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AZBSN COVID-19 Digital Access Task Force Meeting

2020

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Private Health Care LTE Networks with CBRS

June 2020

Juan Santiago

Director, Ruckus CBRS Business

Wireless Technology Evolution

RUCKUS CBRS

"5G" Services

3GPP Cellular SP

Licensed Spectrum (800MHz, PCS, AWS, 700MHz, mmWave,…)

2G → 3G → 4G LTE → 5G NR

+ Network Slicing

Shared Spectrum (3.5GHz CBRS)

4G LTE

+ Edge EPC

IEEE Enterprise

Un-Licensed Spectrum (2.4GHz, 5GHz, 6GHz,…)

a b g Wi Fi n a c → Wi Fi 6™

CBRS: Cellular Technology for the Enterprise

New licensing model that allows enterprises/venues to obtain their own dedicated spectrum

- Uses CBRS Band – 3,550 to 3,700 MHz
  - 150 MHz: Fifteen 10 MHz channels

Enables LTE Wireless Technology for the Enterprise

- More predictable, higher QoS connections
- Much better range, coverage
- Full end to end security – always
- Mobility
- Deployed, managed, and owned by the Enterprise

Ideal for Operational Uses

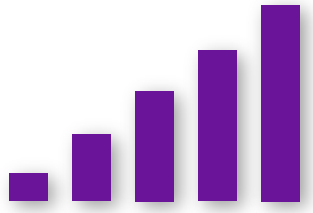
- Network owner also controls the devices
- High-value use cases that can't be solved with Wi-Fi

A new option to meet the most critical or challenging Enterprise wireless requirements!

Why CBRS for Private LTE?

Advantages vs Wi-Fi

Higher reliability
High QoS
Proven, consistent Security
Seamless Mobility
Longer range, non-LOS
Longer device battery life



Advantages vs Cellular Service

Enterprise access to user data
Full enterprise control
Coverage where you need it
Lower Latency
No Monthly Subscription Fees

CBRS complements, not replaces, Wi-Fi and mobile operator LTE service

Private LTE Applications in Health Care

Key Benefits

- Privacy and Security, HIPAA compliance
- Does not degrade with Patient use

Key Applications

- PTT / Critical Communications
- Doctor/Nurse/Staff Communications
- Cleaning Robots
- Security Video Camera backhaul
- Kiosks / Digital Signage
- IoT Gateway backhaul
- Equipment / Asset Tracking
- Bar Code Scanners / Mobile Computers
- Police/Ambulance video upload
- Temporary broadband access (COVID-19)

Case Study: COVID-19 Triage Tents

- Initial deployments at Duke and Rush Medical Centers
- Delivers broadband to Triage tents
  - Easy to deploy
  - Uses existing devices
  - Secure, long range connection
  - Plenty of capacity for critical use cases
- Using Cradlepoint and MiFi clients

DUKE UNIVERSITY MEDICAL CENTER

RUSH UNIVERSITY MEDICAL CENTER

CBRS (B48) Device Ecosystem

RUCKUS CBRS

Routers, Gateways, Bridges

Cradlepoint

Inseego

Sierra Wireless

MultiTech

ARRIS NVG558

BEC

Encore

Amit Wireless

Phones

- iPhone 11, SE
- Samsung Galaxy S10, S20, XCover Pro
- Pixel 3, 4
- LG ThinQ G8
- One Plus 7 Pro
- Motorola Moto z3 w/5G mod

Push to Talk

Motorola SLN1000
Two-way Radio

Scanners

Koamtac

Tablets / Laptops

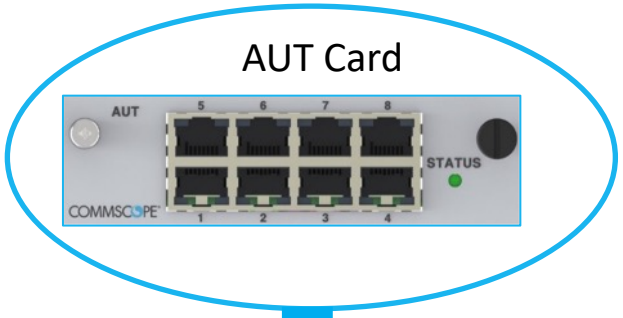
Dell 7212, 7220
LTE Tablets

Zebra L10 Windows
Rugged Tablet

iPad Pro 2020

Getac

Adding RUCKUS CBRS to Era DAS



Era UAP
(or CAP L for Fiber)

CAT6A
(or Fiber for CAP L)

MAIN AUX

2

1GE with PoE+
Output

Era TEN

1GE Input
(Era AUT Card)

