
cisco Live!
Let's go

The bridge to possible

Cisco Spaces

How to turn your Wi-Fi Network into Location Based Intelligence

Peter Malic, Technical Solutions Architect

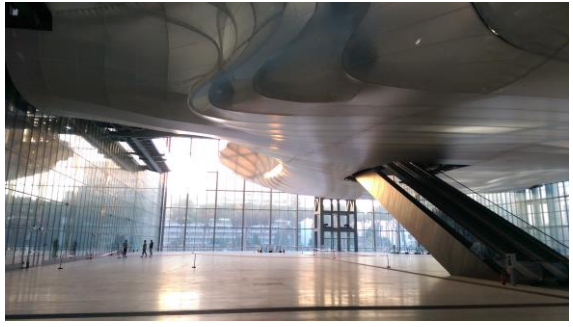
How do we calculate location indoors?

Agenda

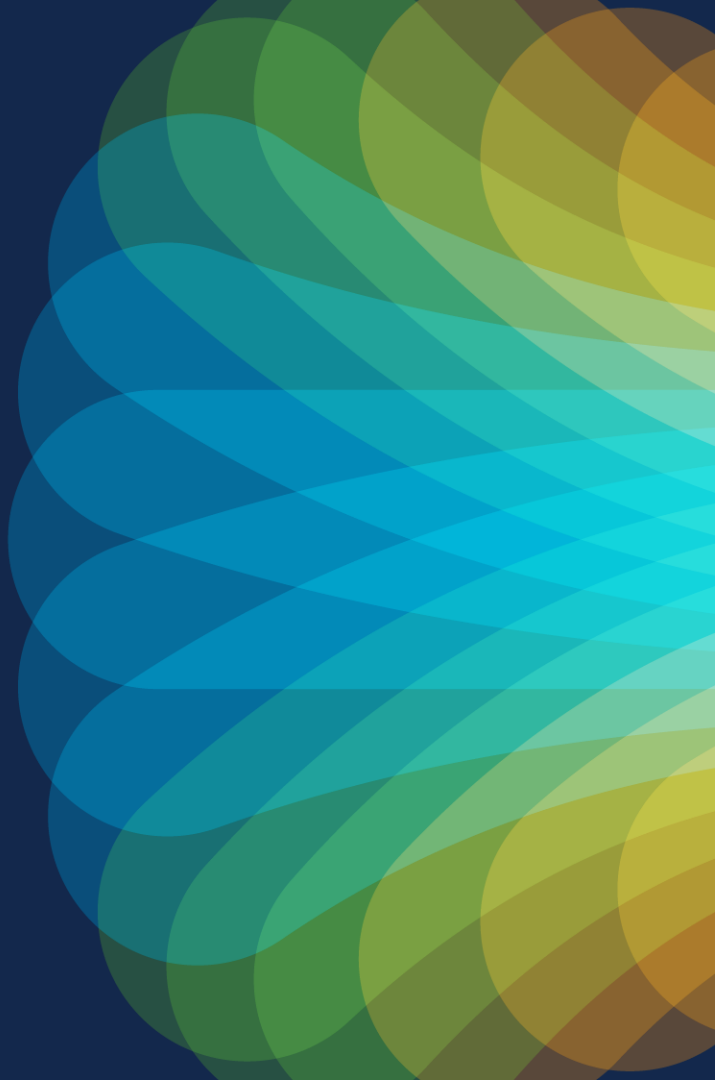
- Introduction
- Indoor Location
- Spaces Architecture
- Deploying Spaces
- Out of the box Location features
- Summary and next steps

Peter Malic

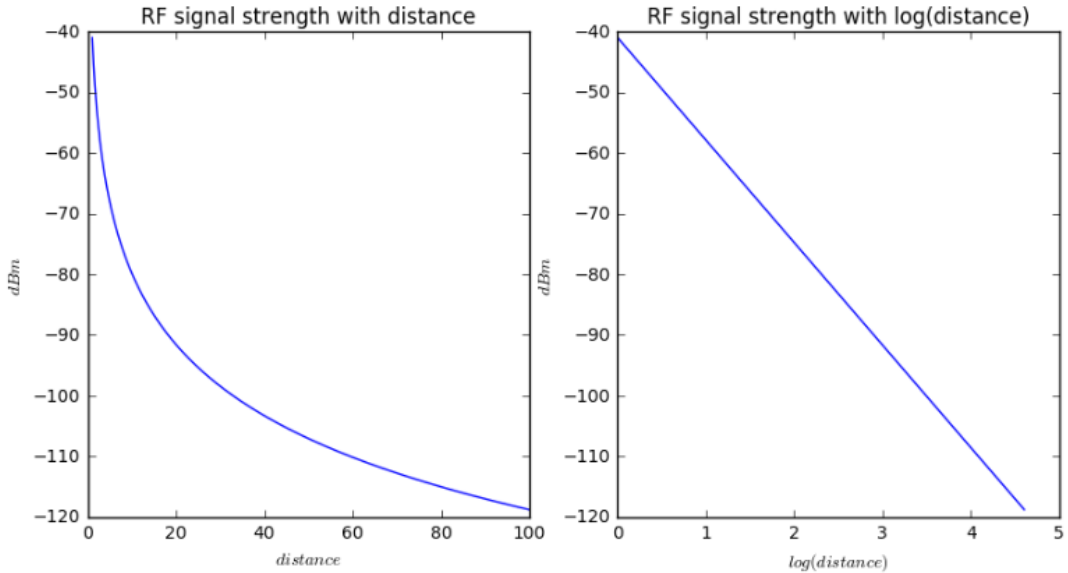
- 2014 as Wireless engineer
- Various roles, different teams, different organizations
- CCIE Enterprise Wireless
- Coffee
- Audio tech
- 2 kids
- Currently IIOT TSA



Indoor Location



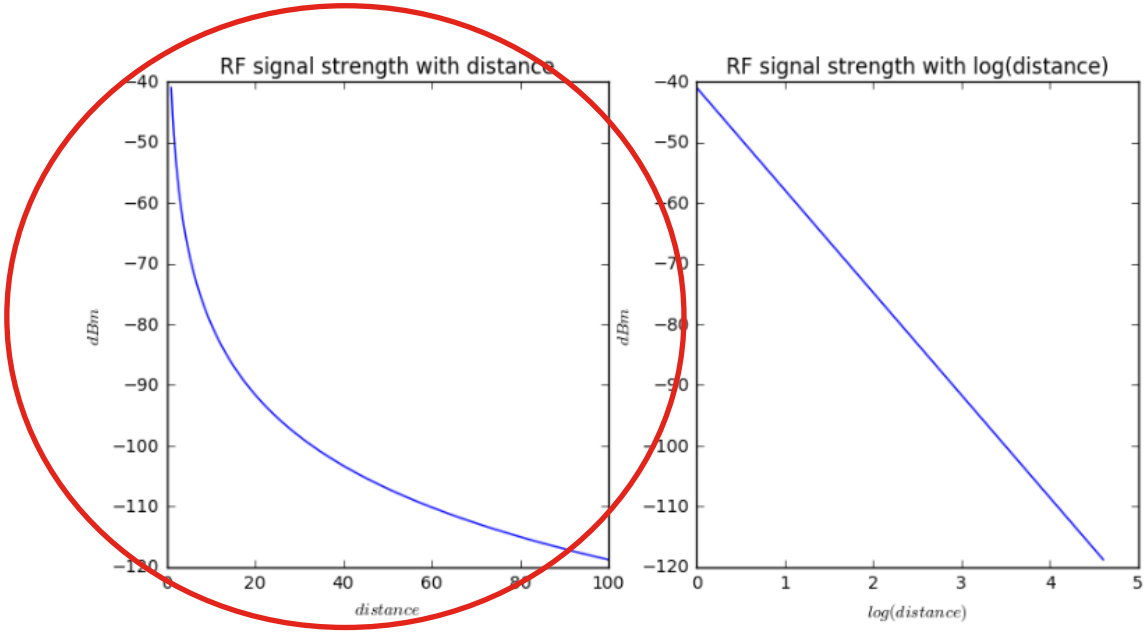
How do we calculate location indoors (2)



Radio signal strength is a function of distance: f(distance) = RSSI

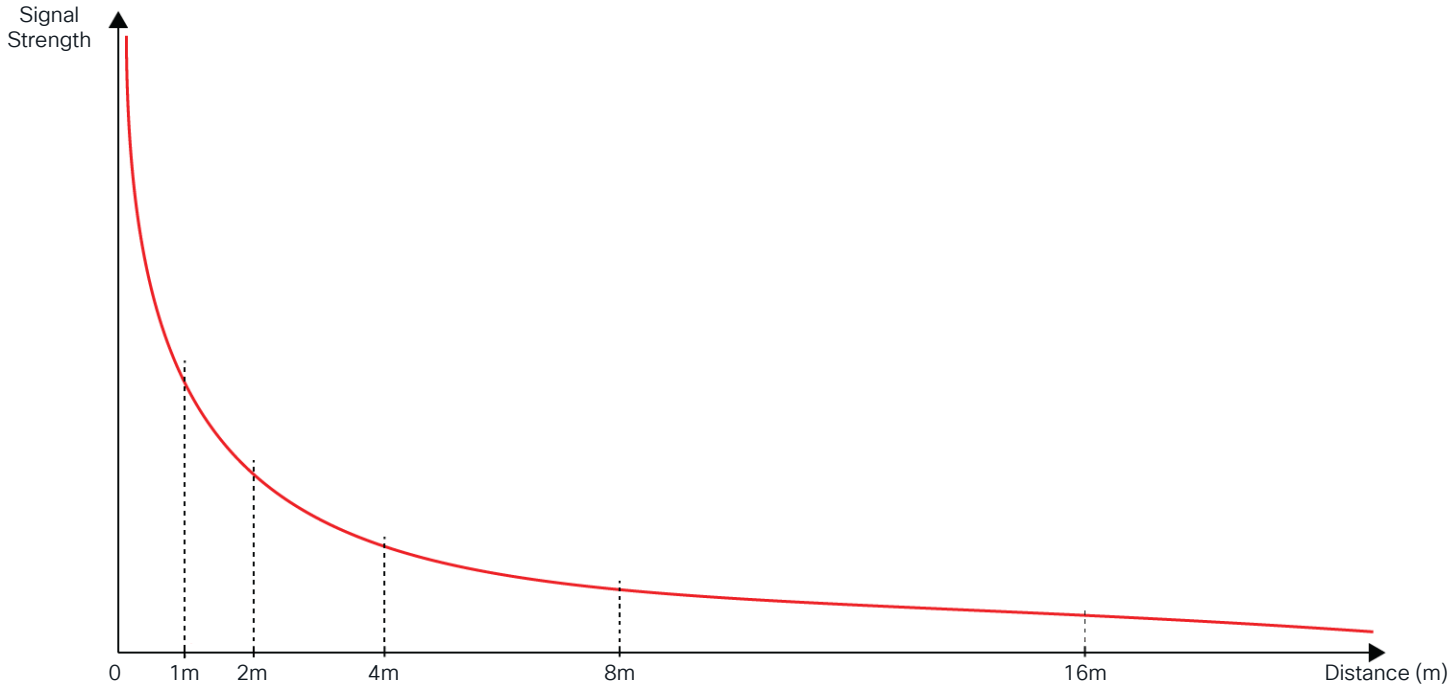
How do we calculate location indoors (3)

Zoom IN

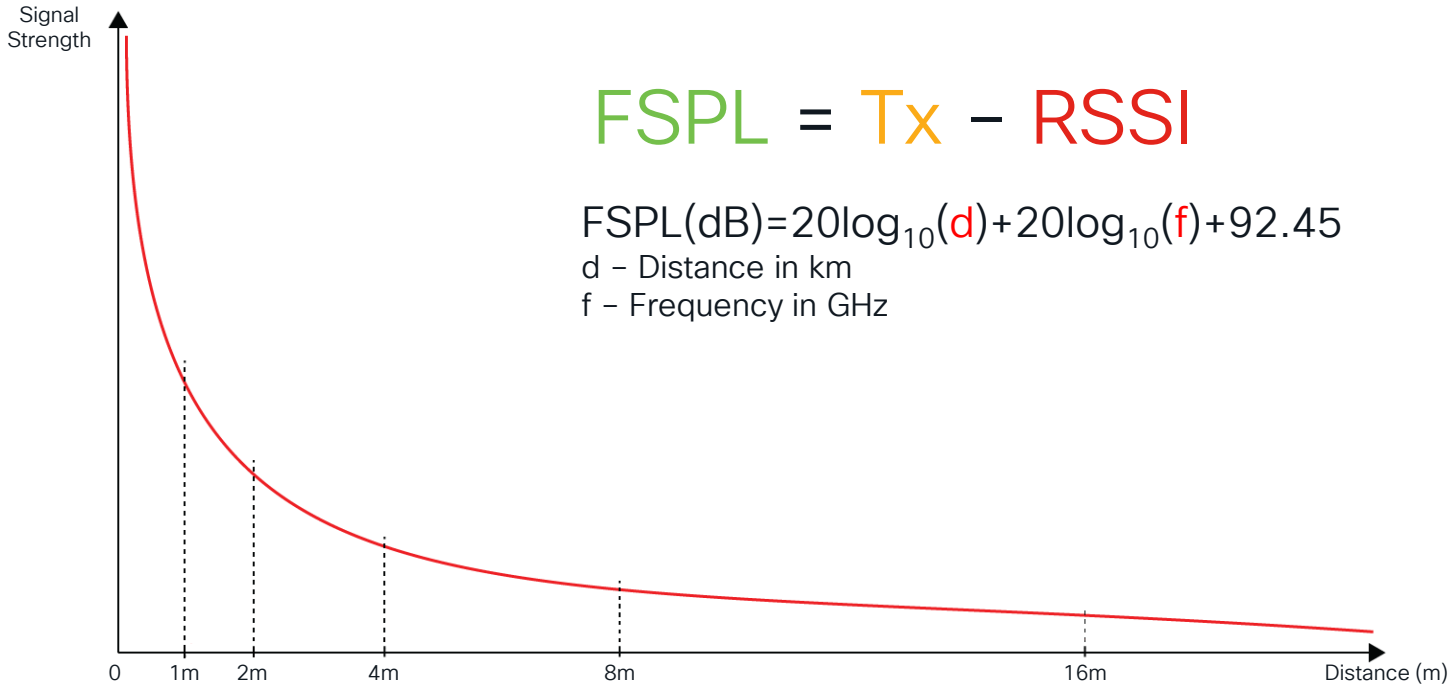


Radio signal strength is a function of distance: f(distance) = RSSI

How do we calculate location indoors (4)



