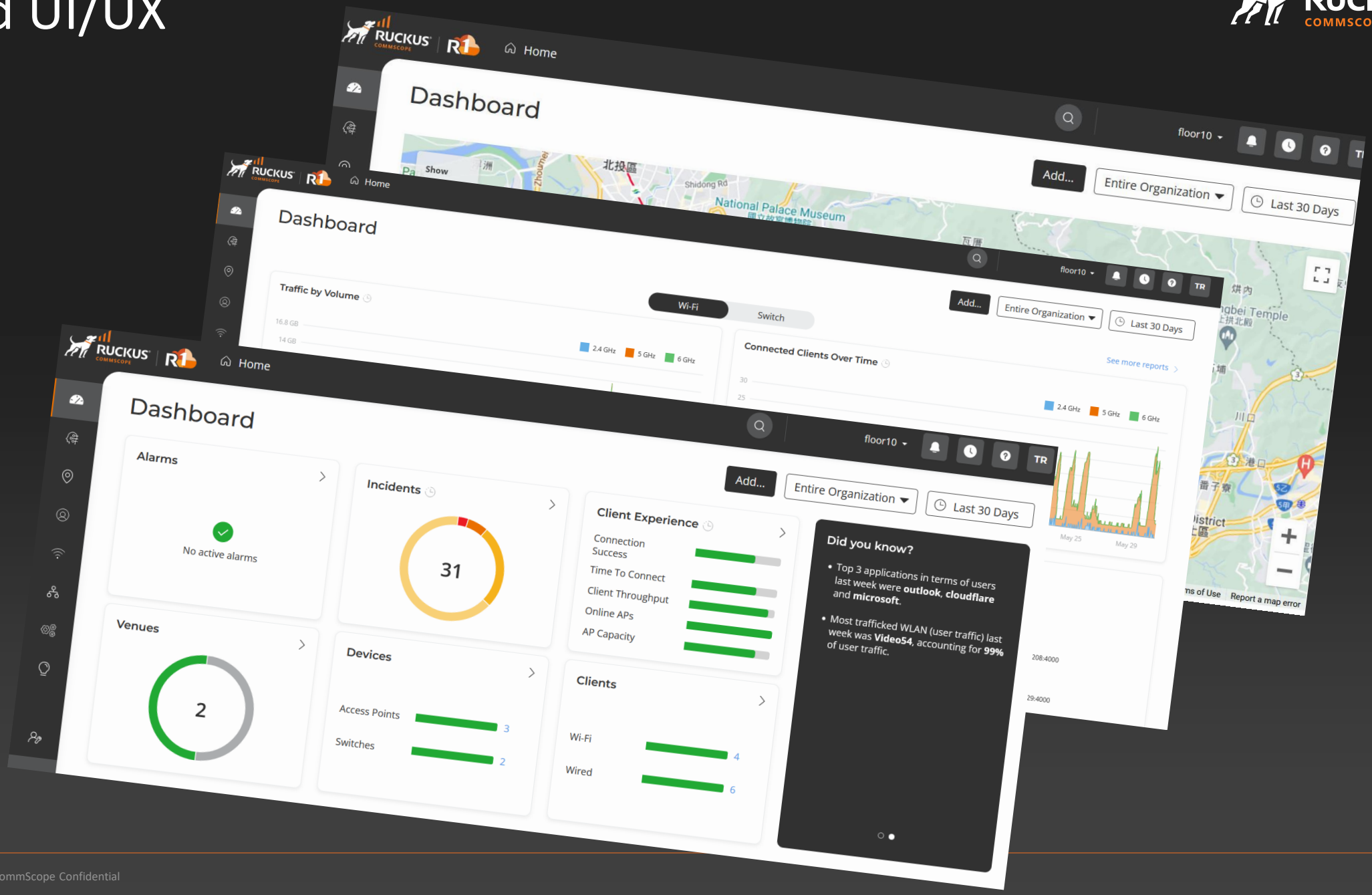
3
簡單的授權機制

4
彈性架構

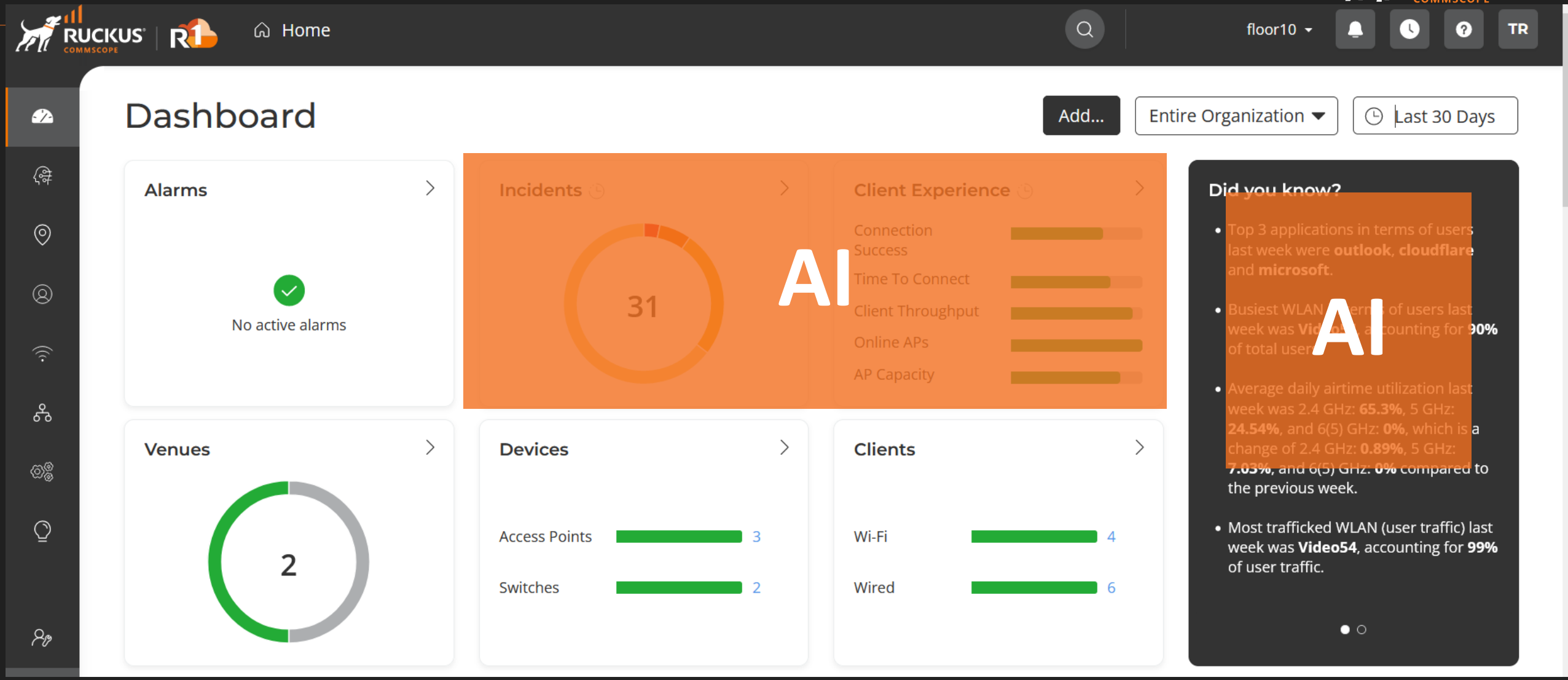
5
容易擴充

 © 2023 CommScope, Inc. | CommScope Confidential

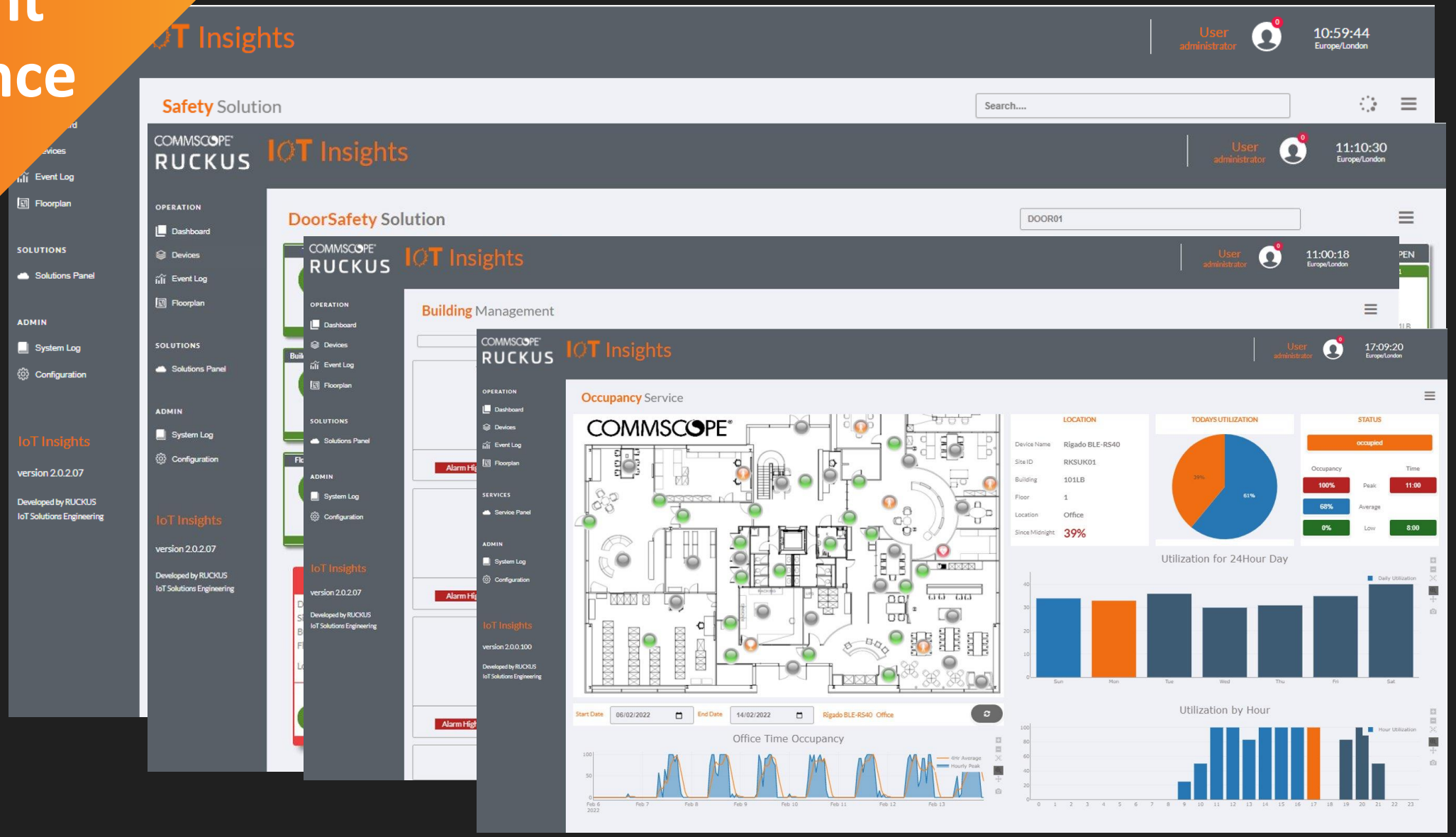
Unified UI/UX



© 2023 CommScope, Inc. | CommScope Confidential

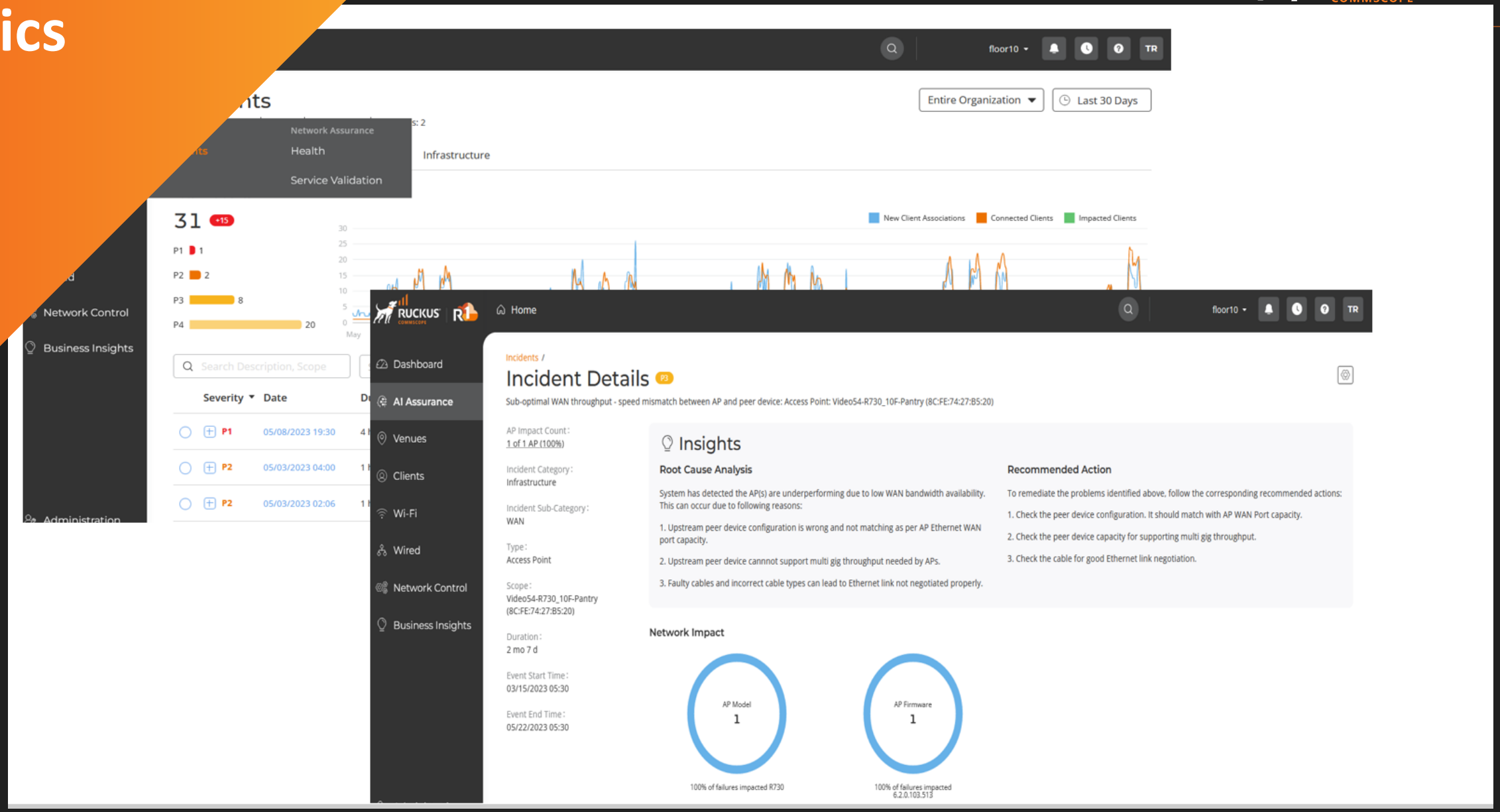