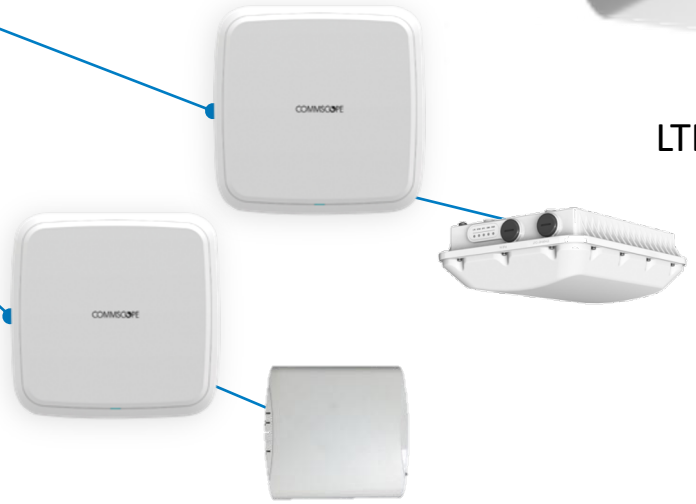
1

Ethernet Switch

LAN/WWW

EPC, EMS, SAS

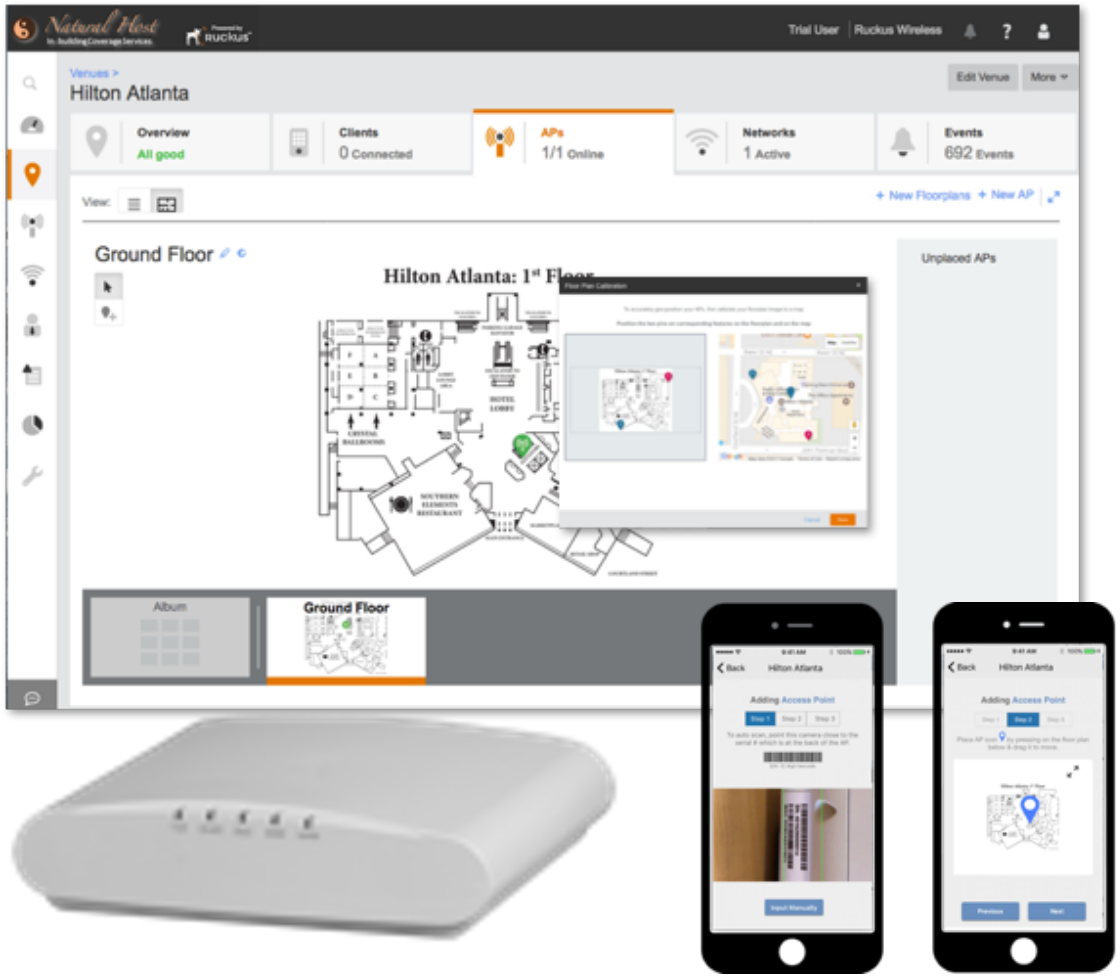
Ruckus CBRS
LTE Access Points



Other Era UAP + LTE APs

Summary: Why RUCKUS for CBRS?

- Built for the Enterprise
- Deploys with Wi-Fi Ease
- Extremely Scalable
- Proven Solution
- Backed by an $8B Company



Ruckus delivers:

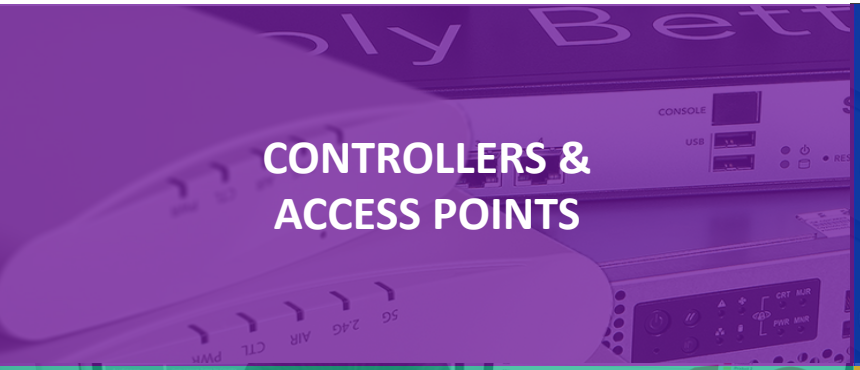
Great end-user experiences

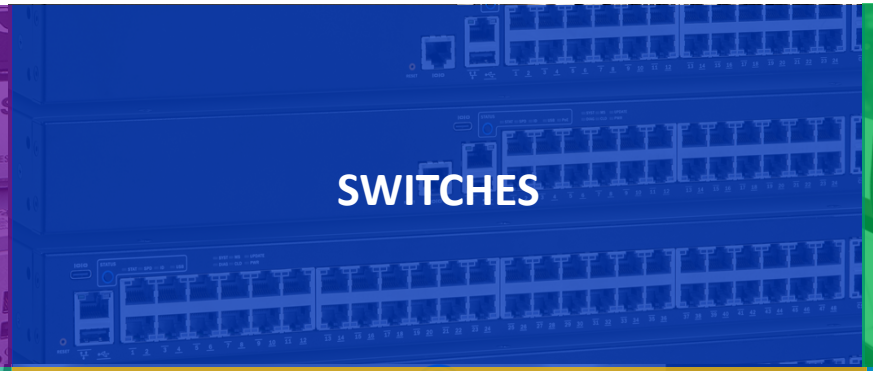
Simpler networking

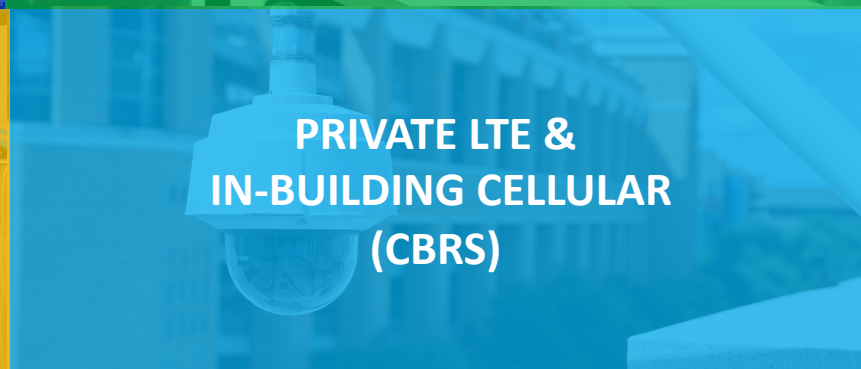
Lower cost per connection

Ruckus Networks builds:

Converged wired and wireless networks for enterprises and service providers







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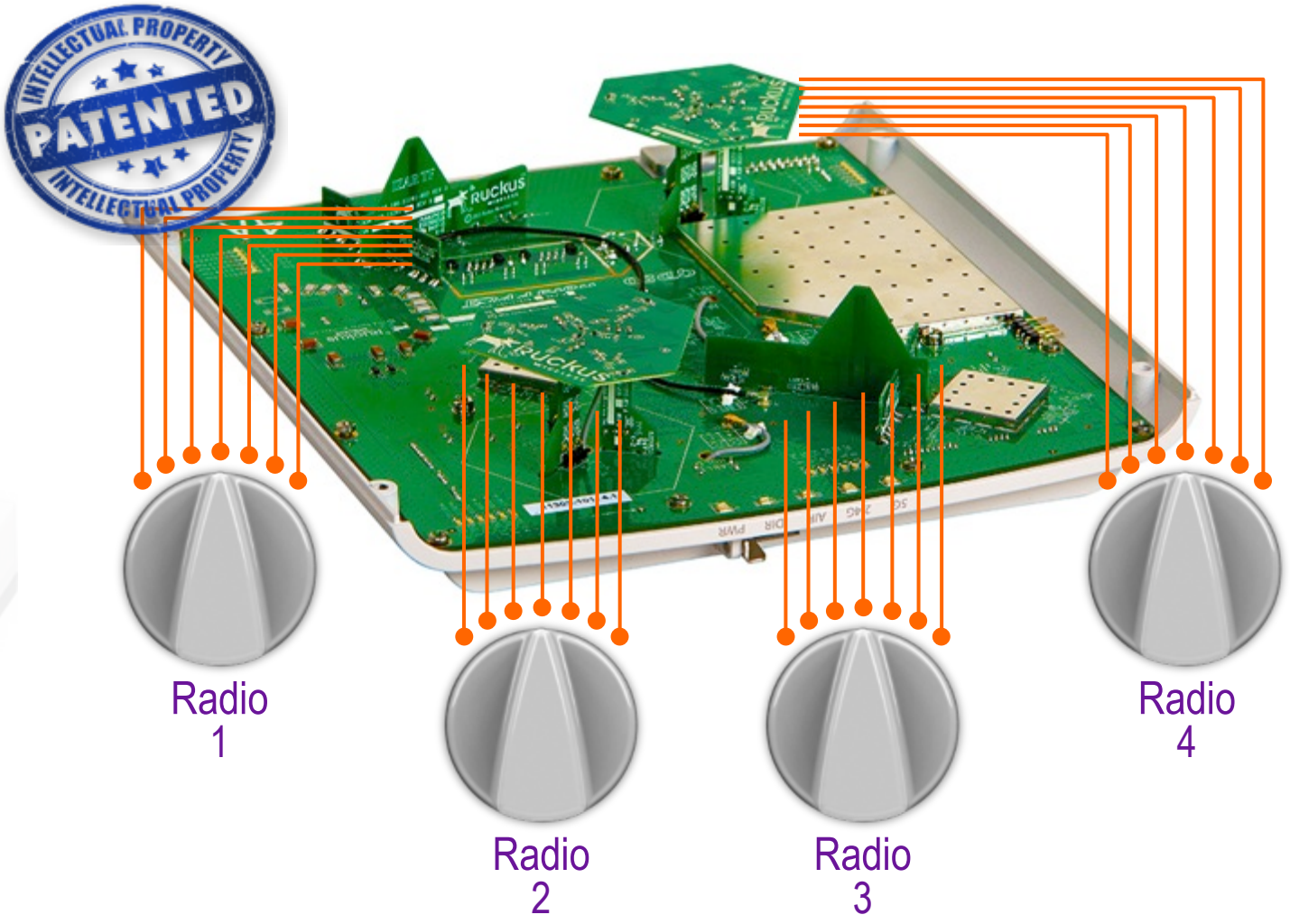
CommScope RUCKUS