How do we calculate location indoors (5)



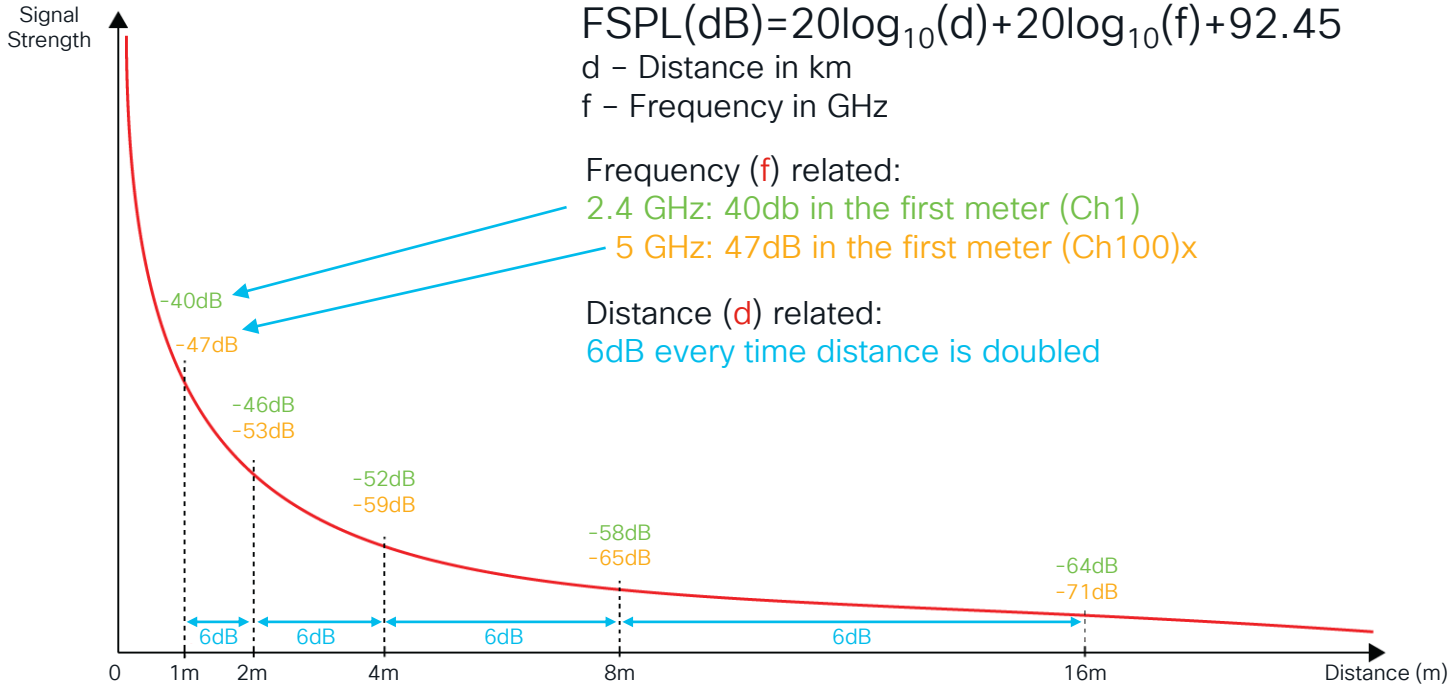
$$FSPL = Tx - RSSI$$

$$FSPL(dB)=20\log_{10}(d)+20\log_{10}(f)+92.45$$

d – Distance in km

f – Frequency in GHz

How do we calculate location indoors (6)



$$FSPL(dB)=20\log_{10}(d)+20\log_{10}(f)+92.45$$

d – Distance in km

f – Frequency in GHz

Frequency (f) related:

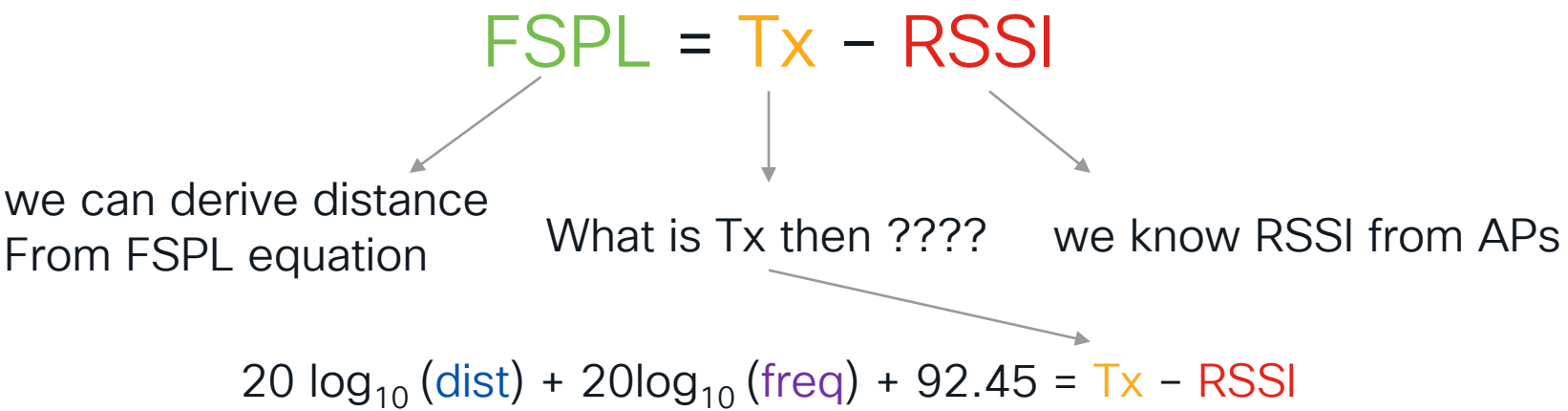
2.4 GHz: 40db in the first meter (Ch1)

5 GHz: 47dB in the first meter (Ch100)x

Distance (d) related:

6dB every time distance is doubled

How do we get the distance?



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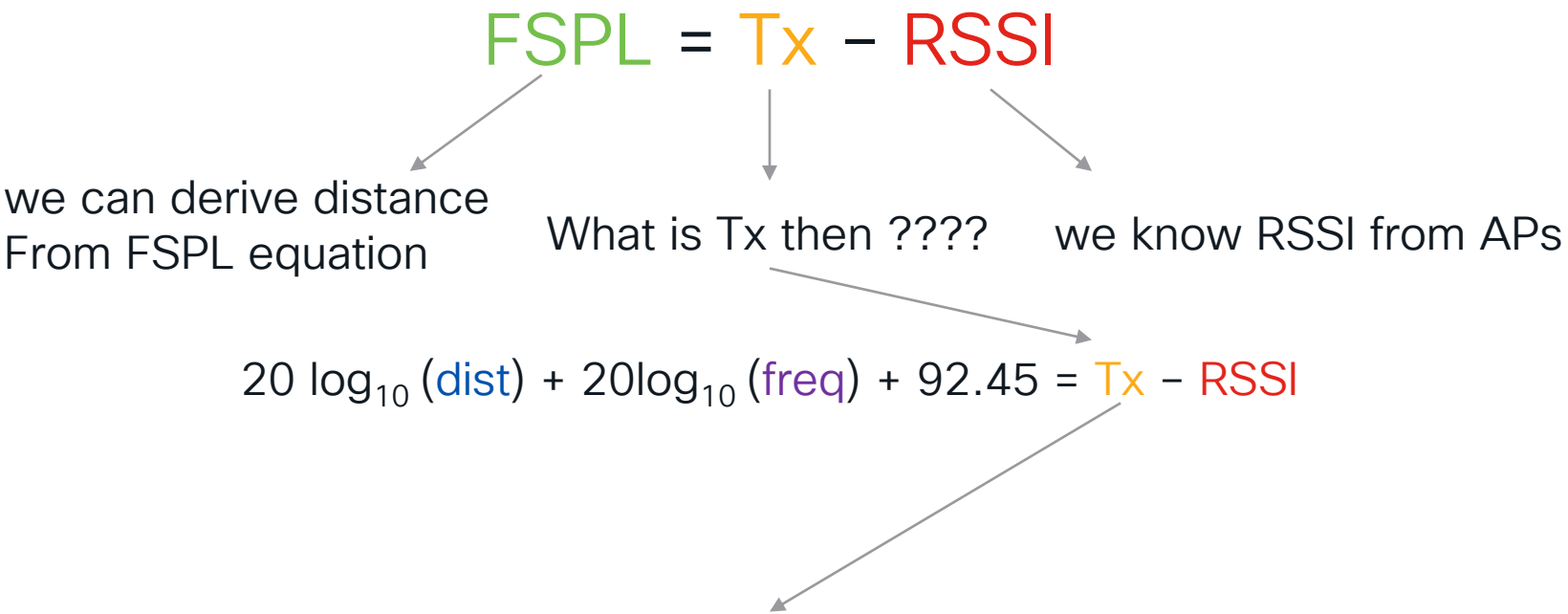
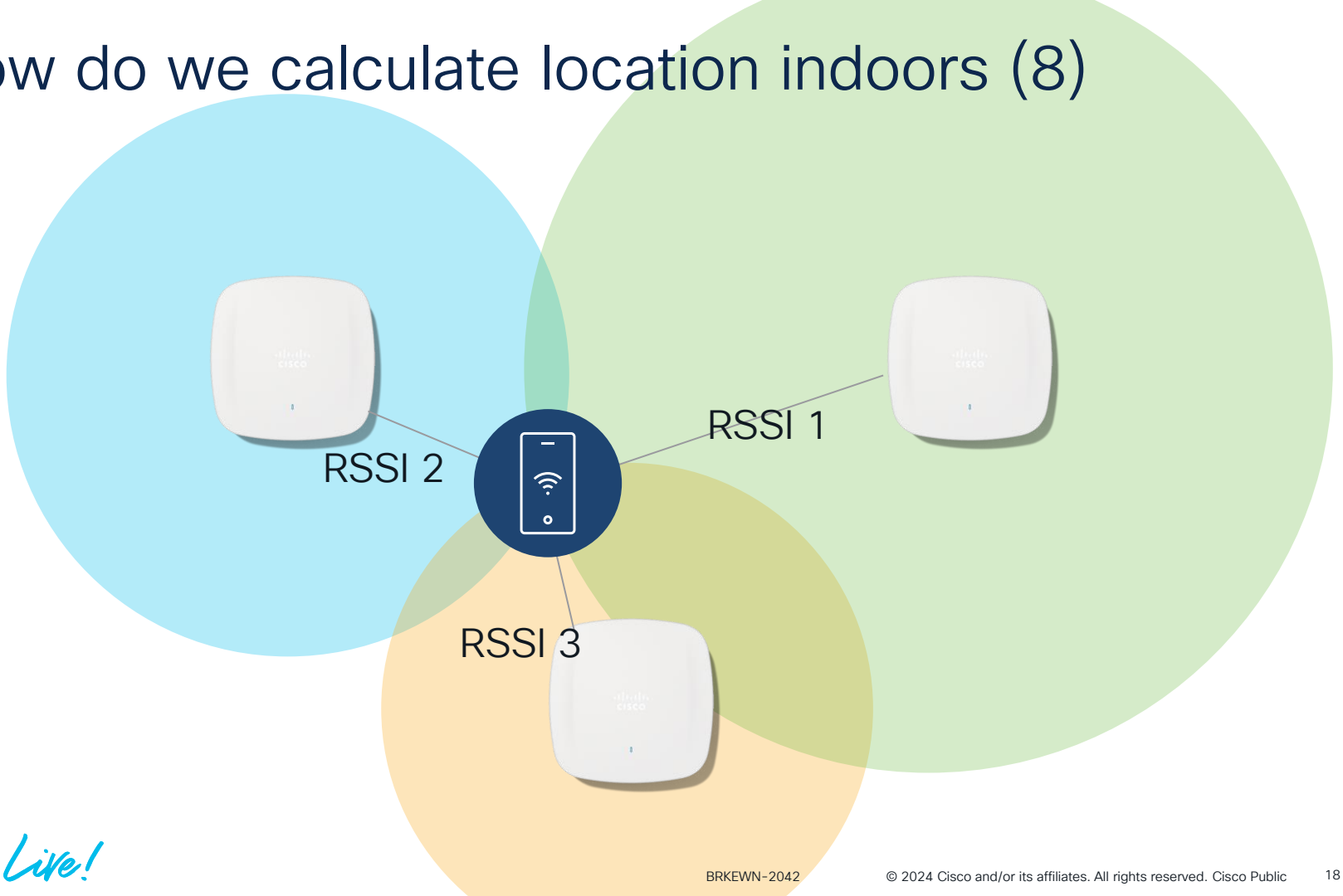