RUCKUS COMMSCOPE
R1
Home
floor10
TR
Dashboard
Add...
Entire Organization
Last 30 Days
Alarms
No active alarms
Incidents
31
AI
Client Experience
Connection Success
Time To Connect
Client Throughput
Online APs
AP Capacity
Did you know?
Top 3 applications in terms of users last week were outlook, cloudflare and microsoft.
Busiest WLAN
of users last
week was
accounting for
of total user
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

IoT Management and Assurance



 © 2023 CommScope, Inc. | CommScope Confidential

Incident Analytics



 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

Configuration Change Analysis

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

8 JS

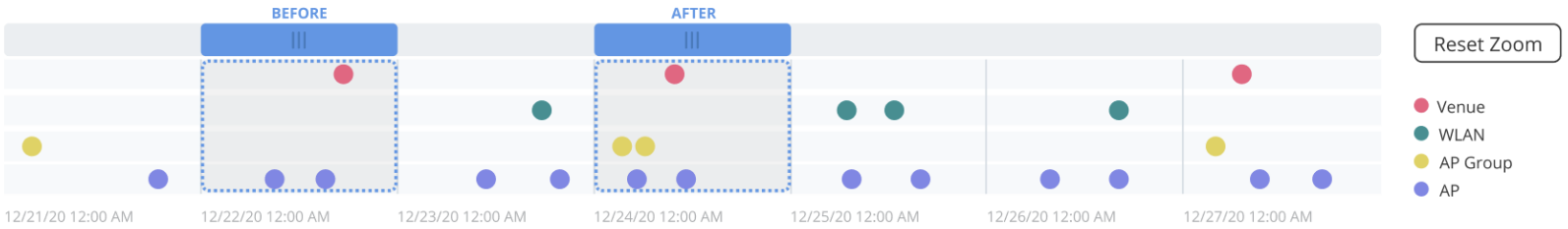
- Analytics
  - Incidents
  - Recommendations
  - Health
  - Config Change
  - Occupancy
- Timeline
- Reports
- Venues
- Devices
- Networks
- Services
- Policies
- Collapse

