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The bridge to possible

Using IOT + Collab + Meraki API's for a safer return to the school

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DEVNET-1416

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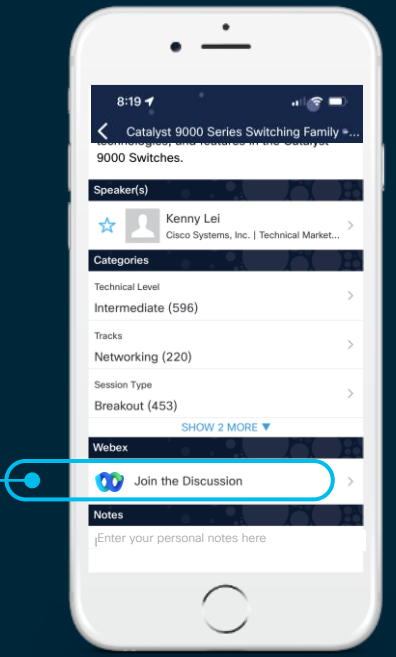

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Abstract

During 2020 1.5 billion of students were taken off from schools due to the COVID-19 pandemic. Different methodologies were applied to make students, professors, school staff and parents environments much safer before vaccination, with mixed results. In 2021, different scientific papers discussed a very simple but powerful way to prevent COVID19 contagions by measuring CO2 levels in the room. In this session, we will provide a simple solution using a cloud connected CO2 meter with wireless mesh and in combination with Meraki Scanning API, we will provide safer metrics for room utilization. Webex API's will provide the feedback and messaging mechanism to send real time alarms when necessary.

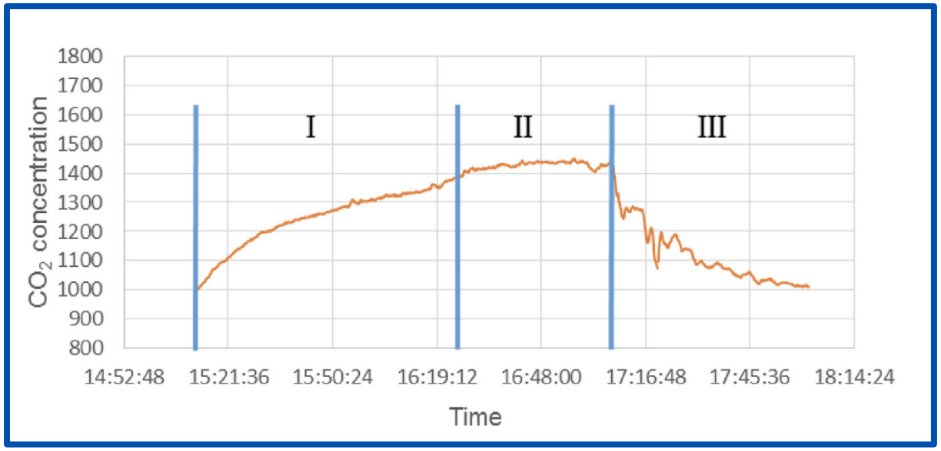
Agenda

- Background, Framework and High-level concept
- Meraki Scanning API
- Meraki and DNA Spaces integration
- CO2 meters + Meraki MR as sensors
- Sensors and Room Utilization Application Integration
- Webex Bot – real-time reporting
- Demo
- Q&A

Background, Framework and High-Level Concept

Background

- SARS-CoV-2 transmission via aerosols – tiny droplets that do not settle due to gravity – is known to play some role in the pandemic [1].
- In rooms without technical air refreshing systems, the aerosol concentration can be reduced with simple natural ventilation activity [2].
- CO_2 monitoring could be implemented as a COVID-19 risk mitigation tool in restaurants [3].
- There is a direct positive correlation of number of people in a room via CO2 concentration and the risk of infection [4]