Wireless Technology – WiFi 6 / 6E

BeamFlex+ Adaptive Antennas

Signal Control is Paramount

- Stronger Wi-Fi signals at longer ranges
- Adapts automatically to environmental changes
- More concurrent users per access point
- More stable connections at higher data rates
- Unmatched scalability



*Radio Tx/Rx chain

Superior Wi-Fi Coverage

Measurements Based on Real-World Customer Production Wi-Fi Network

Before BeamFlex

Green is good
Grey is bad

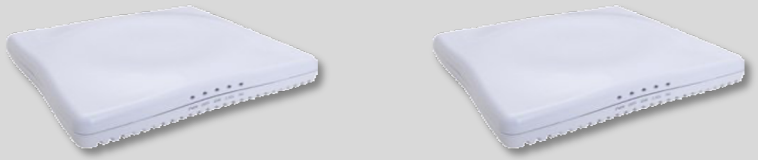
4 Enterprise Grade APs

Superior Wi-Fi Coverage

Measurements Based on Real-World Customer Production Wi-Fi Network

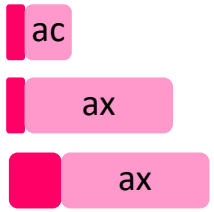
After BeamFlex

Green is good
Grey is bad



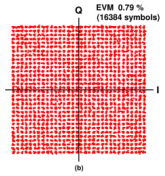
2 Ruckus access points

Wi-Fi 6 addresses insatiable network demand



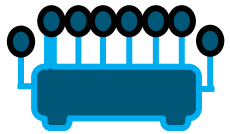
Long OFDM Symbol

- 4x longer OFDM symbol
- 20% higher rates
- Enables outdoor deployment



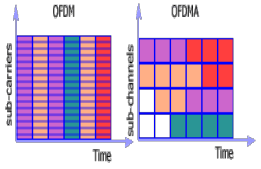
1024QAM

- 25% higher rates
- Gigabit Wi-Fi with 2x2 11ax



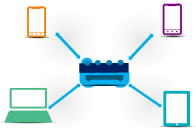
8x8 AP

- High capacity 8ss SU/MU
- High-precision Beamforming



DL/UL OFDMA

- Clients occupy different tone-sets
- Small packet efficiency
- Longer range – close the UL imbalance

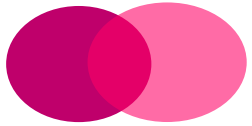


DL/UL MU-MIMO

- Clients occupy spatial streams
- 4-8X throughput gains in DL & UL

Extended Range

- Power boosted preamble & repetition schemes
- ~3 dB range improvement



BSS Color

- Indicate each network with a “color”
- Spatial reuse in dense networks

Dual-band Operation

- Support for both 2.4 and 5GHz
- Single band 11ax clients

RUCKUS Indoor AP Portfolio

RUCKUS CBRS

6GHz

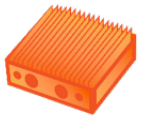
Wi-Fi 6 certifiable products

	TODAY	1H 2020	2H 2020	2021
BEST	**R730** 8x8 + 4x4 11ax, 5GE Integrated IOT **R750** 4x4 + 4x4 11ax, 2.5GE Integrated IOT **R720** 4ss 11ac W2, 2.5GE **R710** 4ss 11ac W2	**R650** 4x4 + 2x2 11ax, 2.5GE Integrated IOT Q1 2020	**R850** 8x8 + 4x4 11ax, 5GE Integrated IOT Mid-2020	2H 2021 **R860** Tri-Band (2.4/5/6GHz) 4x4 + 4x4 + 4x4 11ax Integrated IOT
BETTER	**R610** 3ss 11ac W2 **R510** 2ss 11ac W2		**R550** 2x2 + 2x2 11ax Integrated IOT Q2 2020	
GOOD	**R320** 2ss 11ac W2 **R310** 2ss 11ac		Planning	