Example of client location

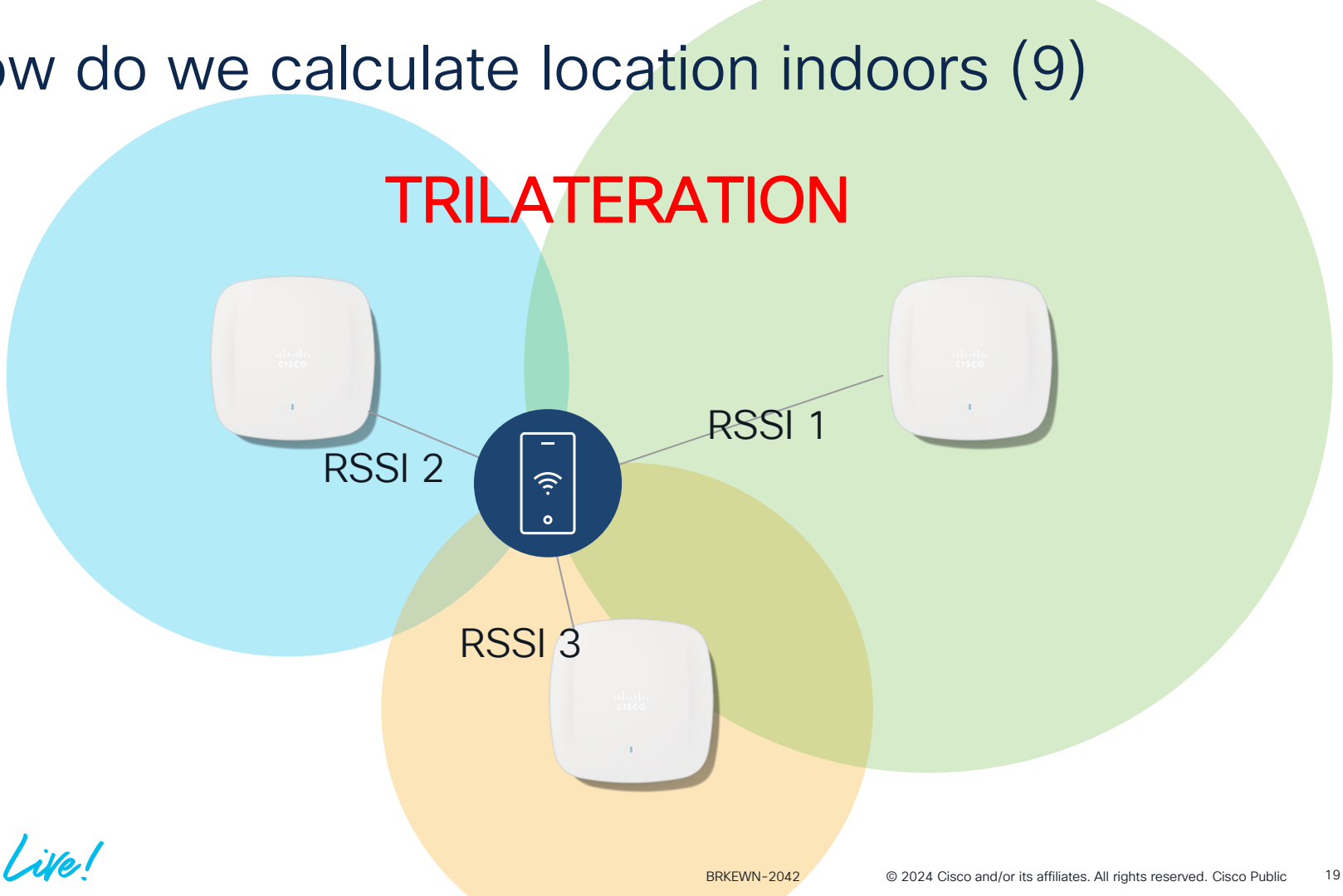
Device @5GHz	Transmit Power (RSSI)	Received Power	Calculated Distance	Error
DEVICE A	19dBm (real)	-44dBm	6.7mtrs	
DEVICE A	15dBm (assumed)	-44dBm	4.3mtrs	-2.3mtrs

We did not even start talking about environment yet!!

How do we calculate location indoors (8)



How do we calculate location indoors (9)



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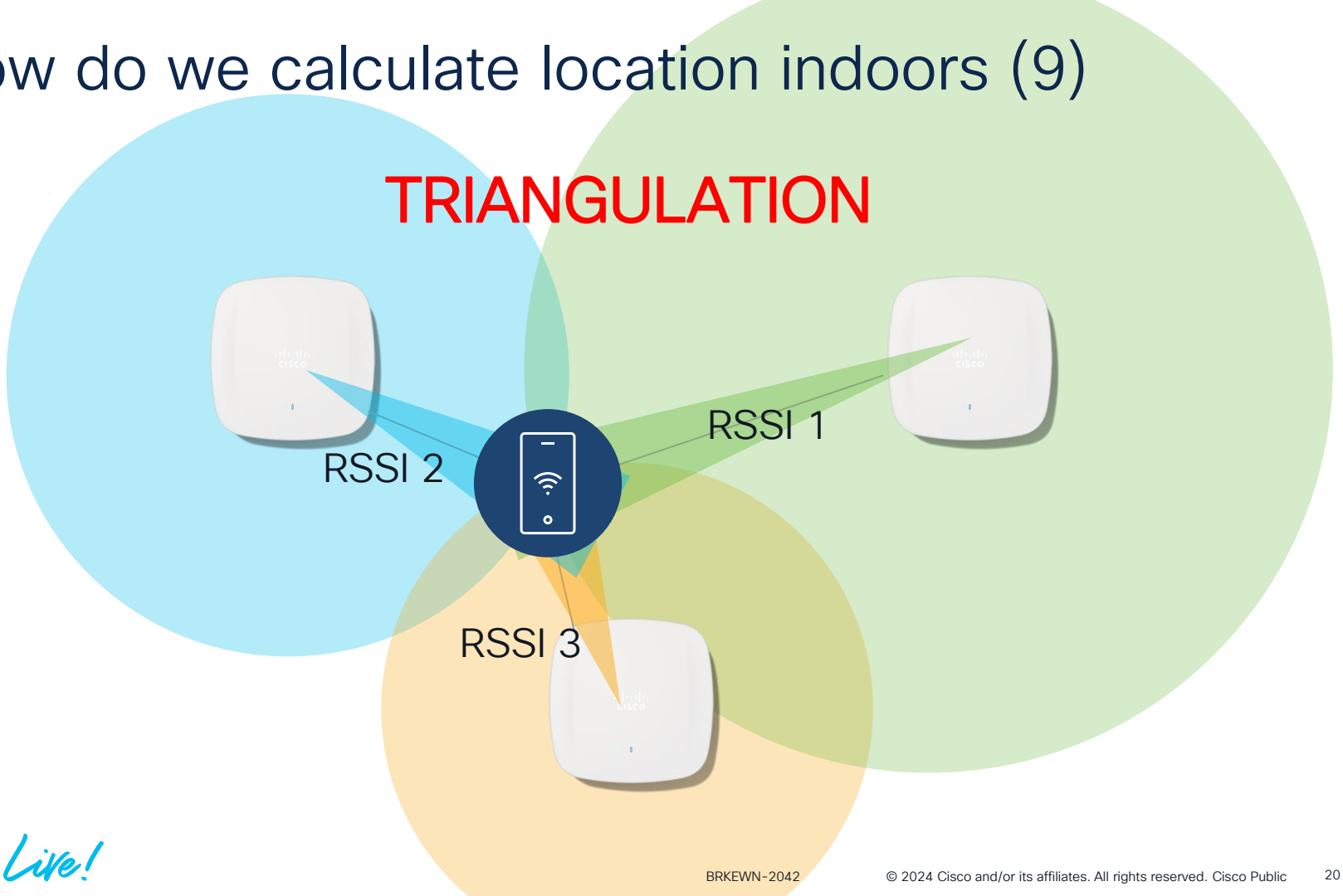
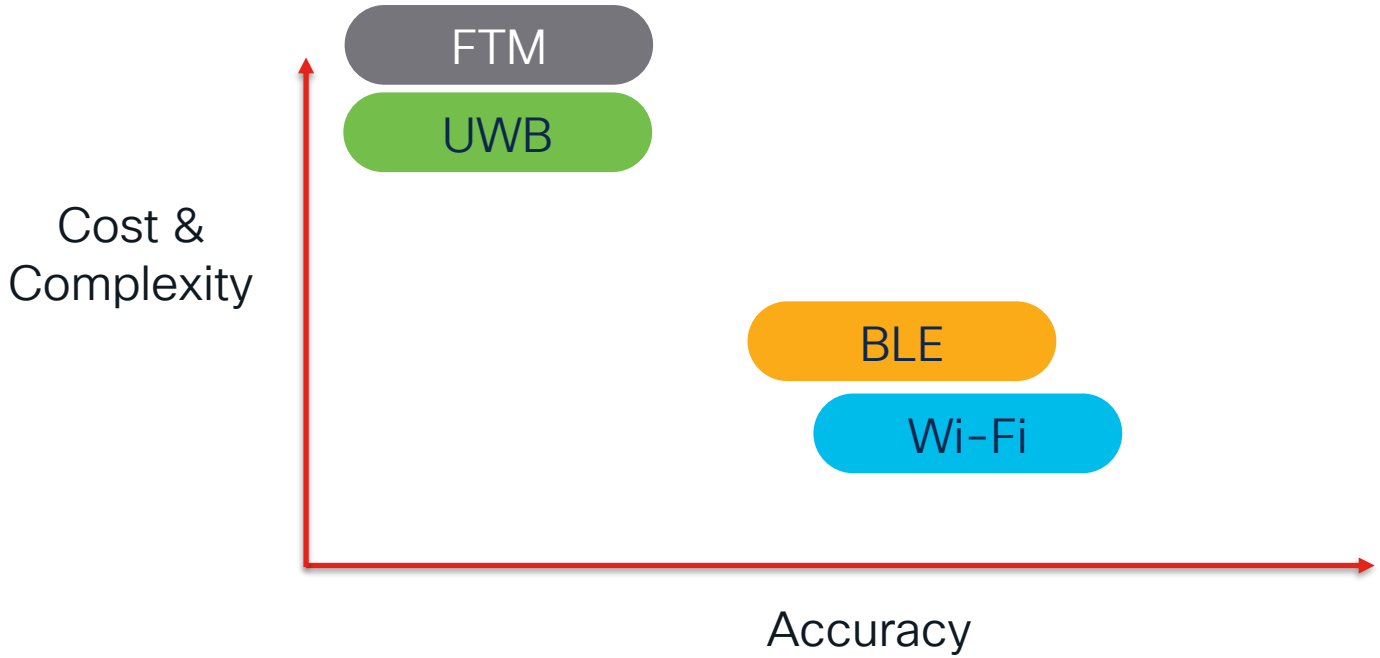
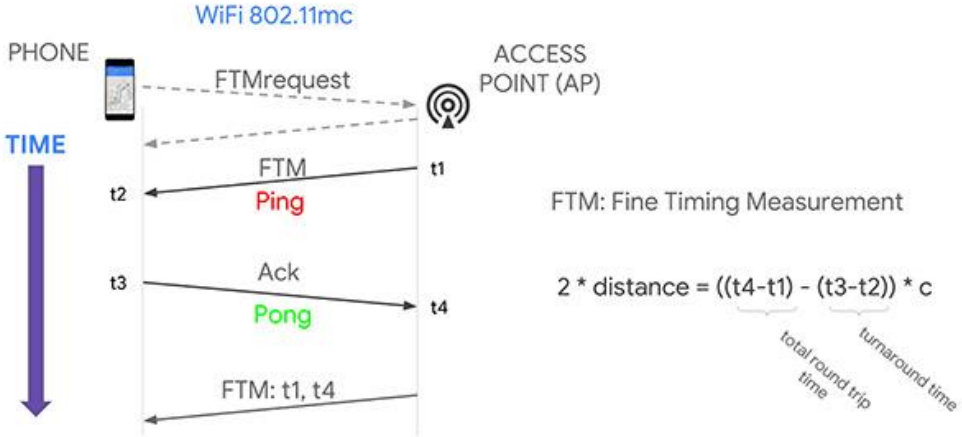


Are there any other methods?



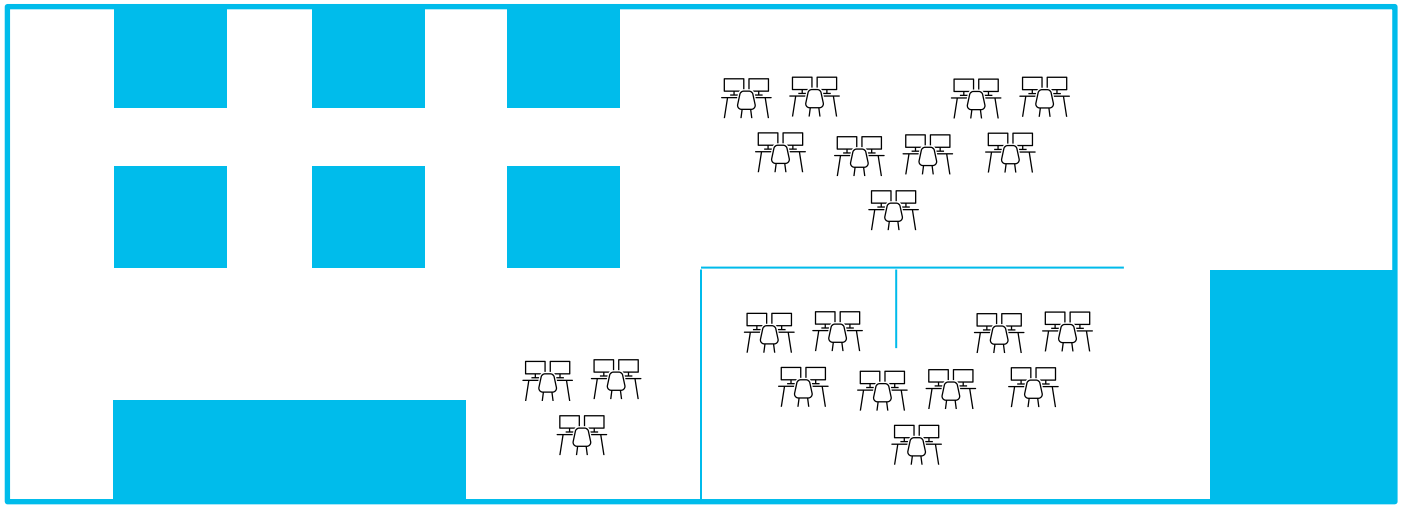
FTM – Fine Time Measurement

- Resilient than RSSI as its RTT based
- Disruptive operation in certain cases
- Needs Calibration to compensate antenna and firmware delays
- Higher the bandwidth lower the sampling delay, better the accuracy
- Performed on 5Ghz and 6Ghz



AP Placement

How and where to put Aps?