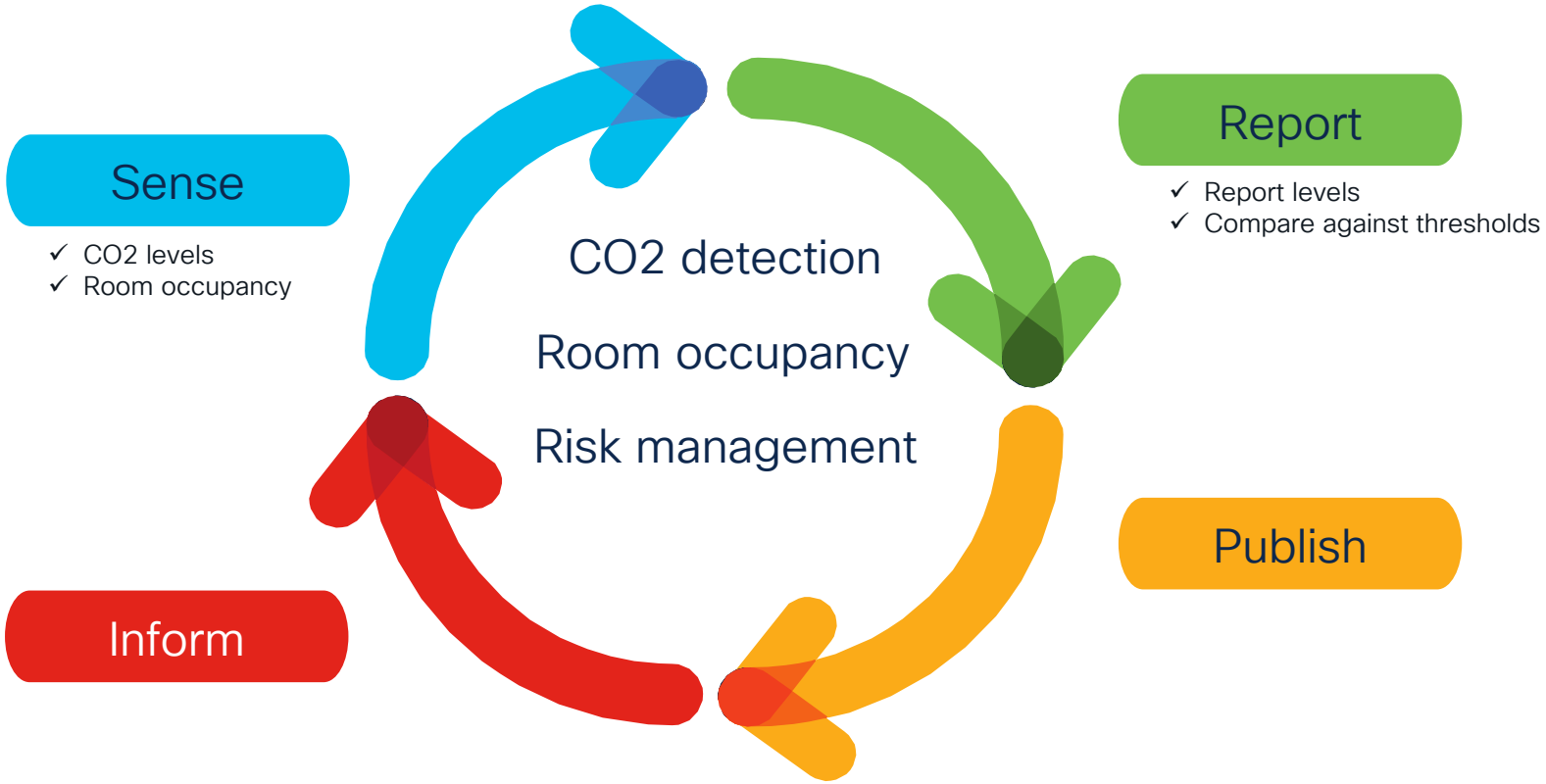


SOURCE - Changes in CO2 concentration in the conference room from "Recommendations for ventilation of indoor spaces to reduce COVID-19 transmission", Chung-Yen Chen et-al. 5 August 2021. https://www.sciencedirect.com/science/article/pii/S092966462100365X