RUCKUS Outdoor AP Portfolio

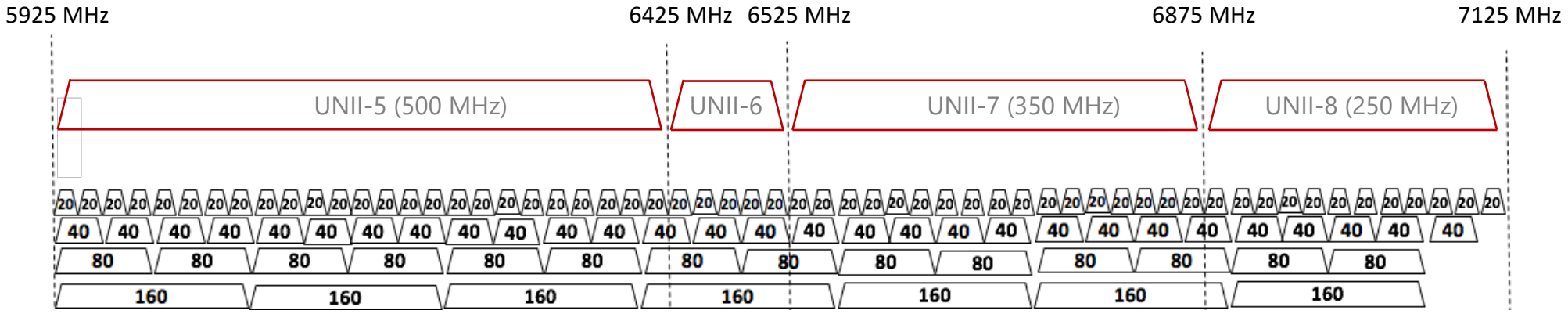
RUCKUS CBRS

Wi-Fi 6 certifiable products

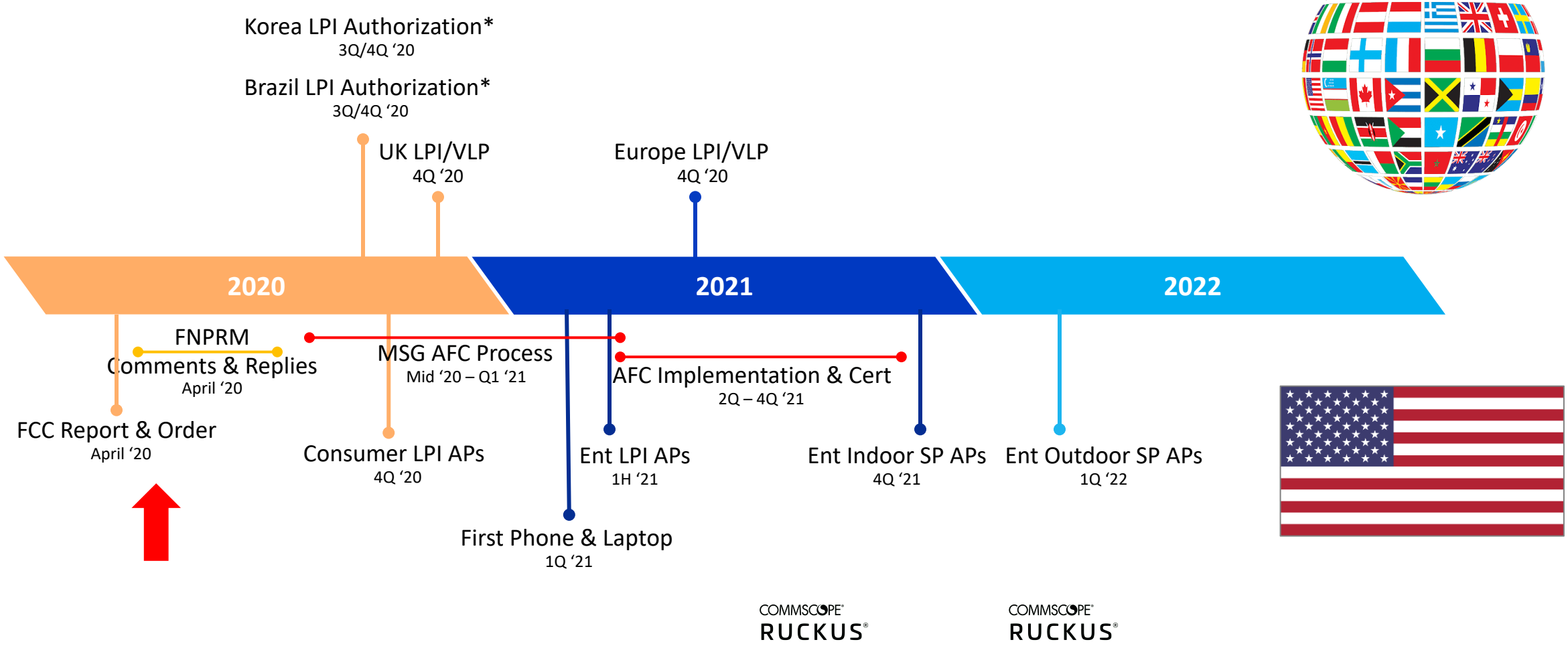
	TODAY	1H 2020	2H 2020	1H 2021
OUTDOOR	 **T710** 4ss 11ac W2  **T610** 4ss 11ac W2 3 MU streams  **T310** 2ss 11ac	 Q1 2020 **T750-O** 4ss 11ax 4 MU streams, PoE In + Out, SFP, GPS, direct AC power, **Omni** antennas, Integrated IOT	 2H 2020 **T750-SE** 4ss 11ax 4 MU streams, PoE In + Out, SFP, GPS, Vac power **Sector** + **external antenna** option, Integrated IOT	 1H 2021 **T350** 2ss 11ax
BRIDGE	 **P300** 2ss 11ac			
SPECIALTY	 **T811cm** 4ss 11ac W2, strand-mount 32x8 DOCSIS 3.1  **E510** 2ss 11ac W2 Outdoor, External antenna  **M510 (various SKUs)** 2ss 11ac W2 – Cat4 LTE-backhaul “SIM AP”		Planning →	

Finding new spectrum – WiFi 6E

59 x 20 MHz
29 x 40 MHz
14 x 80 MHz
7 x 160 MHz



Estimated Timeline to Market



*Note: Both Brazil and Korea may initially authorize LPI in 5925-6425 and later authorize 6425-7125.

Takeaways

- 1.2 GHz of unlicensed spectrum is available in 6 GHz (5.925 – 7.125 GHz)
- Key benefits – high efficiency, high throughput, low latency
- Unlicensed devices will share 6 GHz spectrum with incumbent licensed services
- Two category of unlicensed devices allowed
  - Standard Power (SP) Access Points
  - Low Power Indoor (LPI) Access Points
- LPI Access Points can only operate indoors and AFC is not required
- SPI Access Points can operate indoor and outdoor, AFC system required

W/LAN Control & Management: Take Your Pick

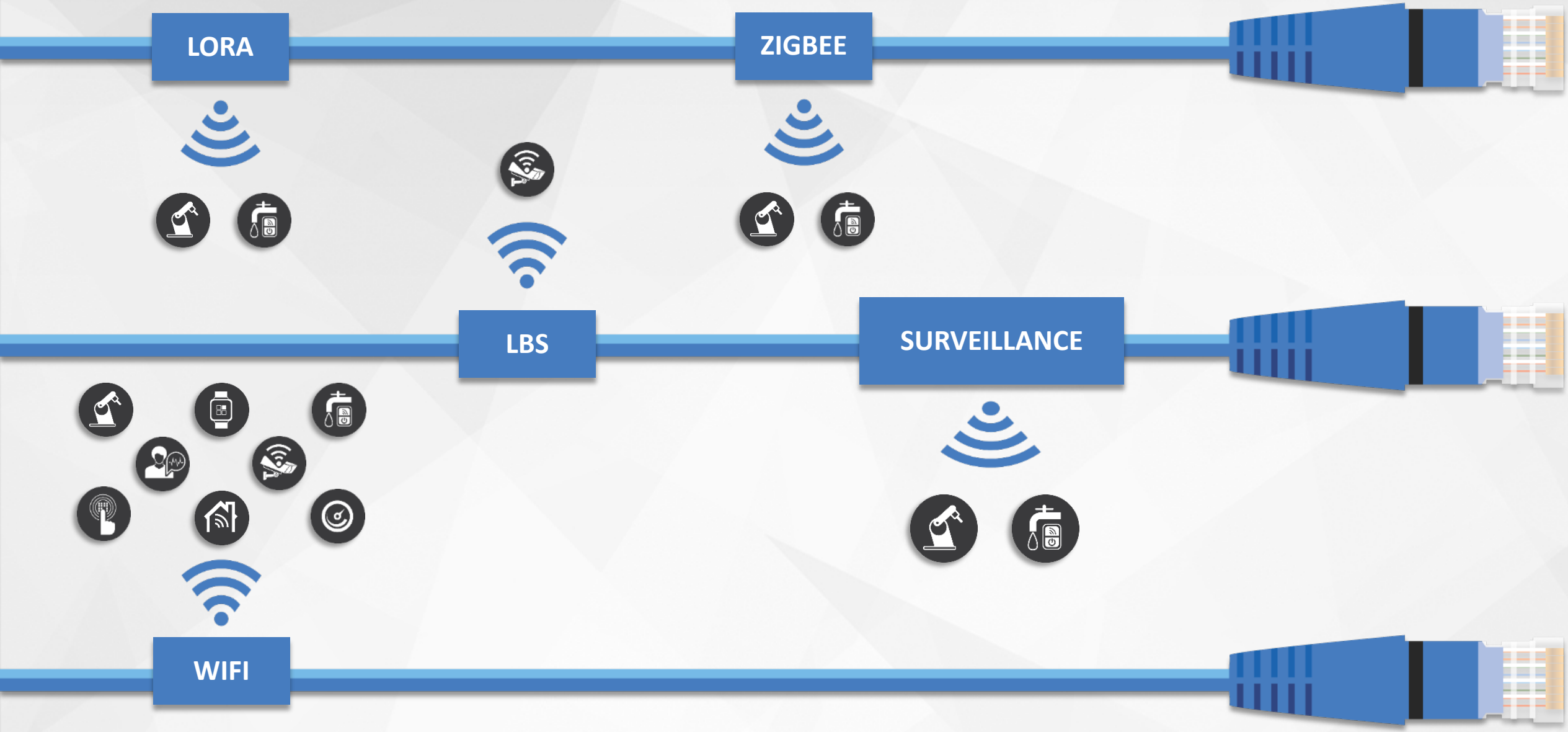
Controller-less	Cloud-managed	Controller-managed
		