AI Analytics /

Config Change

Type: Network | APs: 451 | Clients: 551 | Switches: 33

Entire Organization | Last 24 hours



Overview | Connection | Performance | Infrastructure

Connection Success	Before: 98% | After: 95%	-3%
Time to Connect	Before: 8s | After: 9s	+1s
Client Throughput	Before: 96% | After: 96%	=
AP Capacity	Before: 50 Mbs | After: 50 Mbs	=
AP-Controller Connection uptime	Before: 60% | After: 80%	+20%
Online AP Count	Before: 234 | After: 212	-9%

Configuration Change Listing

+ Add KPI filter

Date	Entity Type	Entity Name	Configuration	Change from	Change to
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False
May 01 2022 12:00	AP	34:20:E3:2D:29:60	Wlan Service (6 GHz)	True	False

 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

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

Type: Network | APs: 451 | Clients: 551 | Switches: 33

Entire Organization | Last 24 hours

0 selected Mute | Unmute Search... All Categories All Types All Status

Priority	Summary	Date	Category	Venue	Status	Actions
High	Tx Power: Same for 2.4 GHz and 5 GHz	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	
High	Tx Power: Same for 2.4 GHz and 5 GHz	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	Applied	
High	Tx Power: Same for 2.4 GHz and 5 GHz	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	Failed	
Medium	Tx Power: Same for 2.4 GHz and 5 GHz	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	Reverted	
Medium	Tx Power: Same for 2.4 GHz and 5 GHz	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	
Medium	Channel Selection Mode and...	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	
Medium	Channel Selection Mode and...	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	
Low	Channel Selection Mode and...	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	
Low	Channel Selection Mode and...	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	
Low	Channel Selection Mode and...	May 01 2022 12:00	Wi-Fi Client Experience	Ruckus-Public	New	