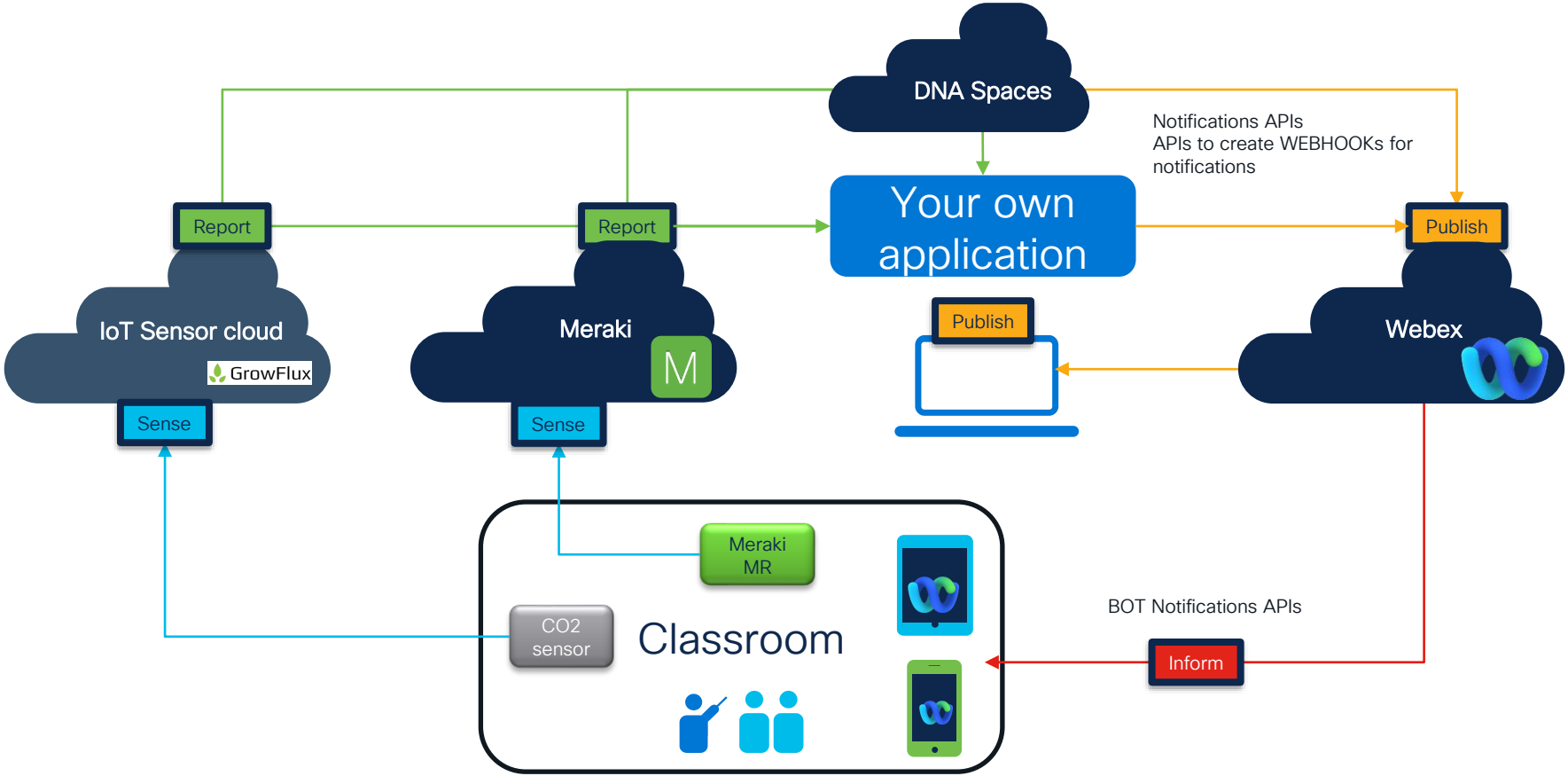
Proposal

- Based on the research there are two facts:
  - CO2 concentration determines the risk of COVID19 contagion
  - Room characteristics such as ventilation and actual space, determines the amount of people in a room
- Due to current vaccination limitations, not all countries are able to vaccinate all population, leading to continues risk of COVID19 peaks
- Young population, between 5 and 18 years, might be subject of contagion due to school attendance and lack of vaccination in some places.
- CO2 concentration and Room occupancy can be determined and actions to make decisions can be automated