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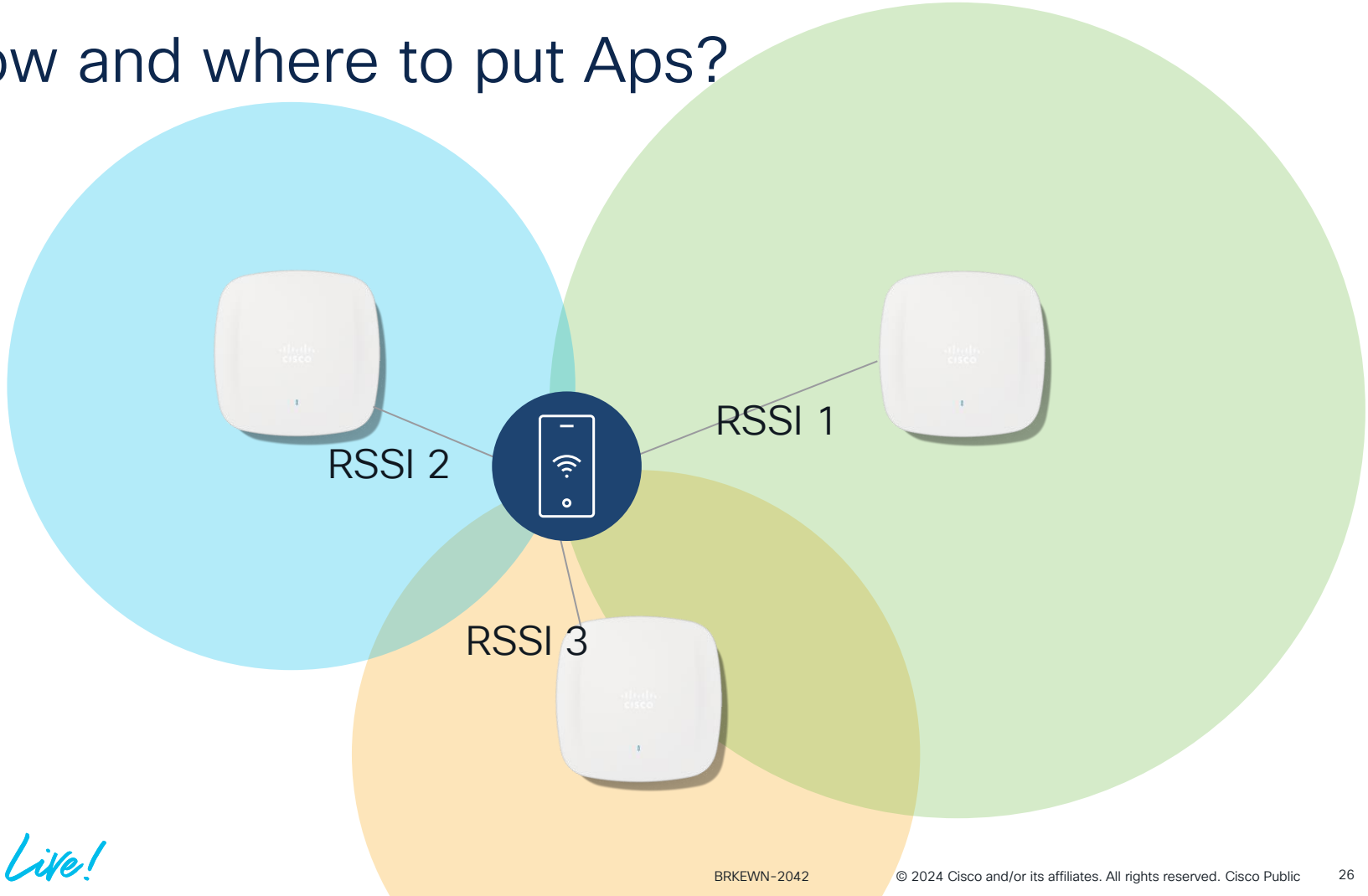

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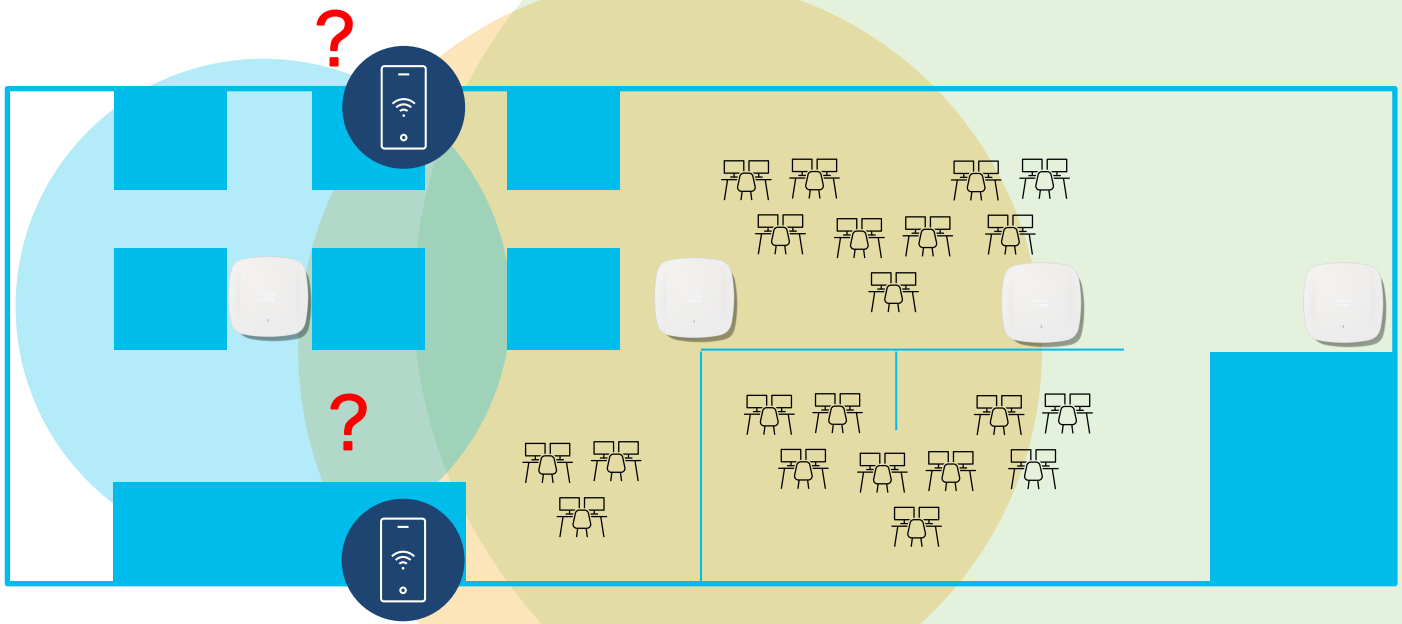

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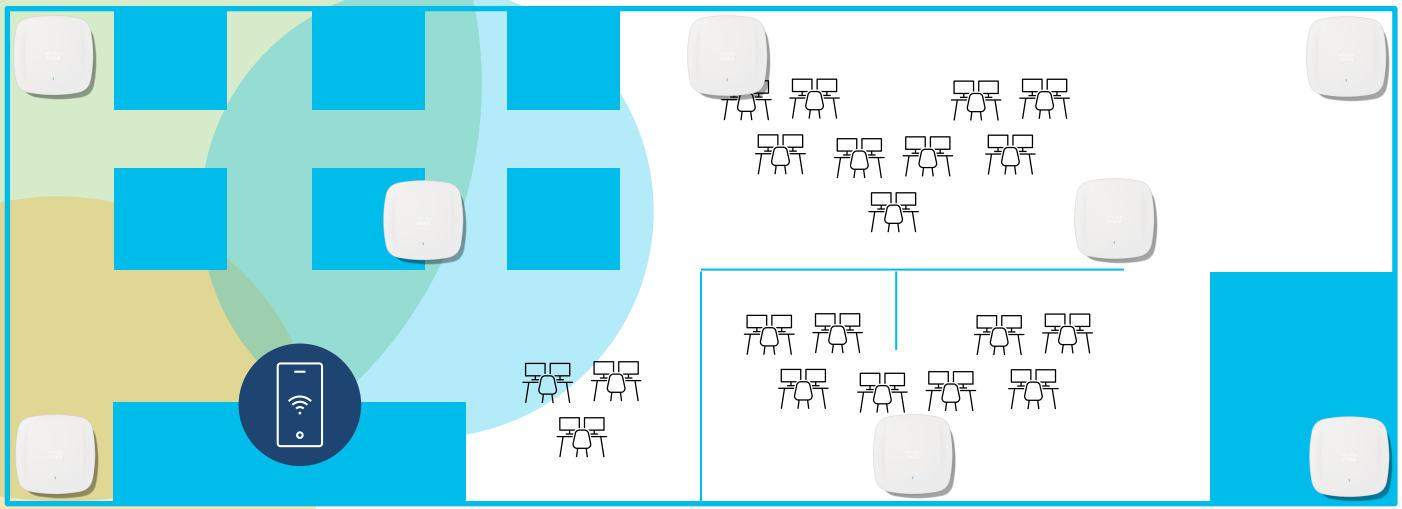
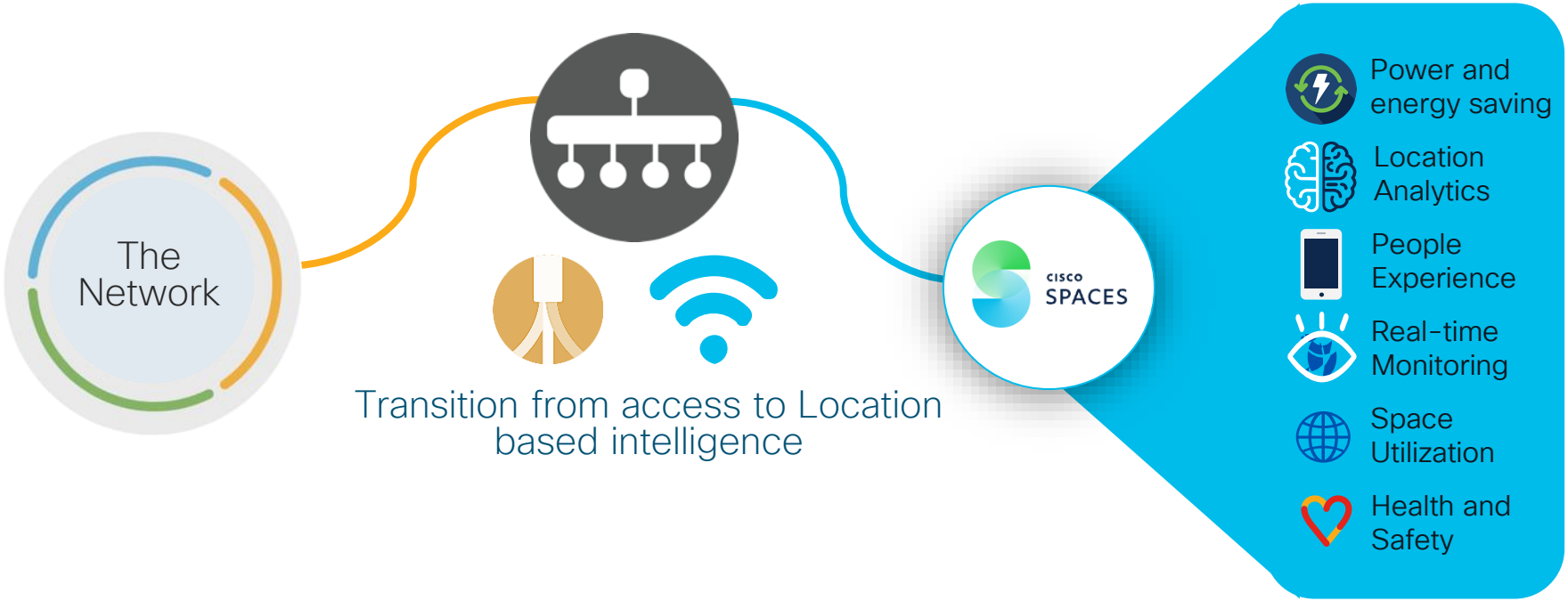