 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

AI Recommendations

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

8 JS

d

Analytics

cidents

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%

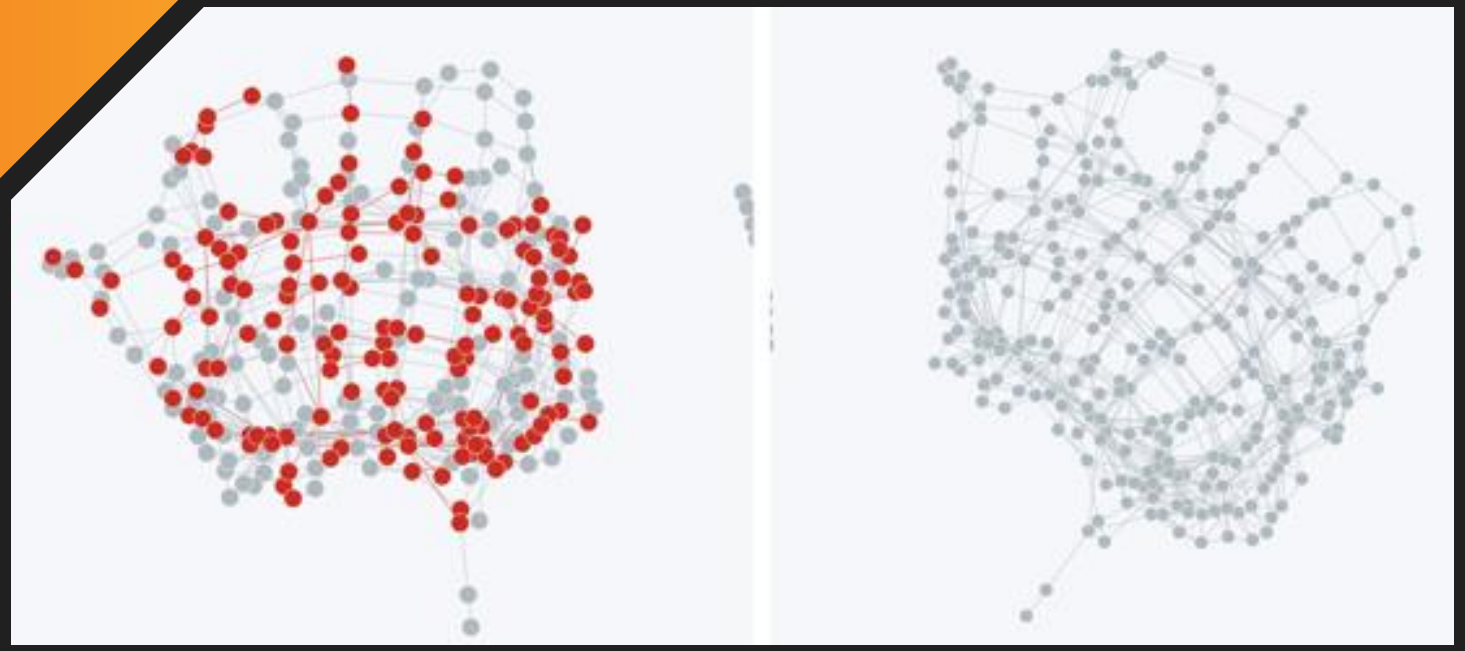
Session time on 2.4 GHz
64.13%

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

 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

AI-Driven Cloud RRM



Greater AP Capacity

Higher client throughput

Lower Airtime Utilization

Higher Reliability

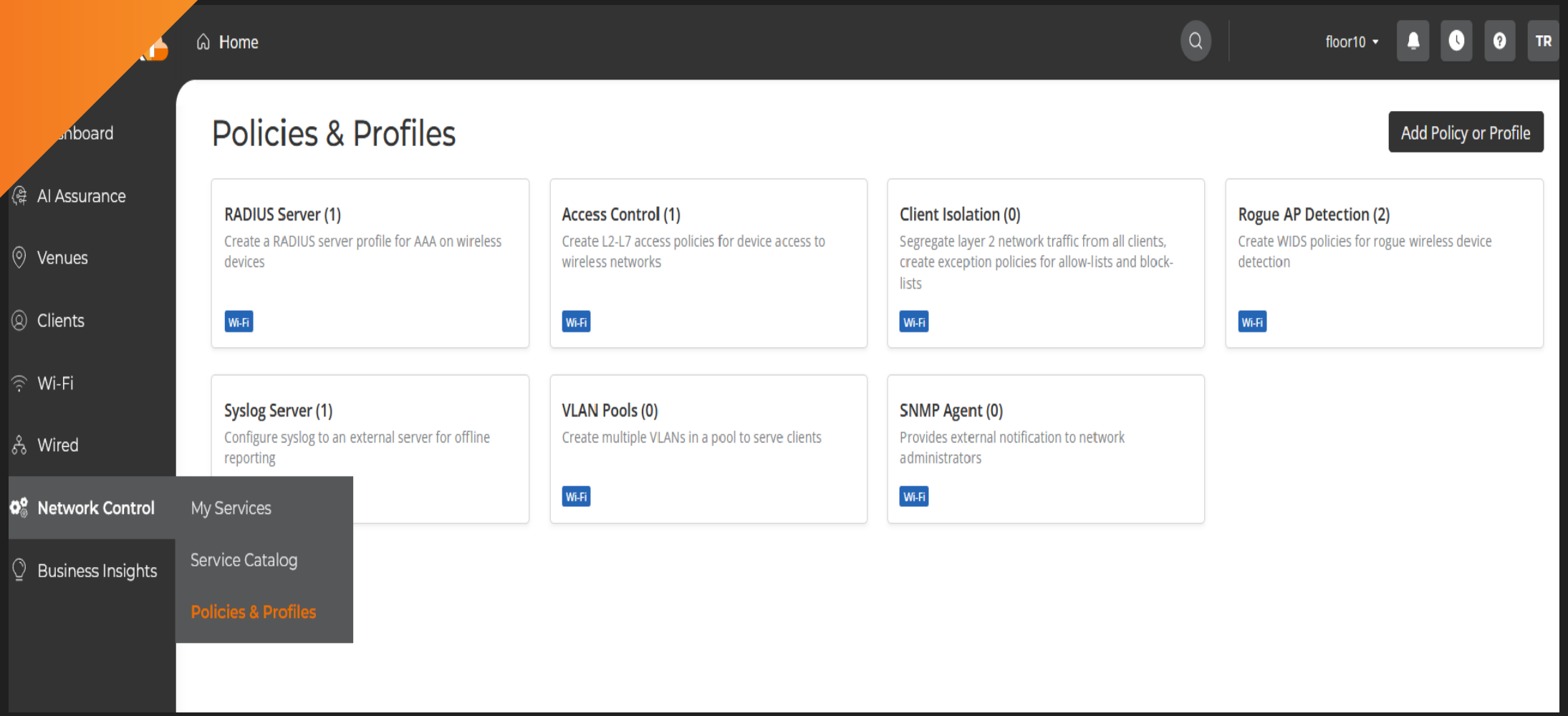
Operate APs at **MAX** capability

Proactive, Network Performance Optimization

Biggest advancement in Radio Management since BeamFlex!

 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

Security and Policy



 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

Flexible Deployment Options

Pure Cloud

Hybrid

 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

RUCKUS One Subscriptions

$

$$

Essentials Tier

- Account Administration
- Unrestricted Scale
- Basic Analytics
- Basic Cloudpath (*)
- Basic IoT (*)

Professional Tier

- Everything in Essentials
- Network Segmentation
- Advanced Analytics
- Advanced Cloudpath (*)
- Advanced IoT (*)
- SSO Login (*)