Framework

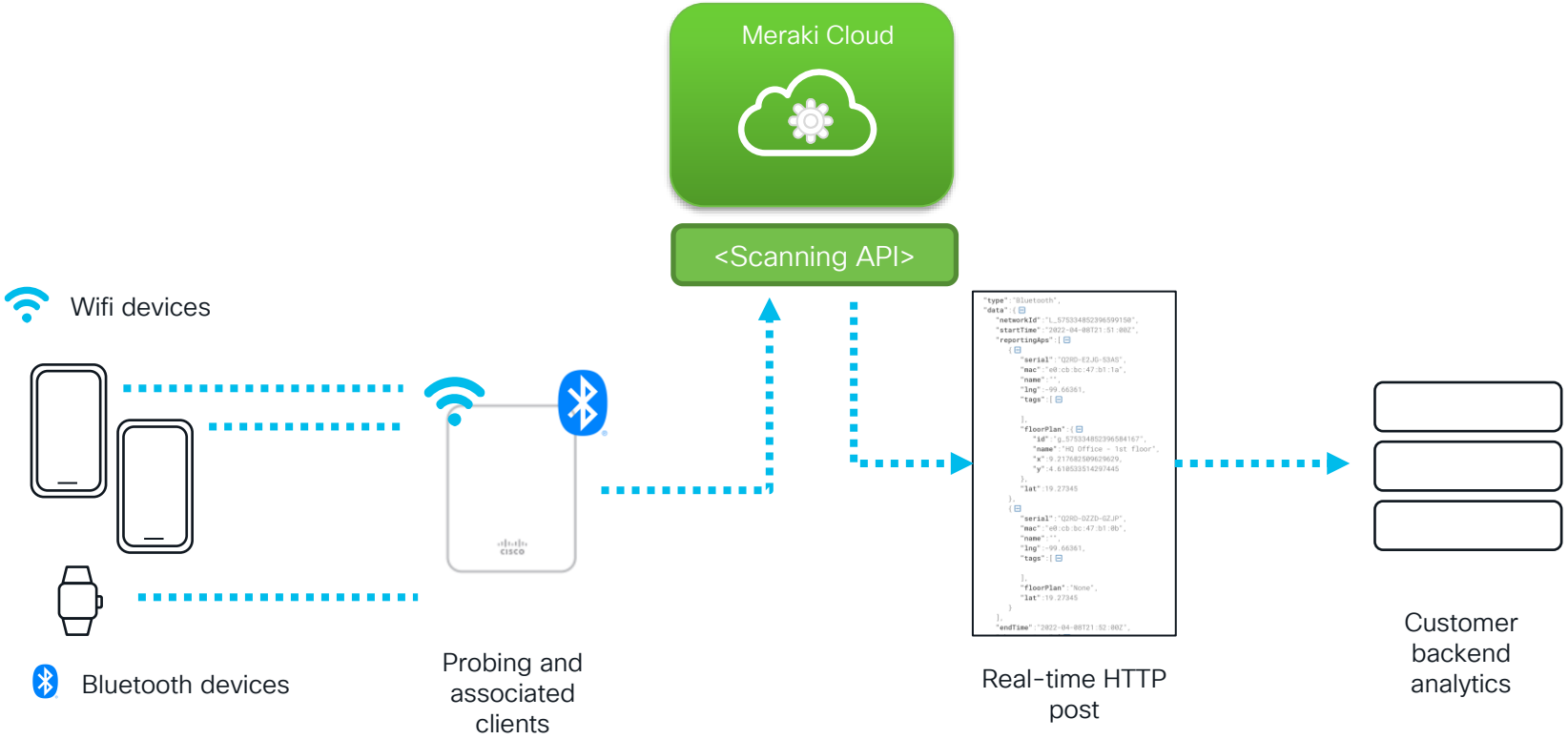


High Level concept

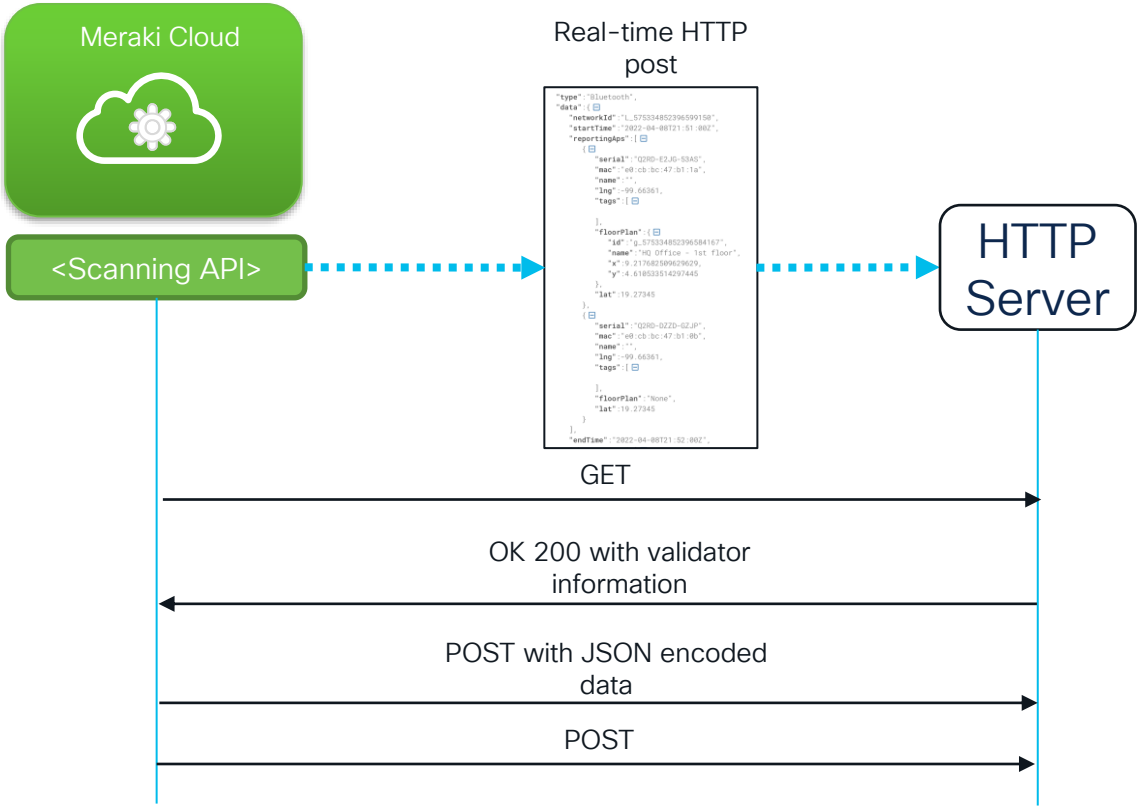