Plug-and-play	*Cloud simplicity*	*Scale & flexibility*
Ruckus Unleashed	Ruckus Cloud Wi-Fi	SmartZone Network Controllers

COMMSCOPE®

Managed WiFi for Healthcare

Enabling IoT

Networks Silos Make IoT Deployments Expensive



Ruckus IoT Suite: We've got you covered

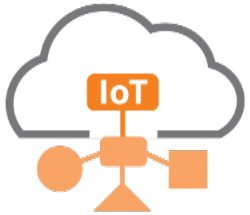
1  **IoT-ready APs**

\+

2  **Ruckus IoT Modules** (BLE ZIGBEE)

3  **Network Controller**

\+

4 

Ruckus IoT Controller

…by Leveraging Existing WLAN Infrastructure…

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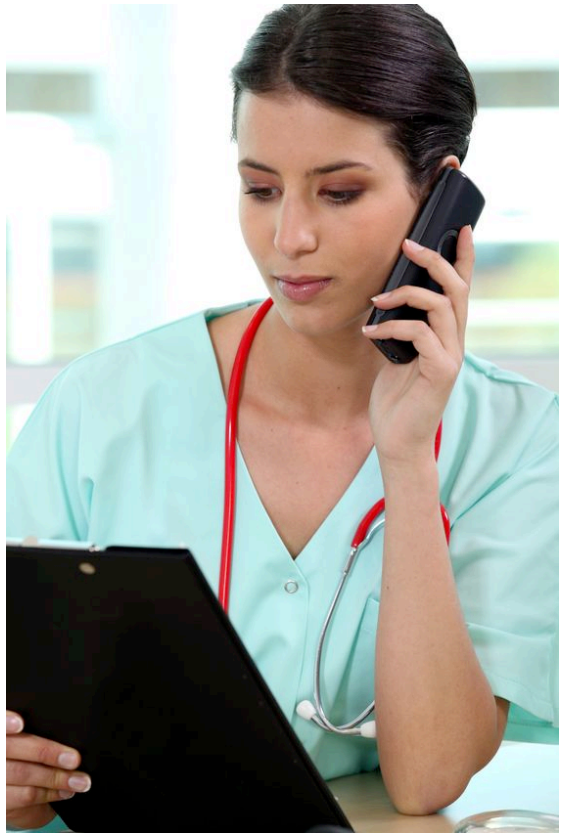
A Lot Is Riding on a Hospital Wi-Fi Network

Hospital Communications

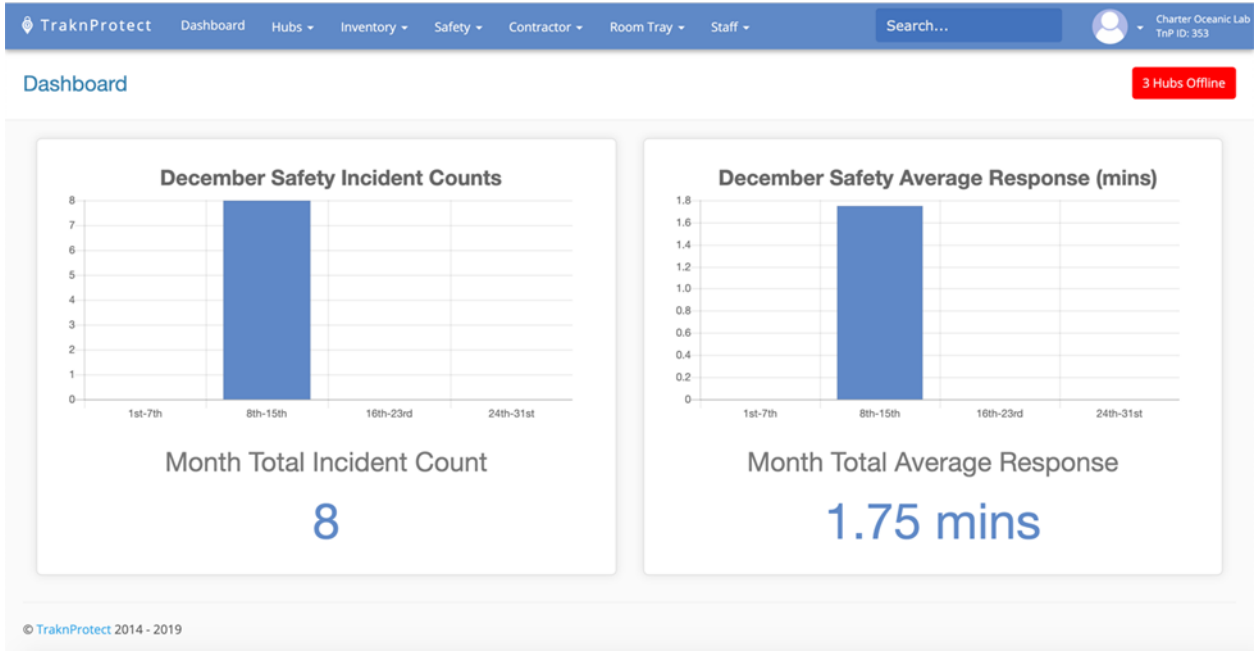


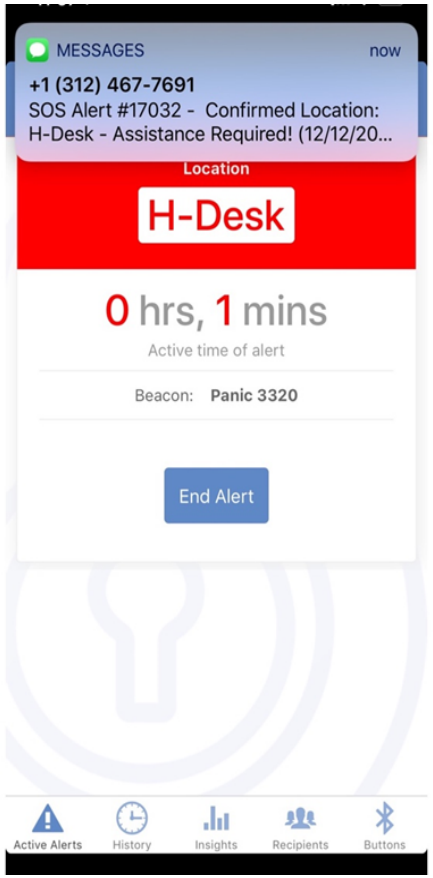
Patient Monitoring

Patient & Asset Tracking

And Many More…

Staff Security
Bluetooth Low Energy (BLE) Panic Buttons





- SMS Alerts
- Mobile app notification
- Dashboard analytics
- Panic button status