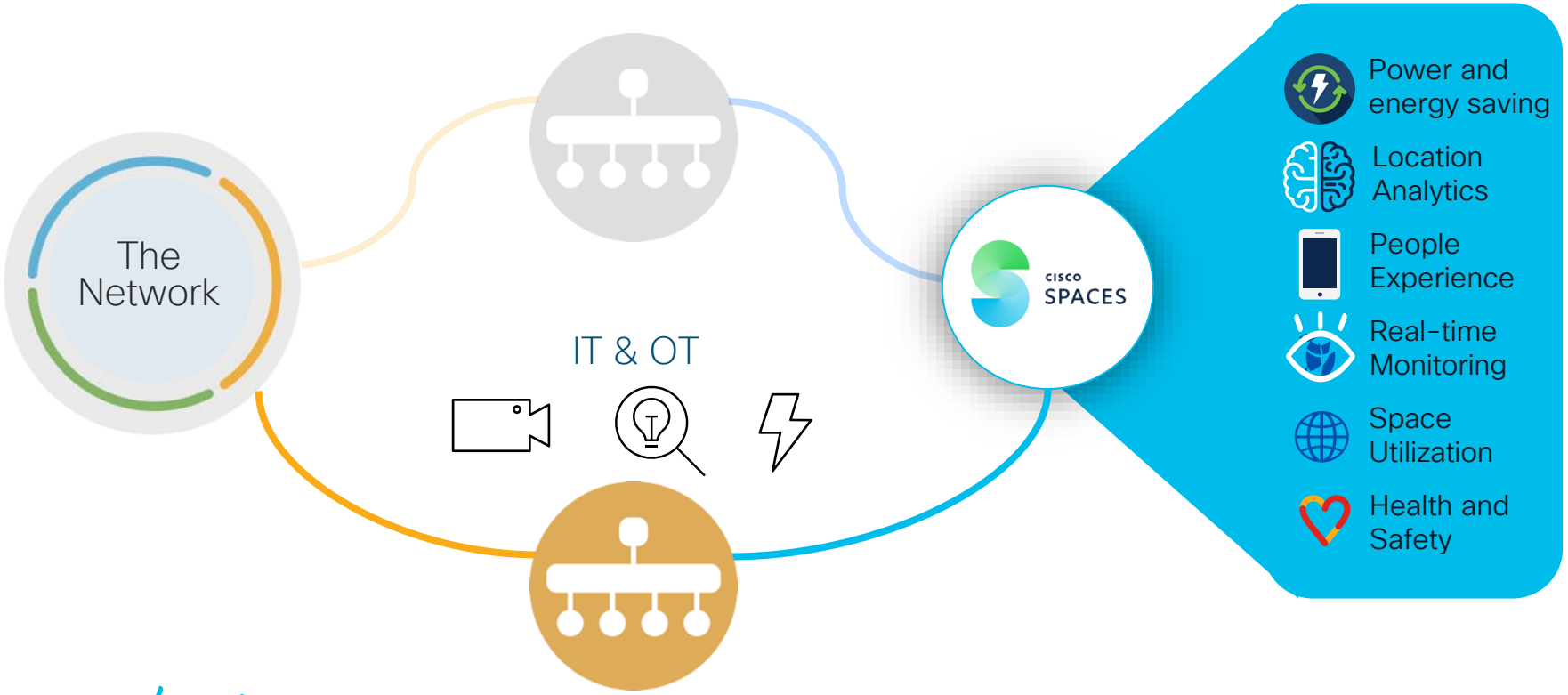
Cisco Spaces Capabilities

Use your network as foundation



Transition from access to Location based intelligence

Use your network as foundation



High-Level Cisco Spaces Setup Flow

01

Activate Cisco Spaces Account

- Activate Account for Purchased licensing
- Start a Free Trial

02

Integrate Wi-Fi Components

- Install Connector
- Integrate AireOS/Catalyst WLC
- Integrate with Meraki

03

Build Location Hierarchy

- Import Wi-Fi Maps
- Organize Meraki Networks
- Fill in Location Data

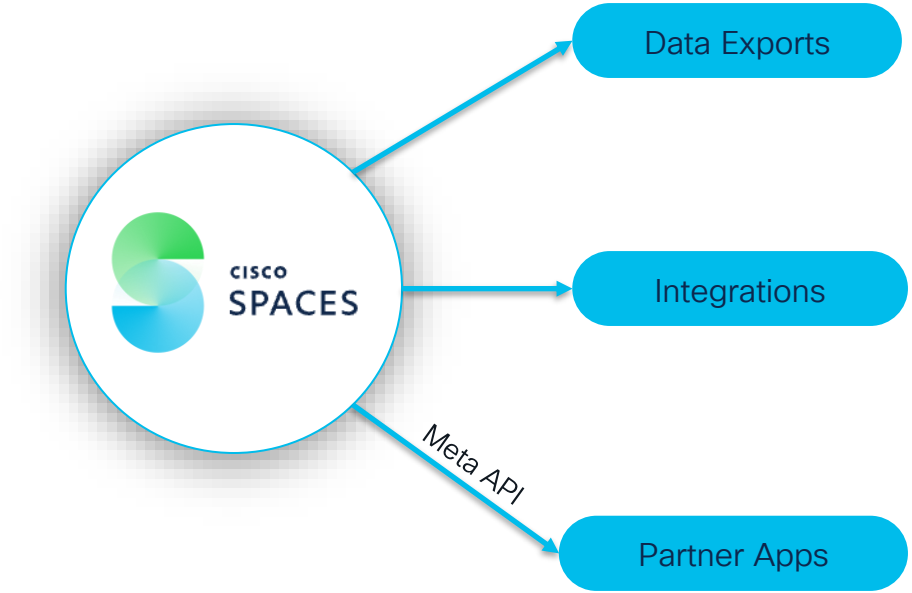
04

Use Cisco Spaces Apps

- Start Using Apps
- Define Rules to Power Apps

Architecture and Deployment

Cisco Spaces Architecture



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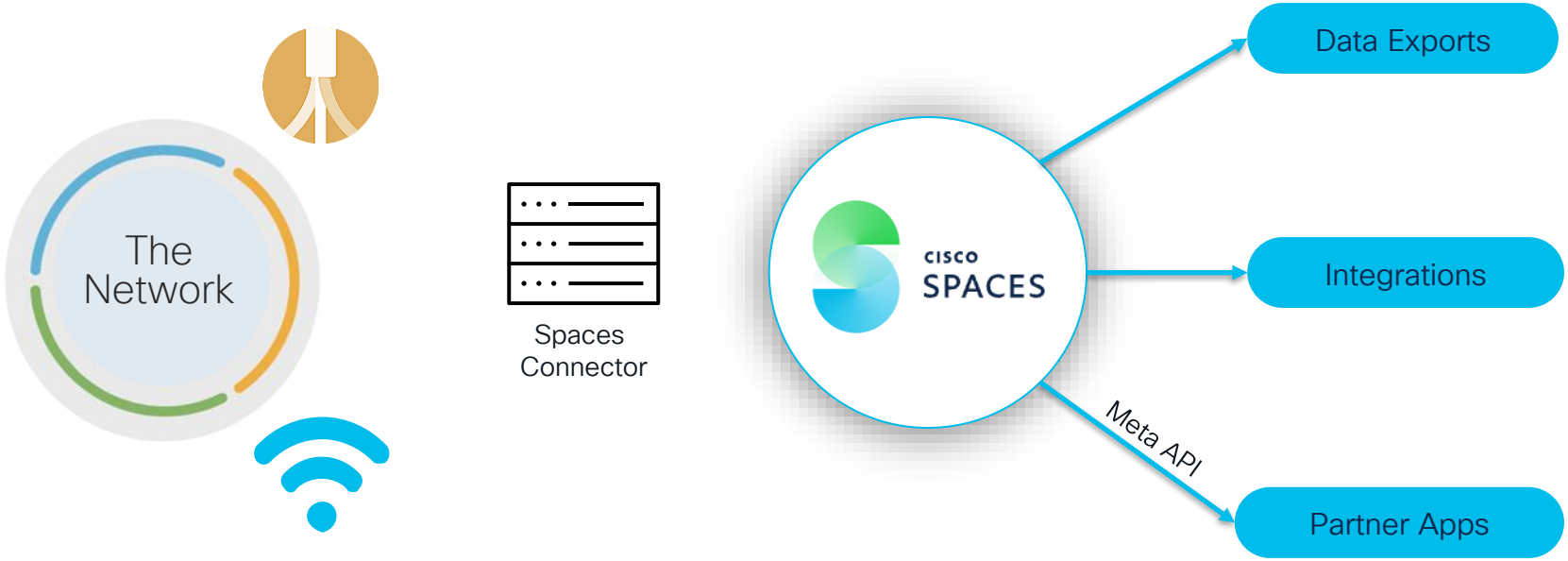

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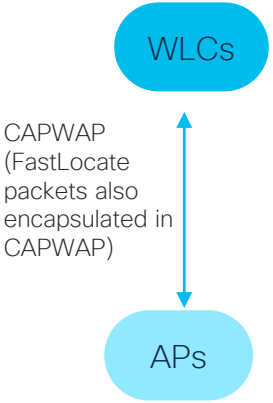

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	52.20.144.155
US Setup	34.231.154.95
	63.33.127.190
EU Setup	63.33.175.64
	13.228.159.49
Singapore Setup (SG)	54.179.105.241
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	54.176.92.81
US Setup	54.183.58.225
	3.122.15.26
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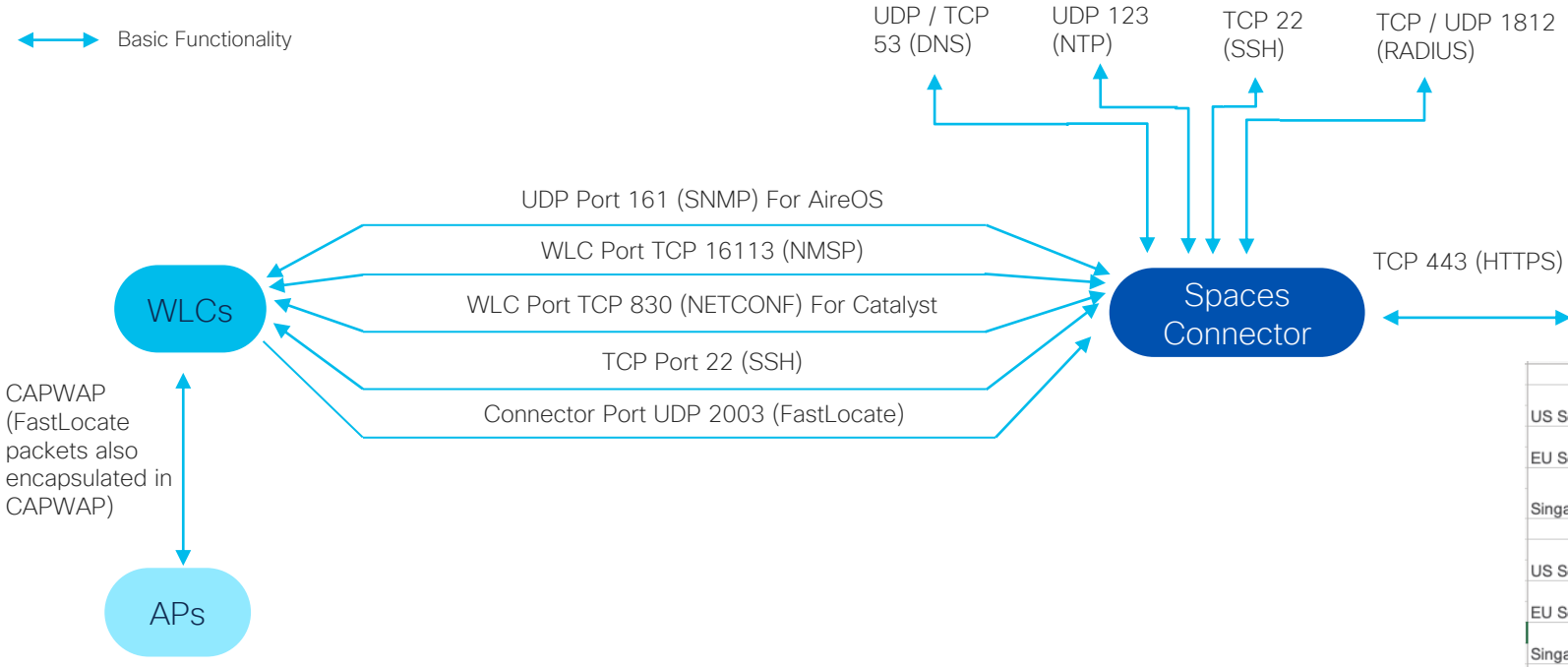
Catalyst Switches

Cisco Spaces Architecture



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Note the connectivity requirement between AP and connector. Important for AWS based connector or FlexConnect AP

Catalyst Switches

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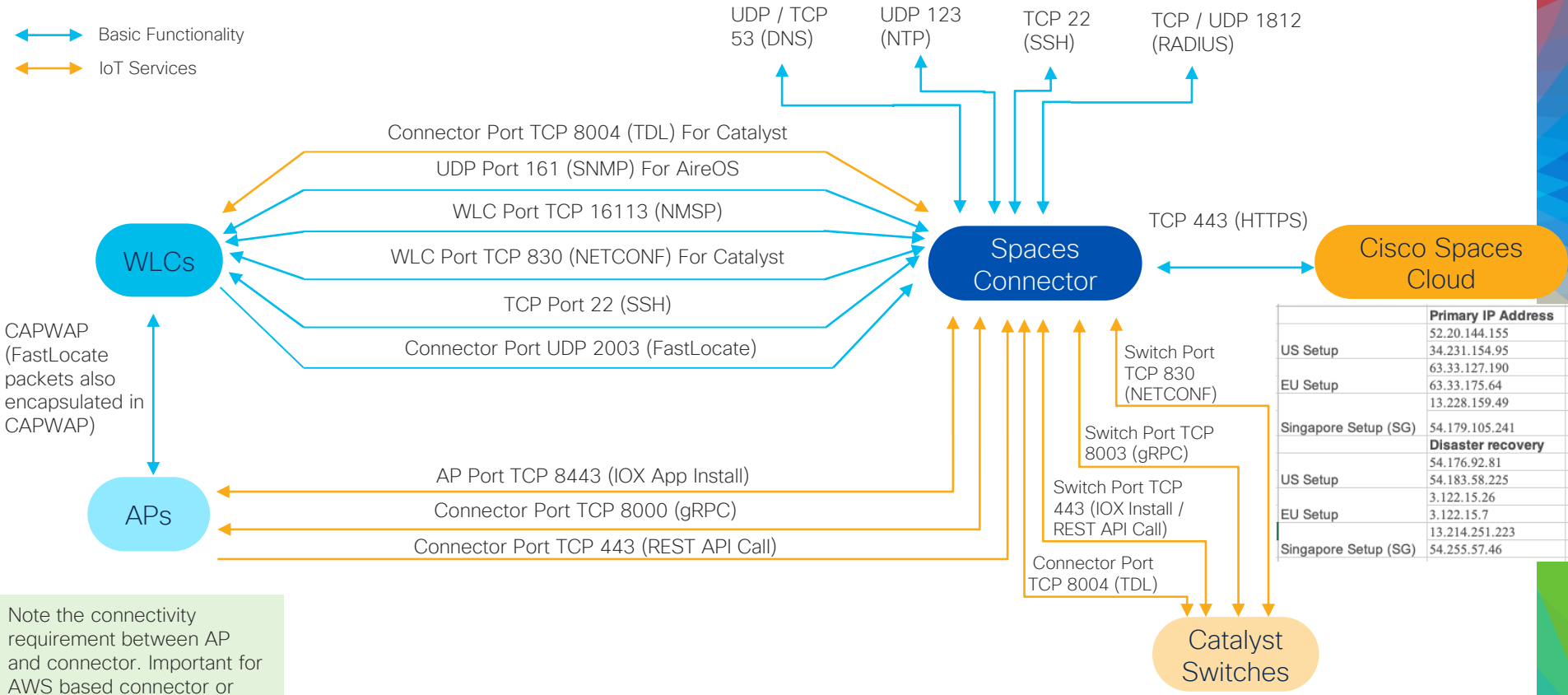