Meraki Scanning API

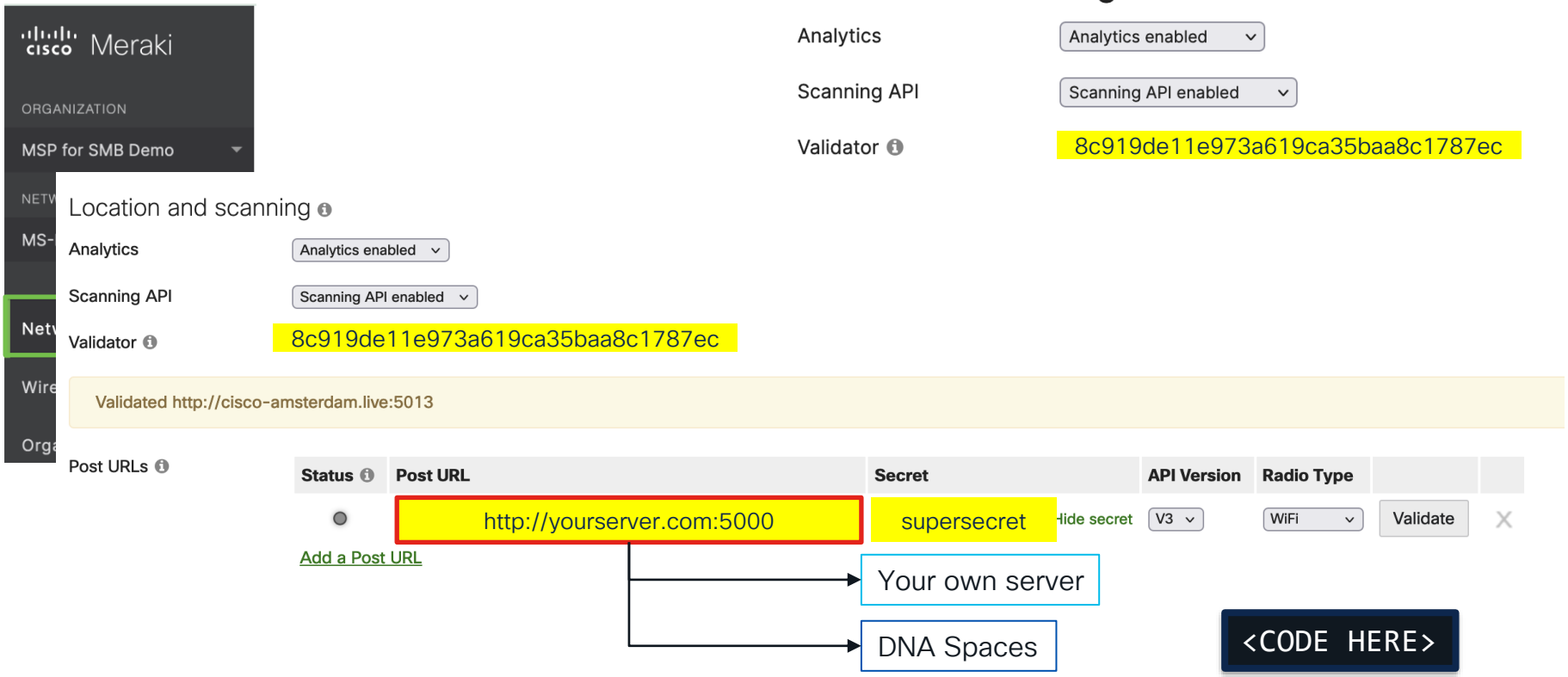
How Scanning API works



Meraki Scanning API flow



Configuring Scanning API