IoT Monitoring Devices

- Patient blood pressure information is uploaded to the hospital's system via the IoT device
- BLE monitors from Omron
- Additional BLE or Zigbee devices can be on-boarded for other use cases

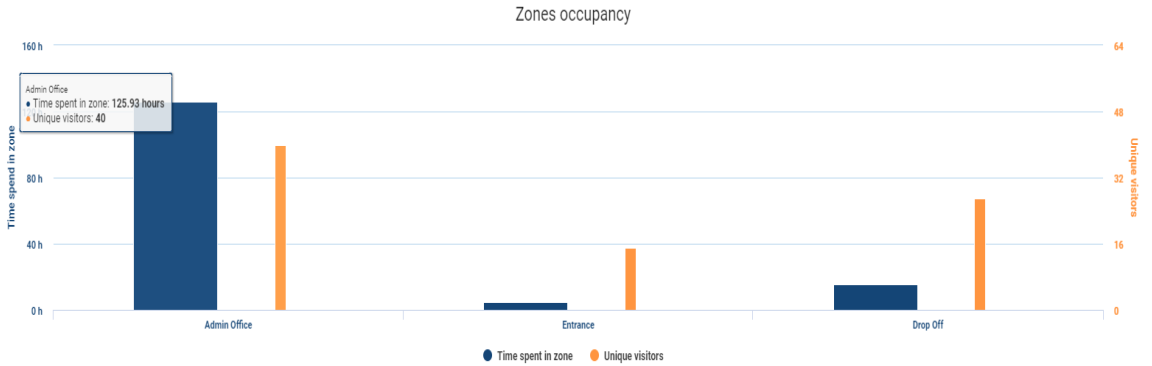
Asset Tracking, Geofencing, Dwell Time

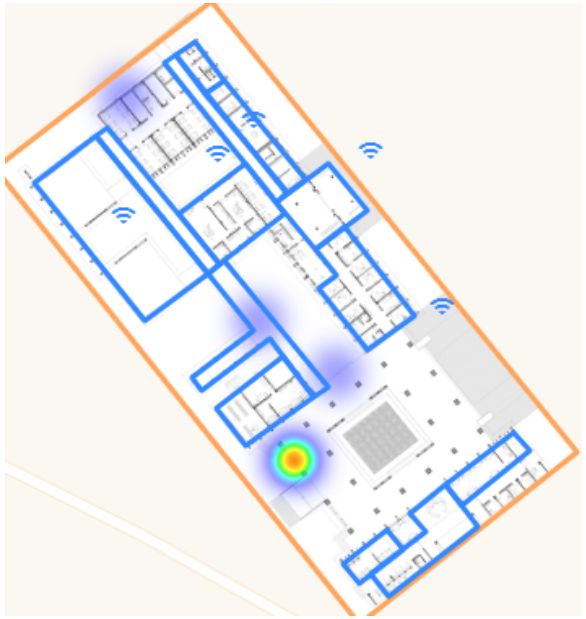
Asset Tracking (wheelchairs, beds, pumps, carts)

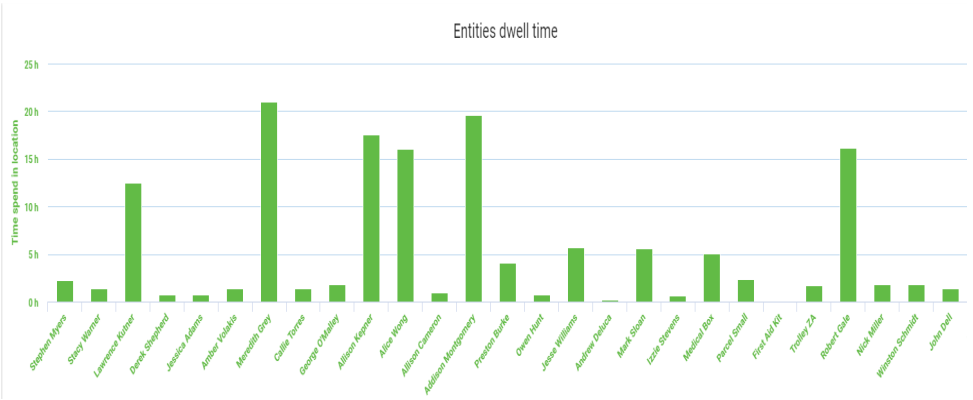
Condition Monitoring (automate compliance, temp, light, humidity in labs, fridges)

Safety and Security (call buttons, geofence zones)

Understand occupancy and dwell times in particular zones (e.g. emergency room)

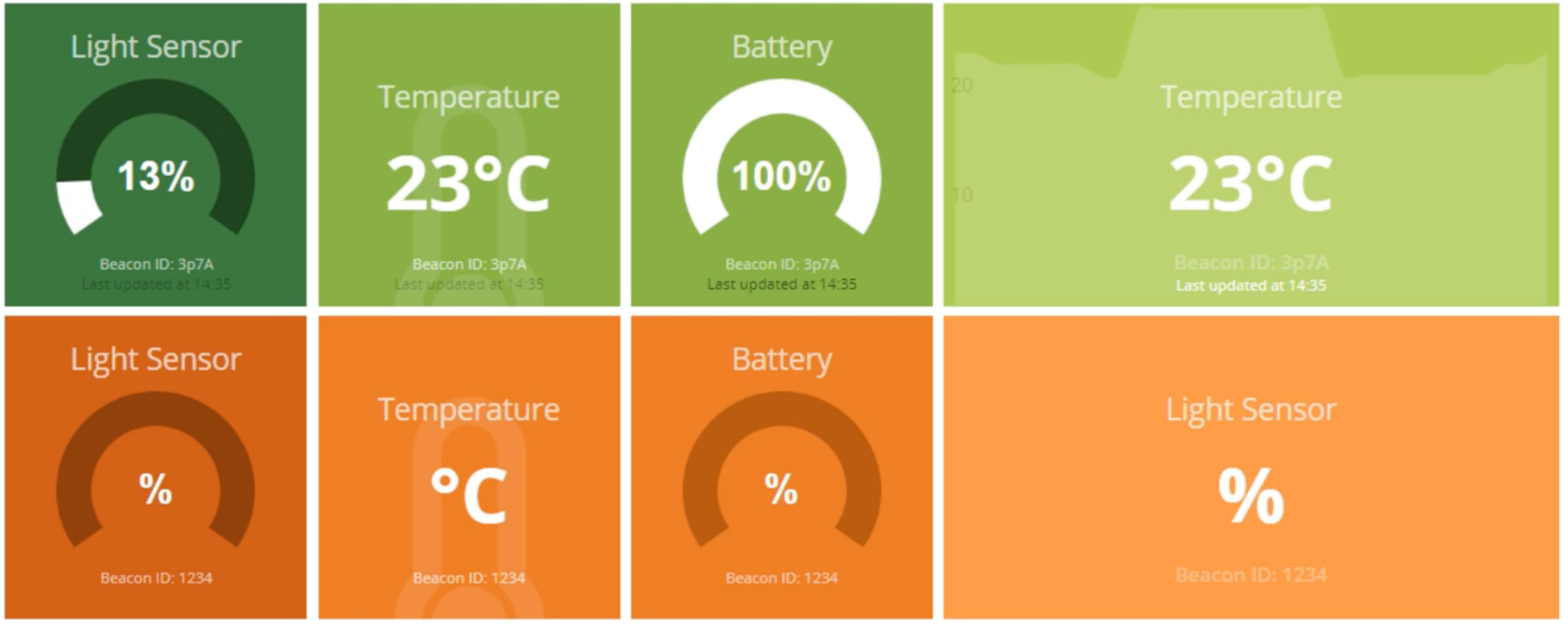






Indoor Wayfinding

Condition Monitoring using IoT Sensors



IoT for location, environment, patient devices, security and more

RUCKUS CBRS

TODAY

ASSA ABLOY
CONNECTED ENTRY

IPCONFIGURE
AXIS COMMUNICATIONS
VIDEO / VMS

Trak n Protect
PANIC BUTTON

SOTER
VAPE DETECTION

kontakt.io
AVSYSTEM
LOCATION SERVICES

telkonet
ENERGY MANAGEMENT

Std. IoT

UP NEXT (DEMO TODAY)