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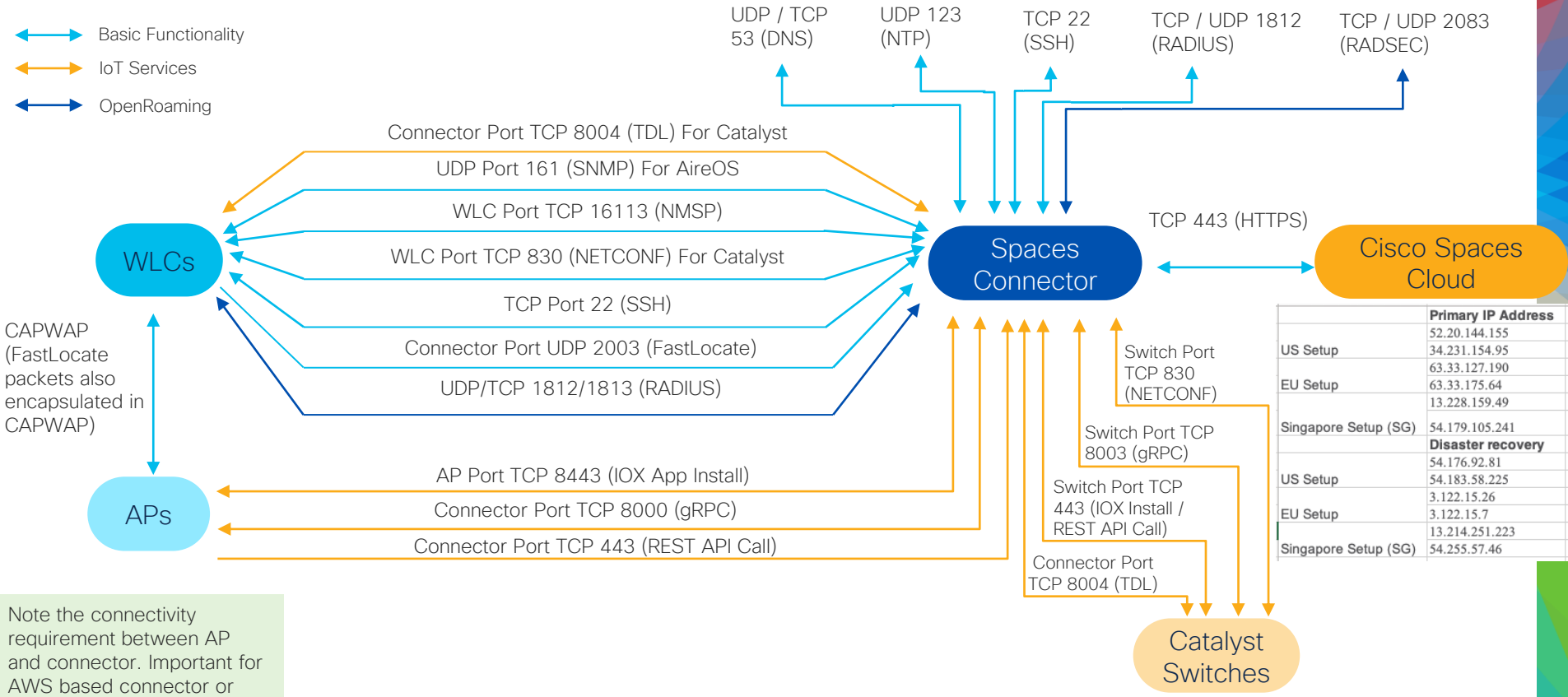

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Note the connectivity requirement between AP and connector. Important for AWS based connector or FlexConnect AP

Why Cisco Spaces Connector ?

- Recommended way of connecting your network to Cisco Spaces Cloud
- Free VM to download in OVA form
- Created to handle high scale and performance, security and HA
- “Lightweight” and easy to deploy control point towards your cloud (open ports HERE)
- One Connector can support multiple WLCs (Max 16 recommended)
- Dual interface option available for easier firewall configurations and DMZ deployments

OVA Type	vCPU	RAM	Storage (HDD OK) 2.X / 3.X
Standard (Recommended for most deployments)	2	4 GB	60 GB / 120 GB
Advanced 1	4	8 GB	60 GB / 120 GB
Advanced 2	8	16 GB	60 GB / 120 GB

*Always refer to release notes for each version

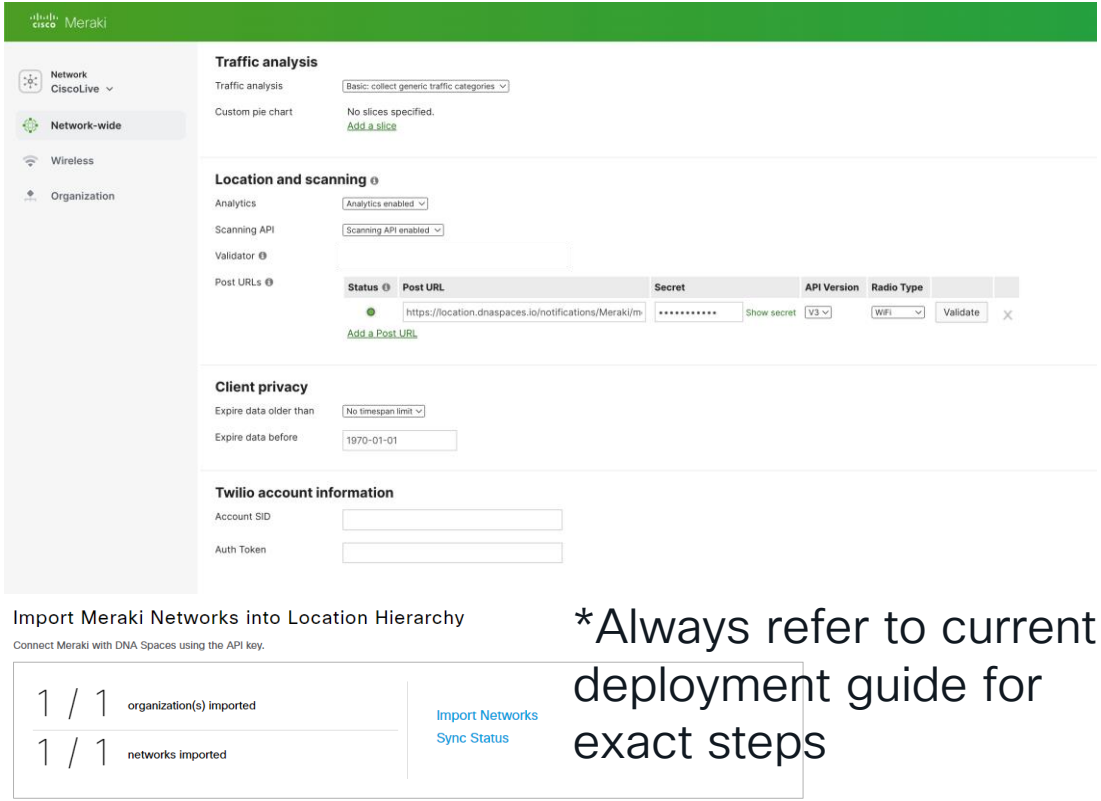
Spaces Connector 3.X

- Modular architecture
- Makes future upgrades easier
- Detailed service-based metrics for monitoring
- New troubleshooting section for diagnostic checks

*Always refer to release notes for each version

Connect Meraki Network

- Enable Analytics and Scanning API key in Meraki dahsboard
- Add and configure a Post URL
- Import networks in Spaces dahsboard
- After adding Meraki networks into the Location hierarchy created Meraki maps will be imported into Spaces Map Services



*Always refer to current deployment guide for exact steps

Few more steps before we are up and running

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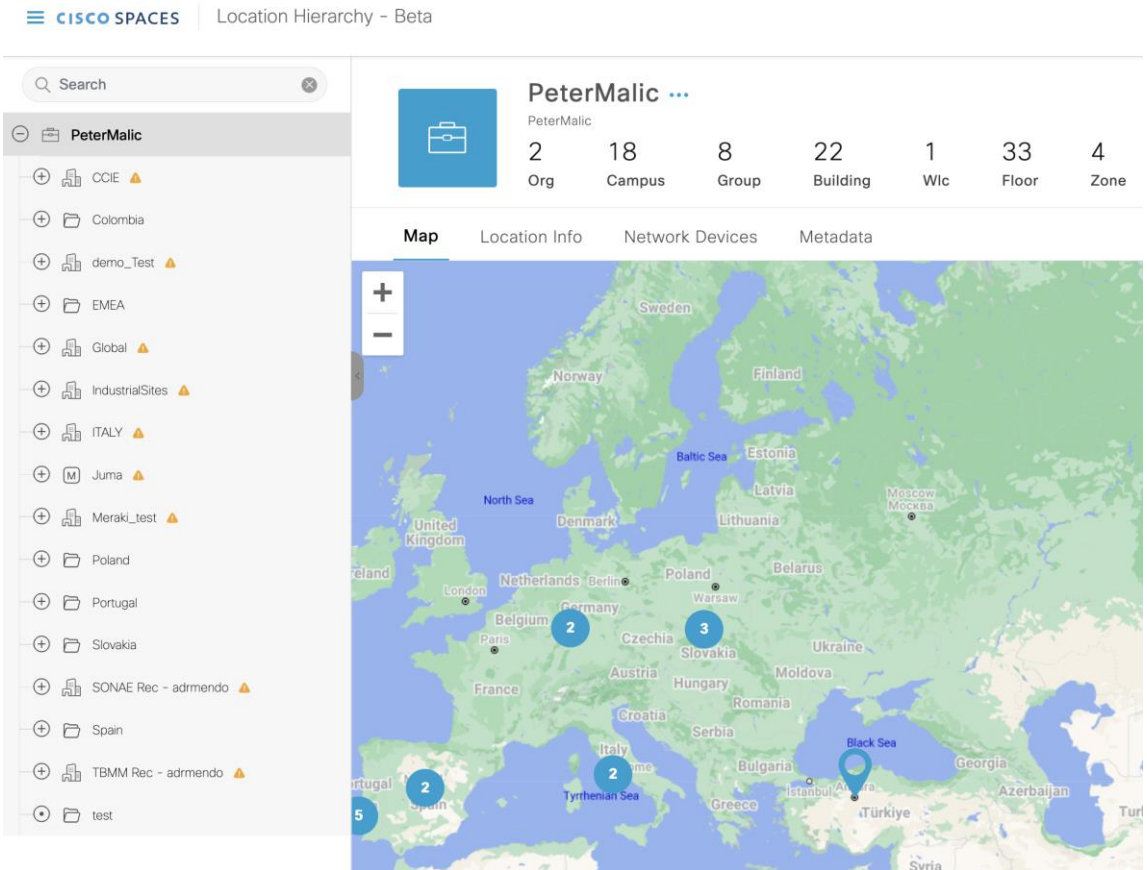
Start with Location Hierarchy in Cisco Spaces



Moving from using existing network hierarchy structure to a facilities/ business hierarchy

Start with Location Hierarchy in Cisco Spaces

- Creating a good location hierarchy is highly recommended in Cisco Spaces!
- Translates IT based hierarchy to business taxonomy

Pre-requisite for many Apps

Using Catalyst Center or PI Maps (Recommended)	Import the Hierarchy present in DNA Center or Prime Infrastructure along with floor maps, AP placements and calibration information.
Creating Location Hierarchy Manually	Only use if maps are not available. Import the controller and manually create different node and Select APs.
Via Meraki Networks	Meraki networks are imported into the location hierarchy and follow the structure as defined in Meraki.