Add-On Services (*)

(*) **2H-2023 (anticipated)**

SKUs	Description
CLD-ESNT-APSW-REC1	Essentials AP/Switch Device 1-Year for **End Customers**
CLD-ESNT-APSW-REC3	Essentials AP/Switch Device 3-Year for **End Customers**
CLD-ESNT-APSW-REC5	Essentials AP/Switch Device 5-Year for **End Customers**
CLD-ESNT-APSW-EDU3	Essentials AP/Switch Device 3-Year for **Education**
CLD-ESNT-APSW-EDU5	Essentials AP/Switch Device 5-Year for **Education**
CLD-PROF-APSW-REC1	Professional AP/Switch Device 1-Year for **End Customers**
CLD-PROF-APSW-REC3	Professional AP/Switch Device 3-Year for **End Customers**
CLD-PROF-APSW-REC5	Professional AP/Switch Device 5-Year for **End Customers**
CLD-PROF-APSW-EDU3	Professional AP/Switch Device 3-Year for **Education**
CLD-PROF-APSW-EDU5	Professional AP/Switch Device 5-Year for **Education**
CLD-PROF-APSW-MSP1	Professional AP/Switch Device 1-Year for **MSP**
CLD-PROF-APSW-MSP3	Professional AP/Switch Device 3-Year for **MSP**
CLD-PROF-APSW-MSP5	Professional AP/Switch Device 5-Year for **MSP**
CLD-R1-TMP090-REC	RUCKUS One Trial 90-Day for End Customers
CLD-R1-TMP090-MSP	RUCKUS One Trial 90-Day for MSP

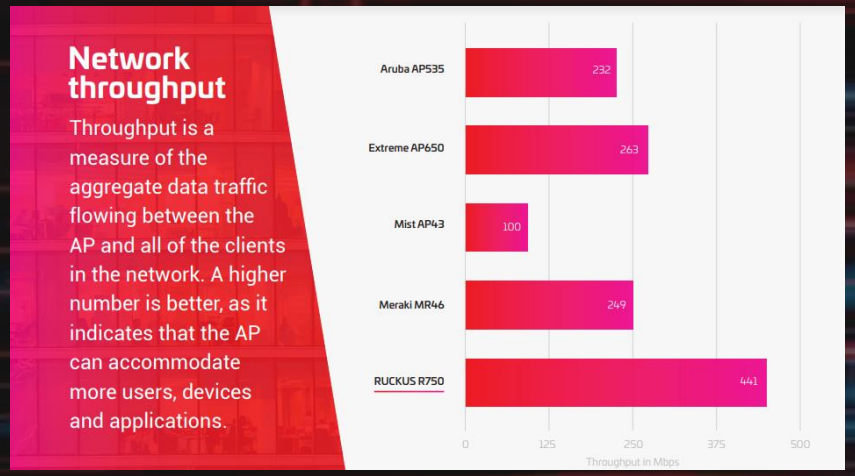
 © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential

RUCKUS®
COMMSCOPE

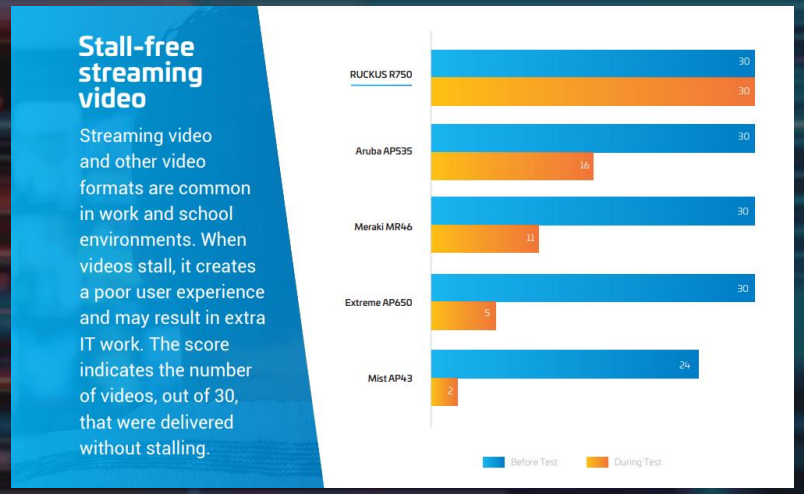
Thank You

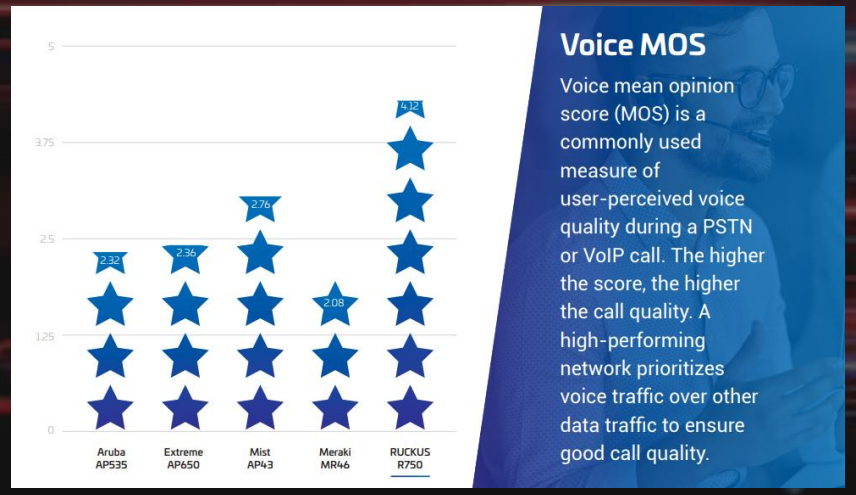
RUCKUS Wi-Fi: Best In Class!

Highest network throughput

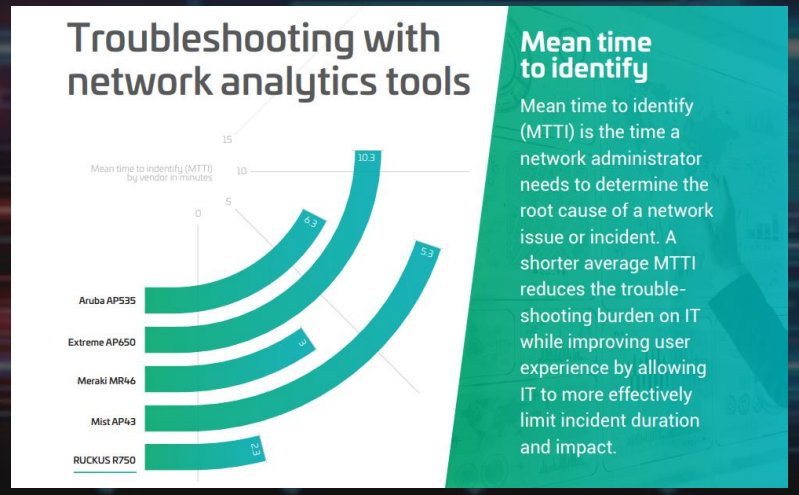


100% stall-free videos





Highest voice MOS



Lowest MTTI

 | © 2023 CommScope, Inc. All rights reserved. | CommScope Confidential