dormakaba
CONNECTED ENTRY

REACT mobile
PANIC BUTTON

SmartThings
HOME AUTOMATION (MDU)

OMRON
HEALTHCARE

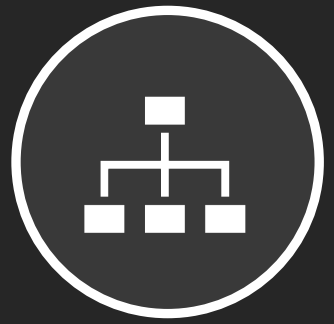
COMMSCOPE

COMMSCOPE®

CommScope RUCKUS Analytics

Machine-assisted Proactive Networking

Network-Generated Data

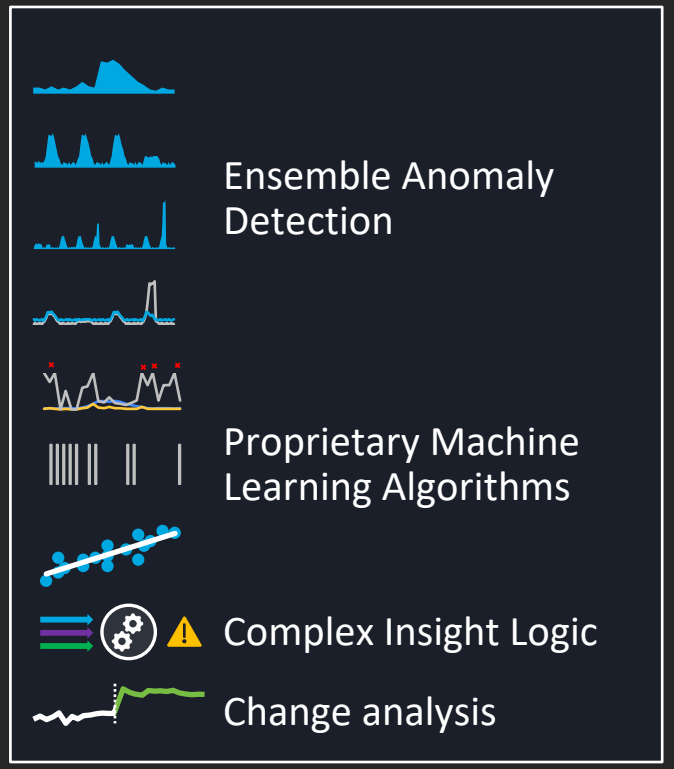


- Counters, KPIs, events, and actions
- Sent as streaming APIs

Data, Event, Config Processing

- ML data baselining
- Big data architecture for ingestion, index, aggregation, storage

Machine Intelligence

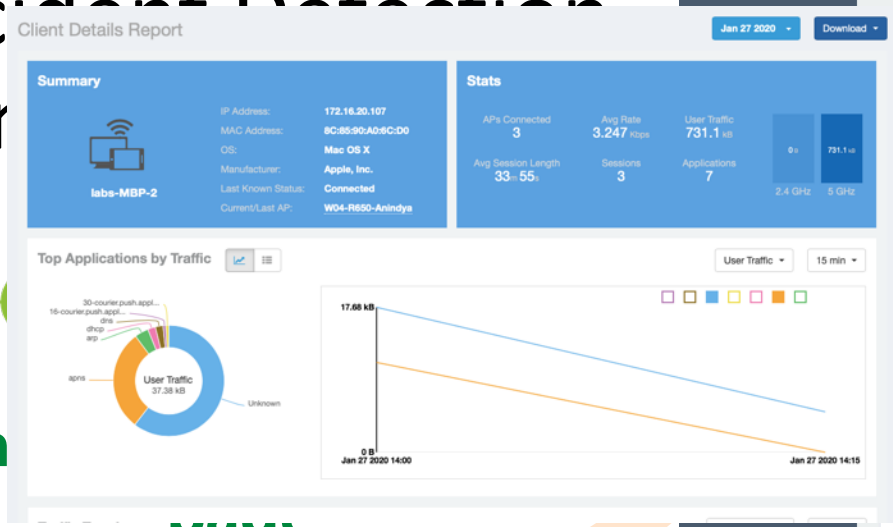


Proactive Visibility

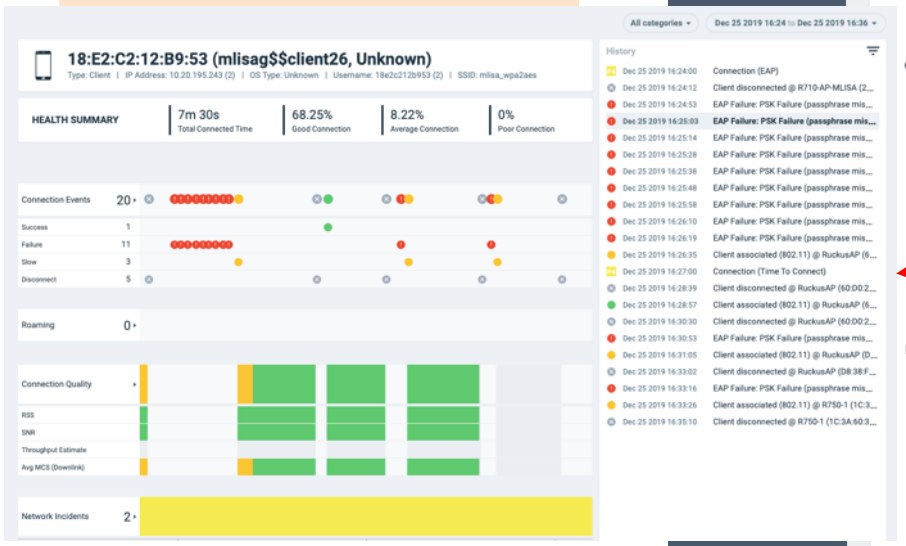
- Full-time AI assistant
- Auto-classify incidents by client impact
- Notify as needed