Meraki + DNA Spaces integration

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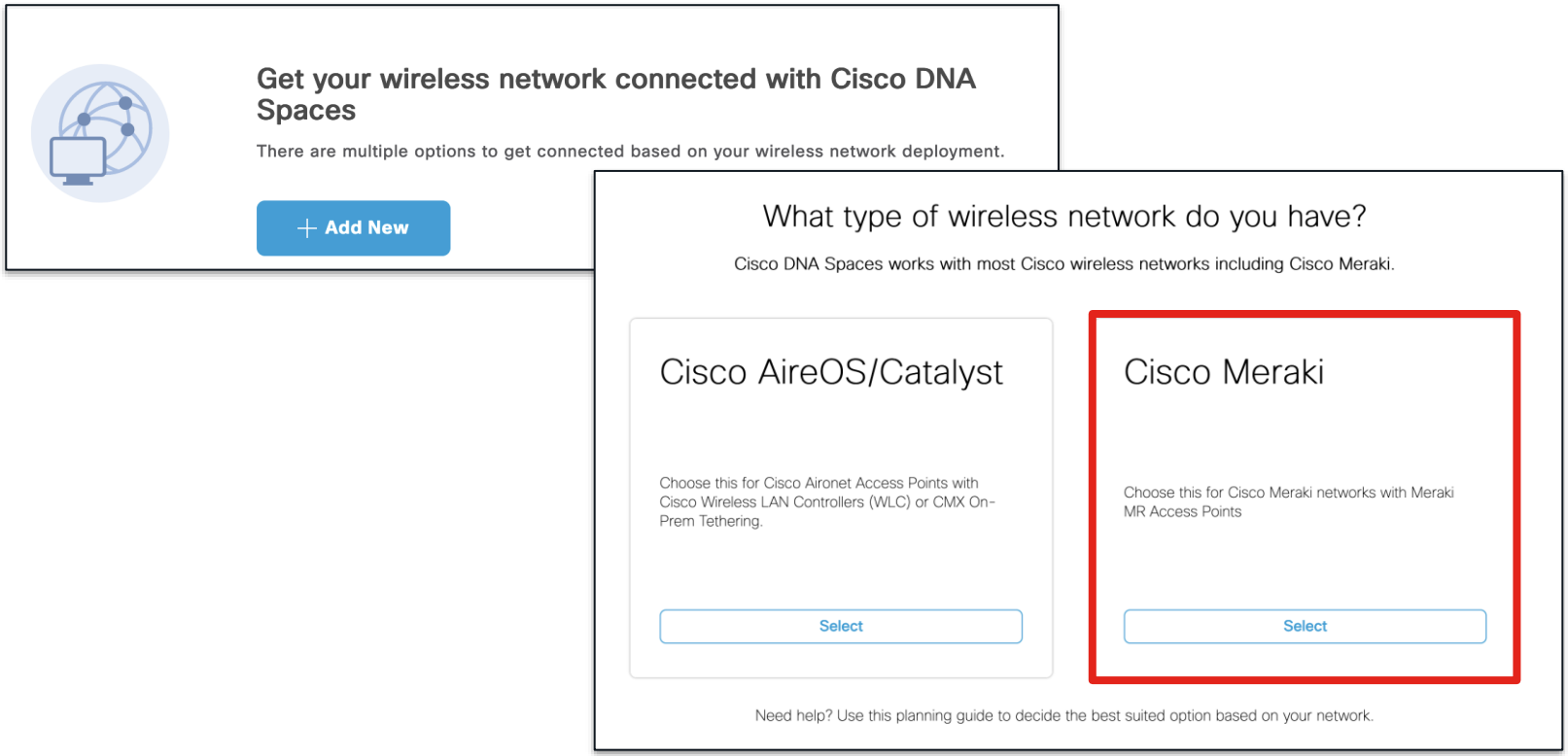