Location hierarchy and maps

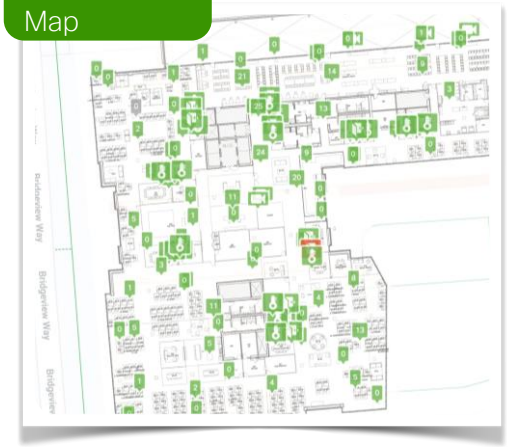
Prerequisite or highly recommended for majority of Applications

- Creating a good location hierarchy is **highly recommended** in Cisco Spaces!
- Translates IT based hierarchy to **business taxonomy**.
- Add **Exclusion and Inclusion Zones in the maps** for best accuracy of calculated locations in Detect and Locate
- Create **accurate floor maps** for best granularity and accuracy of location calculations and analytics.
- **Add accurate metadata** to the nodes of Location Hierarchy for highest value. Example: Area of building / floors, occupancy limits, tags, address and time zone etc.
- Create **sub-zones or groups in Hierarchy** for use in other applications and rule engines

Building Rich Map

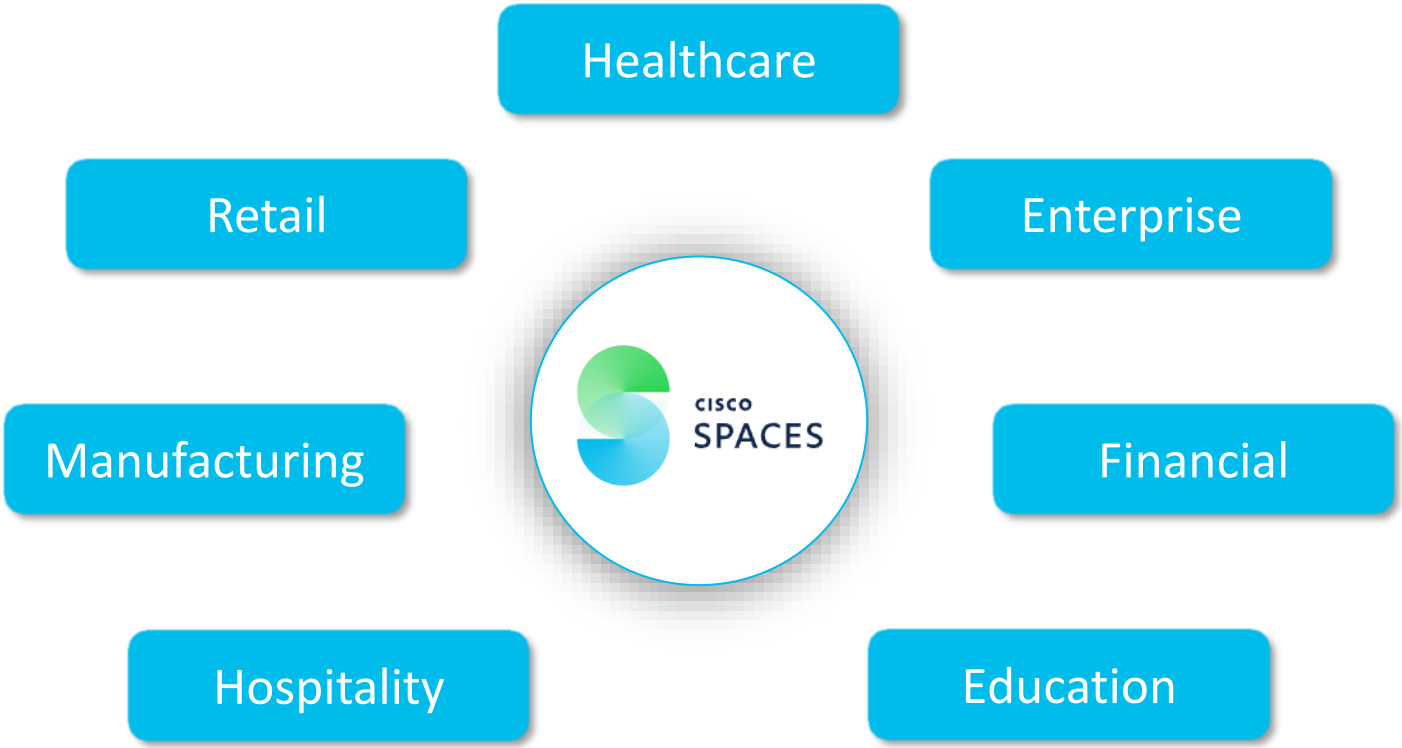
- Transforming floorplan CAD file into 3D Rich map
- Enhancing the experience with Webex devices and other sensors available

Network Map



Facility Map

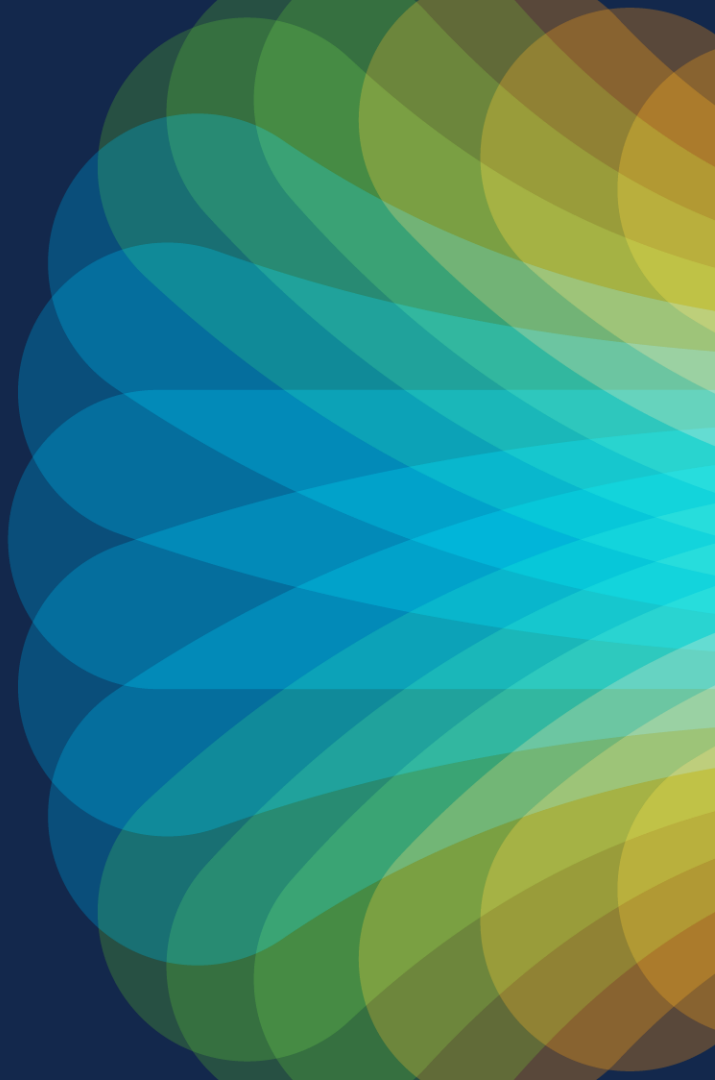
Look into different verticals



Look into different verticals

	Wi-Fi count	Challenges
Workspace	User-id data is a close approximation of actual numbers Device count trends correlate strongly with badge data at the daily count/location level	User-Id availability Vertical definition SSID labeling SSID discipline ‘Campus impact’
Education	Similar as above	User-id availability SSID labelling SSID discipline Device/person separation ‘Campus Impact’
Retail and Verticals with low % of associated clients / high guest count	Good for trends and behavioral metrics but limited for counts	Crowded entrances could impact count Cannot count zones with no clear entrances (density metric as a proxy) Cannot count unique visitors due to other challenges

Location Features



Detect & Locate

View and track devices in your deployment

Value

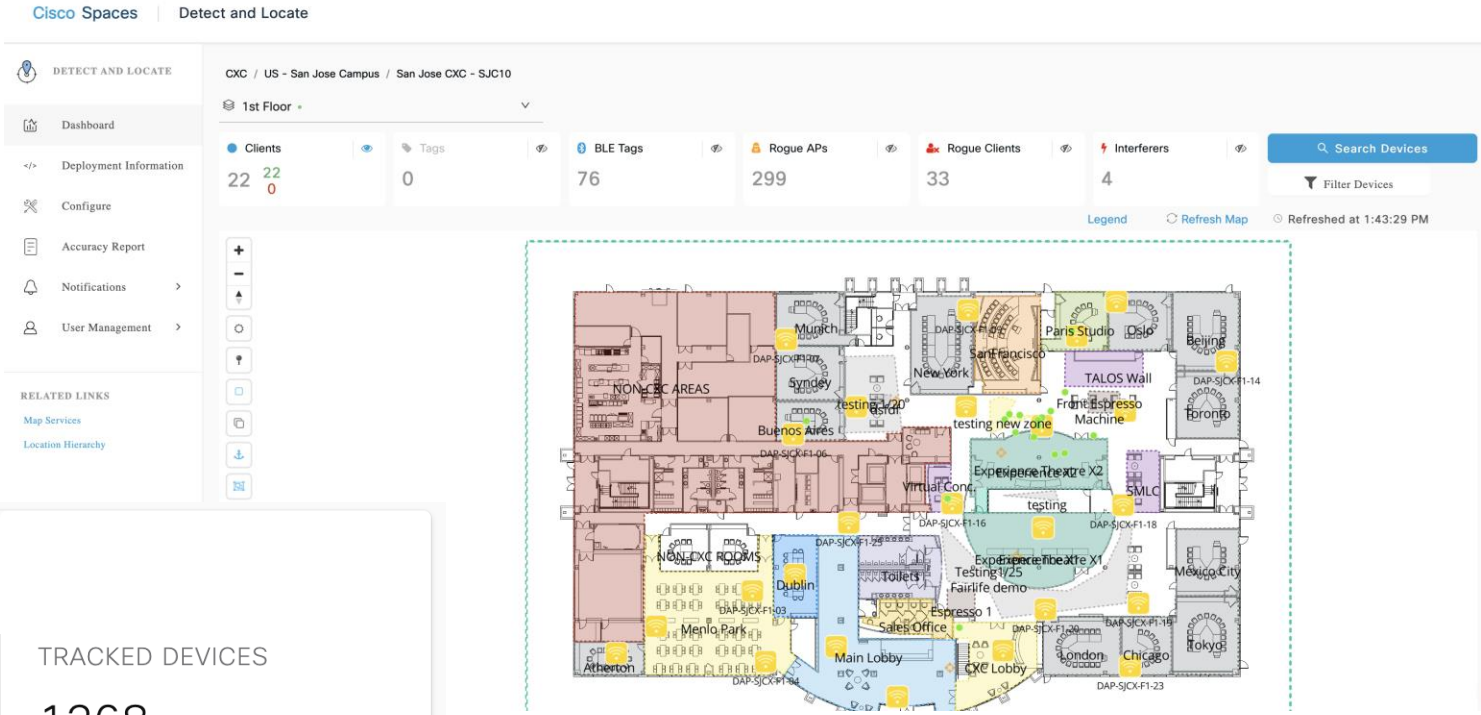
Operational efficiency

IT productivity

Use cases

- View and track devices in your deployment
- Access to client history and API to access both real-time and historical data (ACT license)

Detect & Locate



ACT FEATURES BLE

Detect and Locate

Search and display location of devices

TRACKED DEVICES

1268

Right Now

Gain a real-time view of visitor behavior at your properties.

Value

Understand behaviors

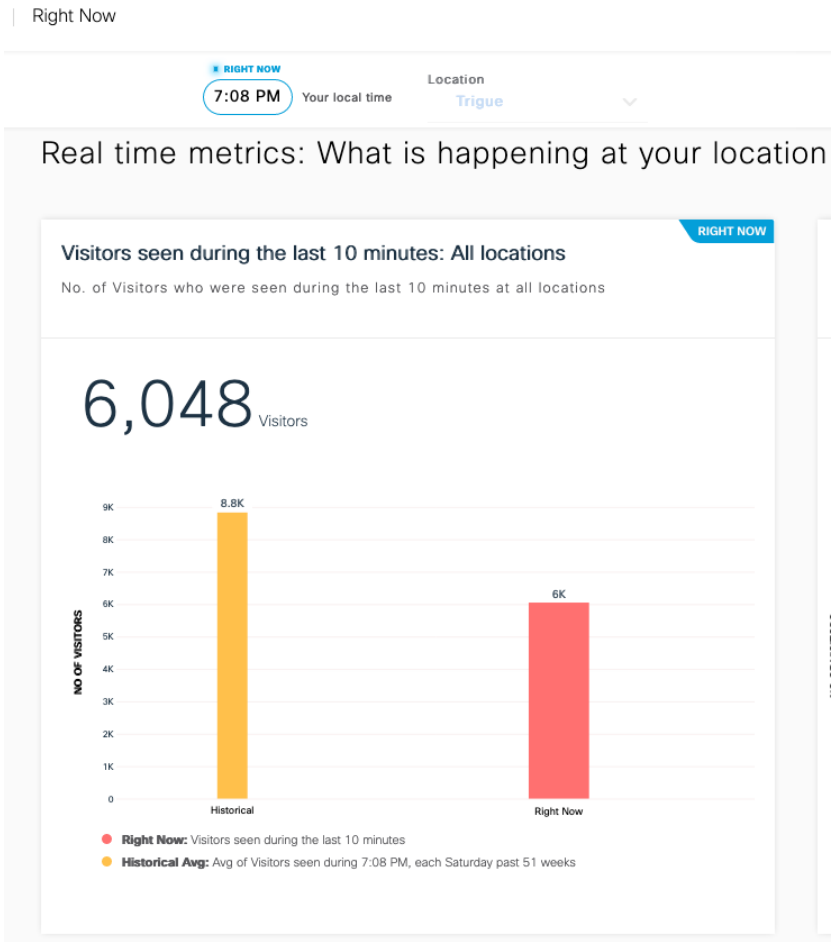
Optimize operations and staffing

Use cases

- Get a real time view of the visitors currently present at your locations
- Respond to change in presence levels within location

Right Now – App Overview

- Provides a ***real time*** *count* of the number of people at a physical location or group of locations
- Compare with the ***historical average***
- Two types of data sources:
  - Wi-Fi network data
  - Meraki Camera data
- Automated Triggers
- Assist with Safety and Compliance



Behavior Metrics

Gain a real-time view of visitor behavior at your properties.