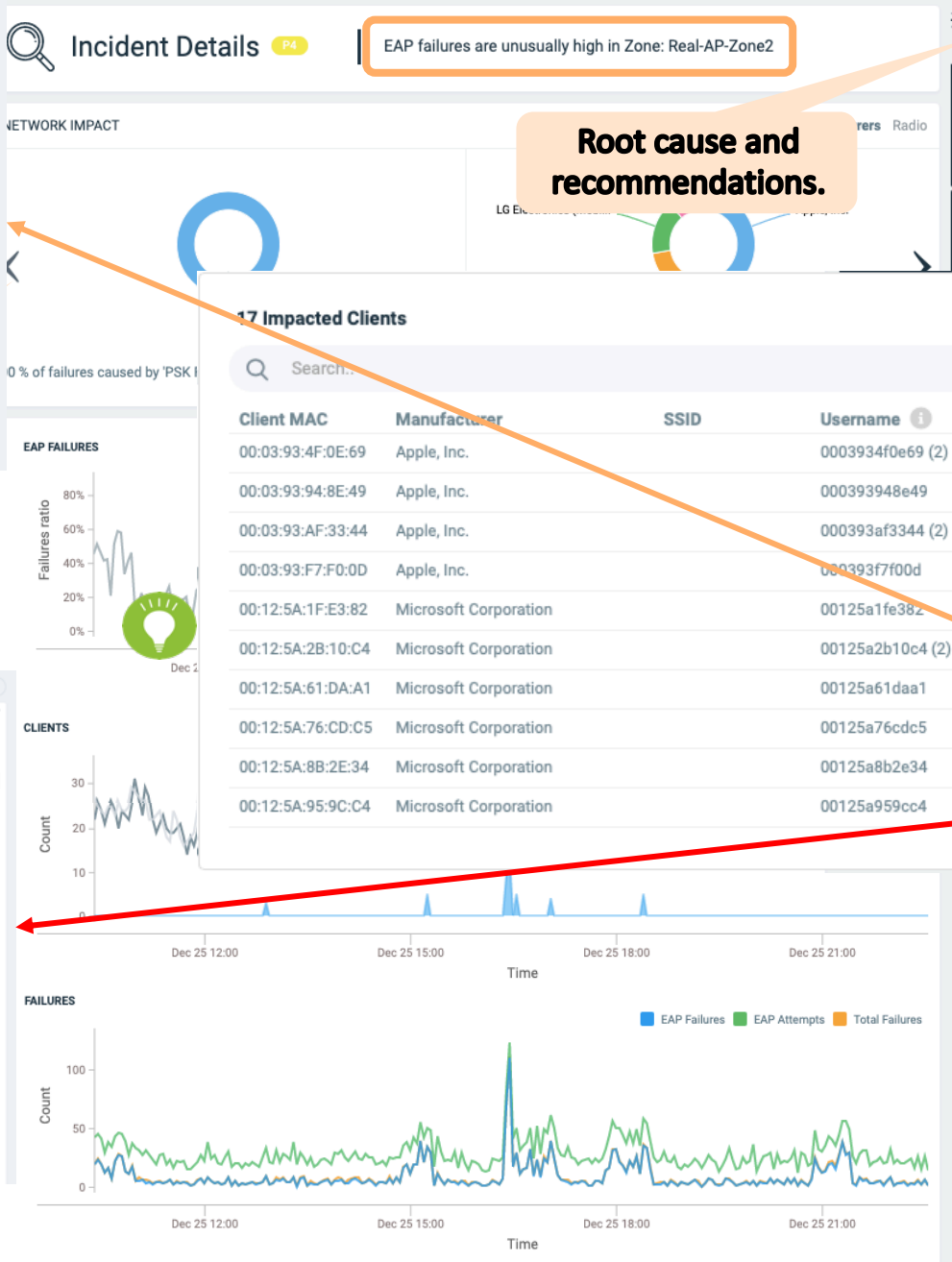
Incident Detection – Ir

ca page

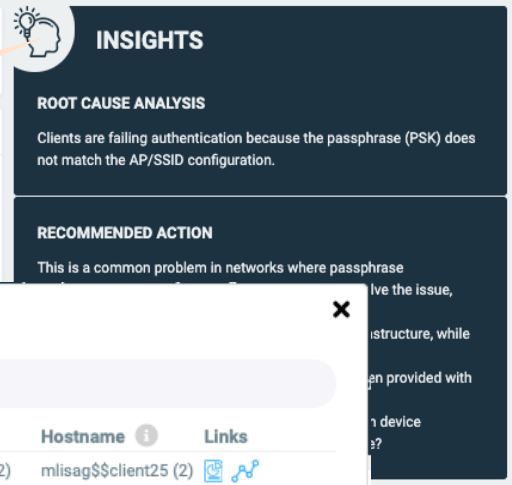


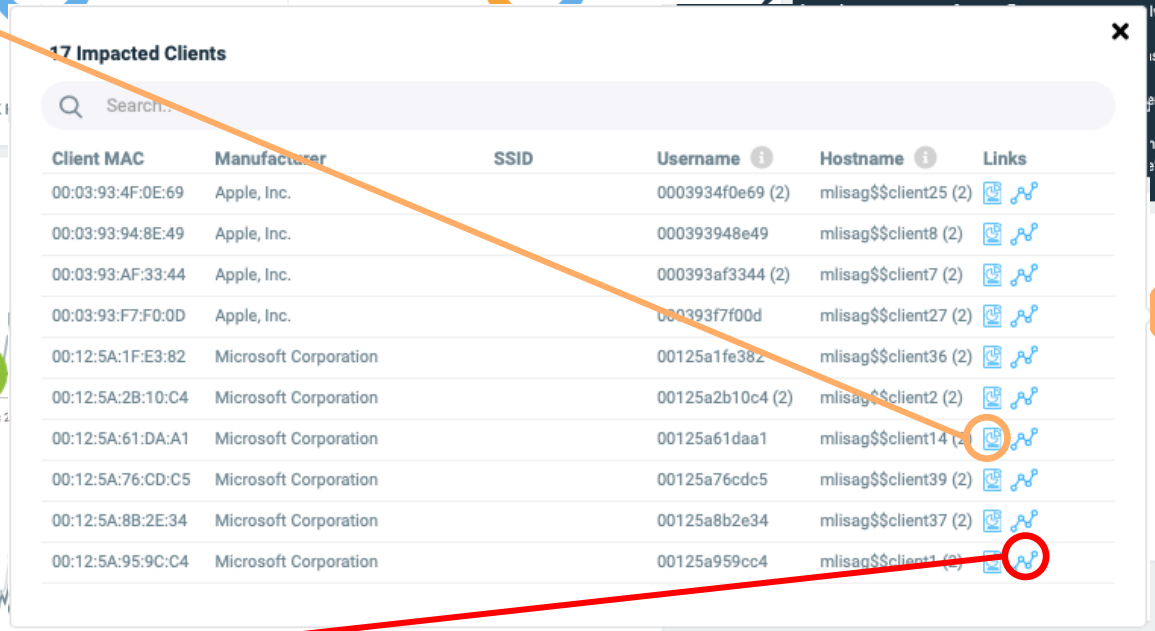
Carousel of 4 related pie charts.





Root cause and recommendations.





Summary of incident info.

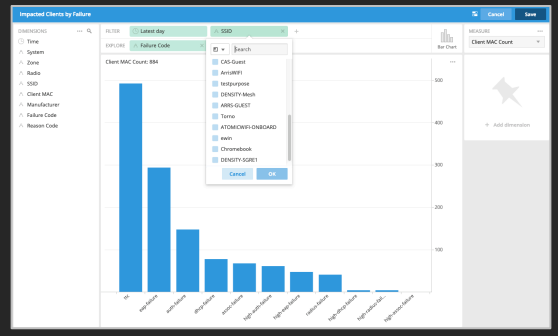
RUCKUS Analytics Core Features

Network Health Dashboard

ML-Driven Incidents

Client Troubleshooting

Robust 12-mo Reports



Custom Data Exploration

AP/WLAN Assurance

Q&A – Follow Up Items