Value

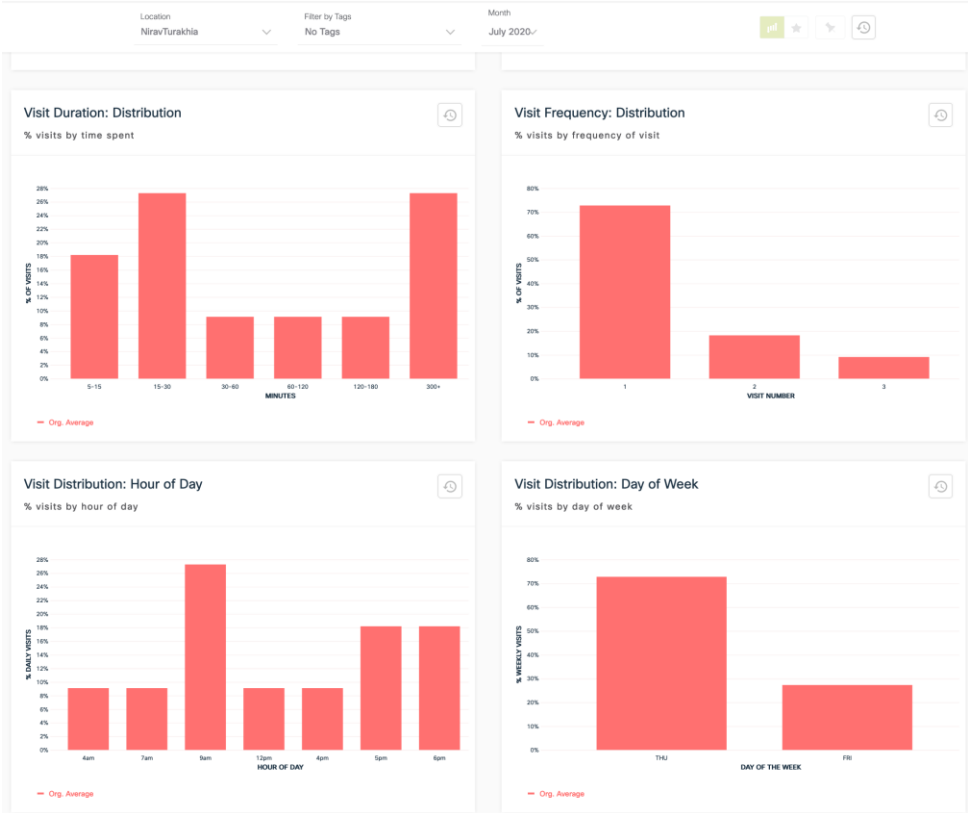
- Understand behavior
- Space optimization
- Optimize operations
- Drive productivity

Use cases

- Get understanding of on-site customer behavior across locations
- Understand peak days and times to make informed decisions such as staffing
- Measure customer loyalty by identifying new vs repeat visitors
- Benchmark performance of locations to understand below or above-average performance
- Correlate location behavior with other data sources such as - PoS, CRMs, loyalty database, etc. to get a 360-degree view of customer

Behavior Metrics

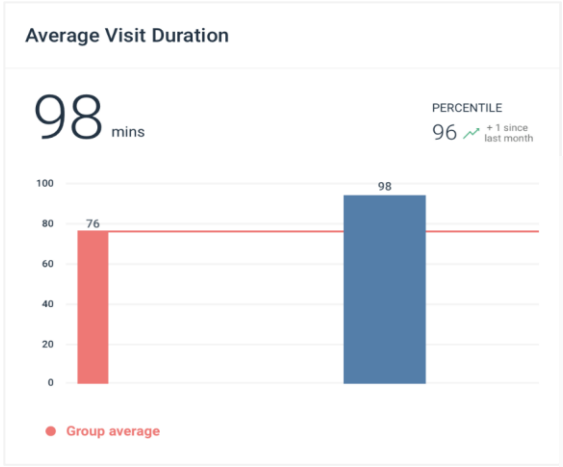
- Gives a monthly-report of how people are behaving at locations – helpful for LOB use cases and business users
- Can choose to view report by:
  - Location Name
  - Tags created
  - Month
  - Historical View
- Associated Wi-Fi devices
- Vertical dependent metrics - A client is considered to end the visit if no location update seen for:
  - Workspace: 10 hours
  - Education: 10 hours
  - Retail: 3 hours
  - Generic: 3 hours
- Additional vertical specific insights

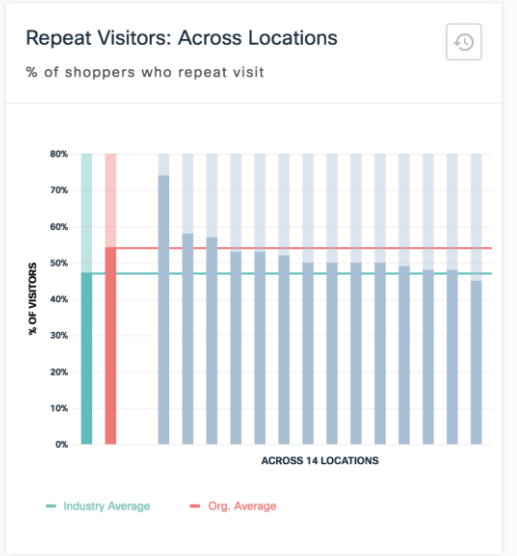


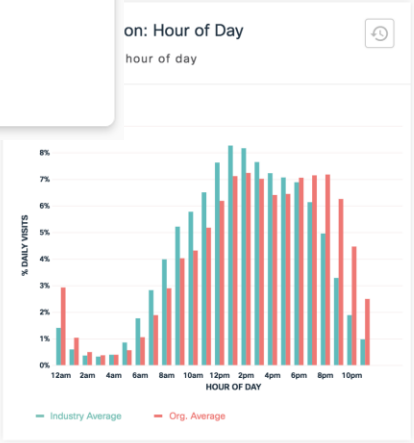
Behavior Metrics

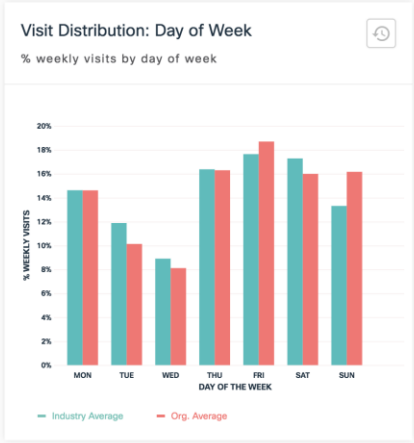
Behavior Metrics

Gold standard performance metrics for physical spaces









Location Analytics

Gain visibility into behavior patterns.

Value

- Understand behavior
- Space optimization
- Optimize operations
- Drive productivity

Use cases

- Gain visibility into customer behavior patterns
- Create custom views and reports, filter by locations, date range
- Access historical trends to understand how customers interact with different parts of buildings or environments

Location Analytics

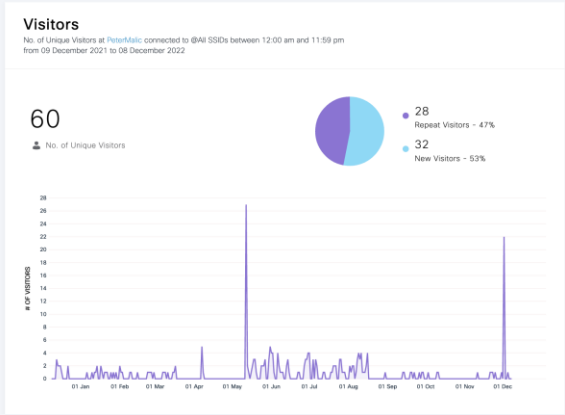
BETA ACT FEATURES

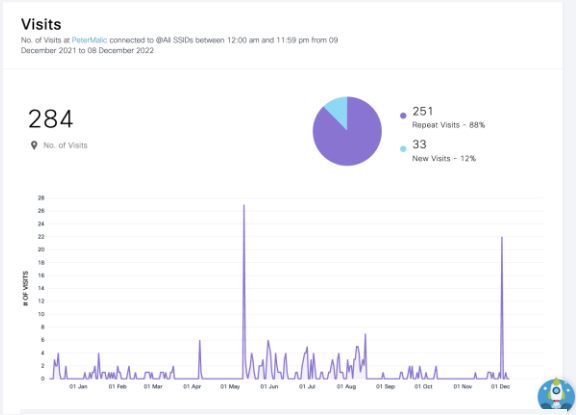
Location Analytics

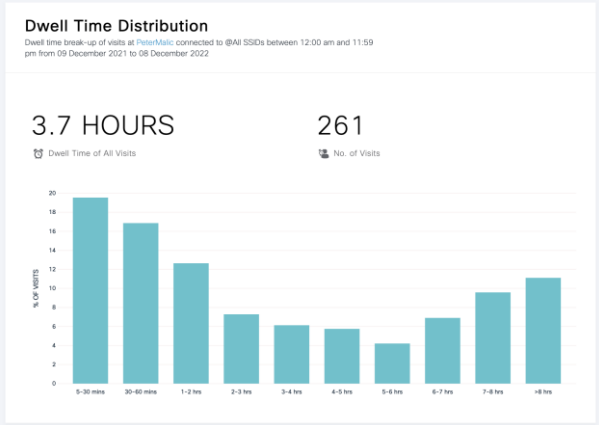
Gain visibility into customer behavior and patterns

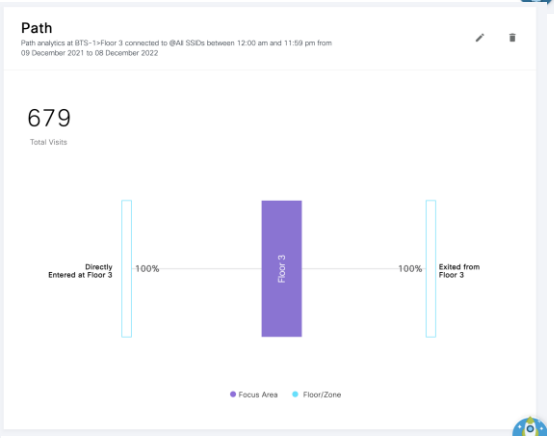
ACTIVE DEVICES

990441









Impact Analytics

See the impact of events & changes to your business location on your behavior metrics.

Value

- Understand behavior
- Space optimization
- Optimize operations
- Drive productivity

Use cases

- Gain visibility into customer behavior patterns
- Create custom views and reports, filter by locations, date range
- Access historical trends to understand how customers interact with different parts of buildings or environments

Impact Analytics

Impact Analysis

See the impact of events & changes to your business location on your behavior metrics.

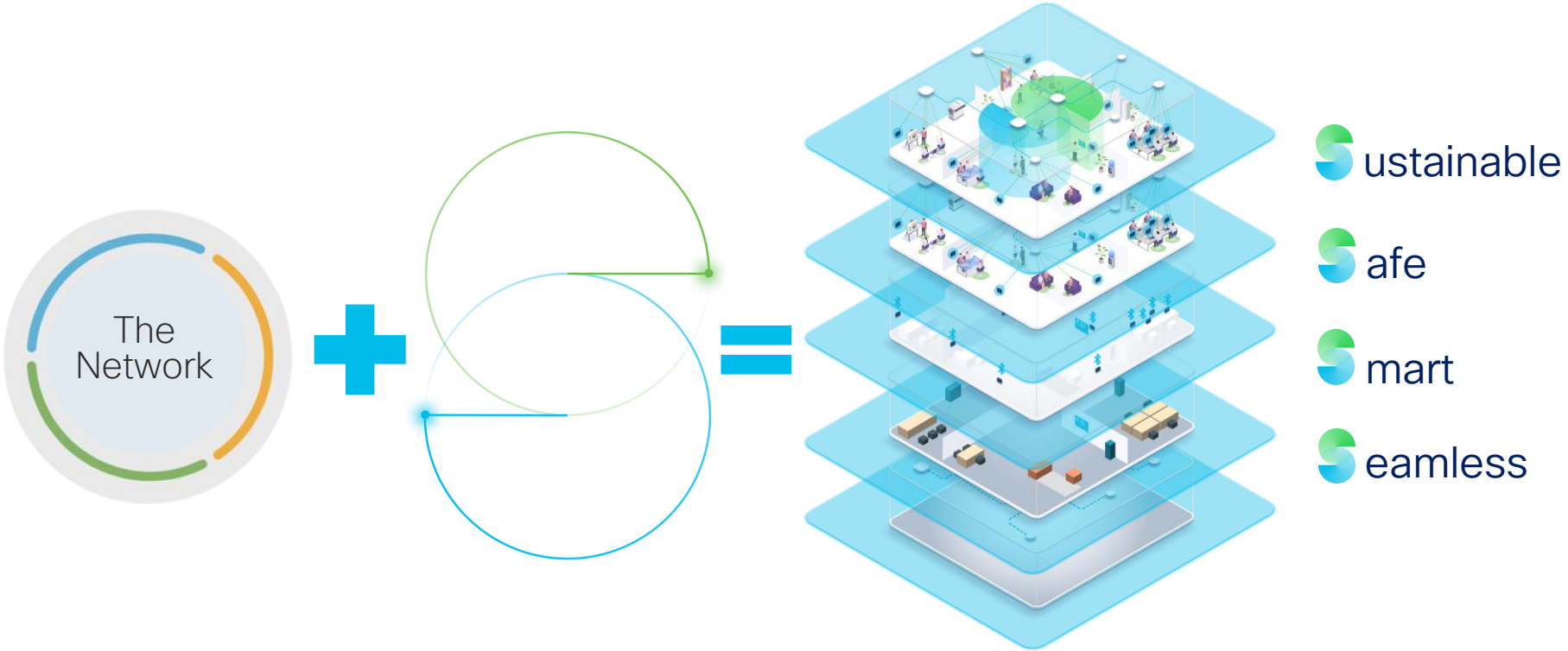
Now see Impact of COVID19

EVENTS MEASURING IMPACT

18

Demo

What now?

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Let's go