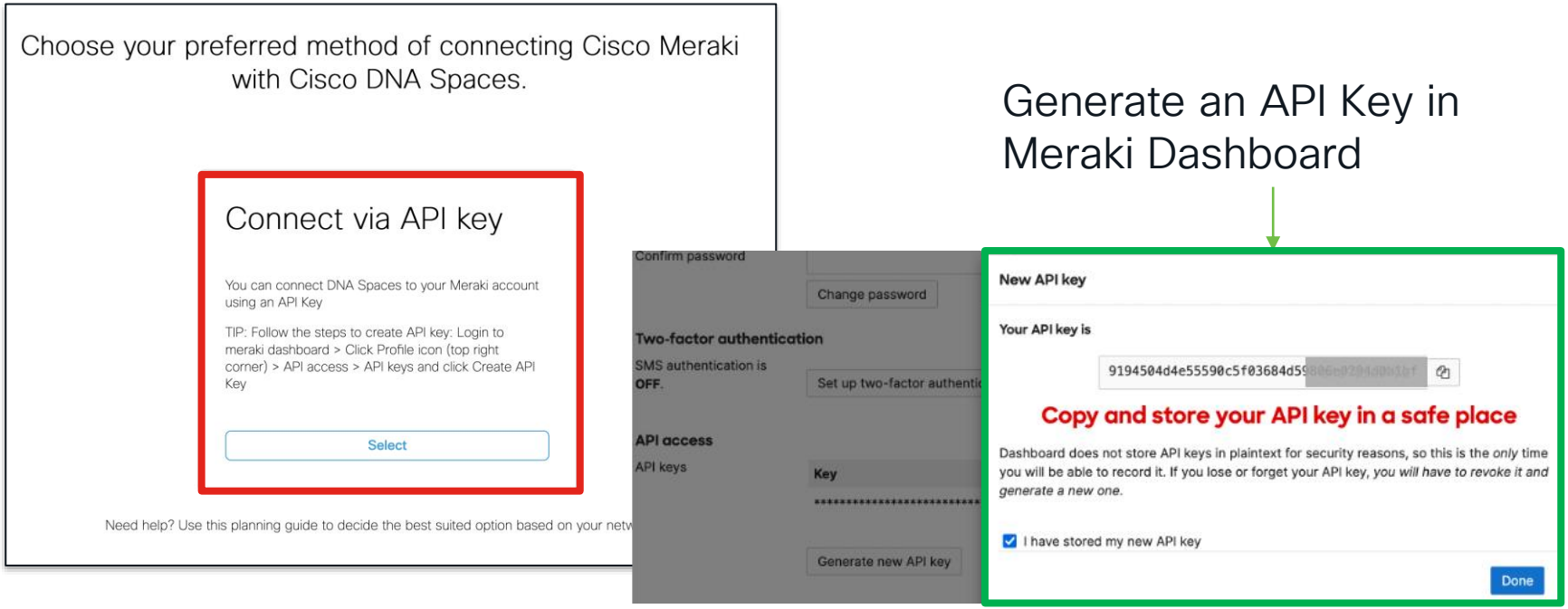
Meraki and DNA Spaces integration

1 – Add new wireless network



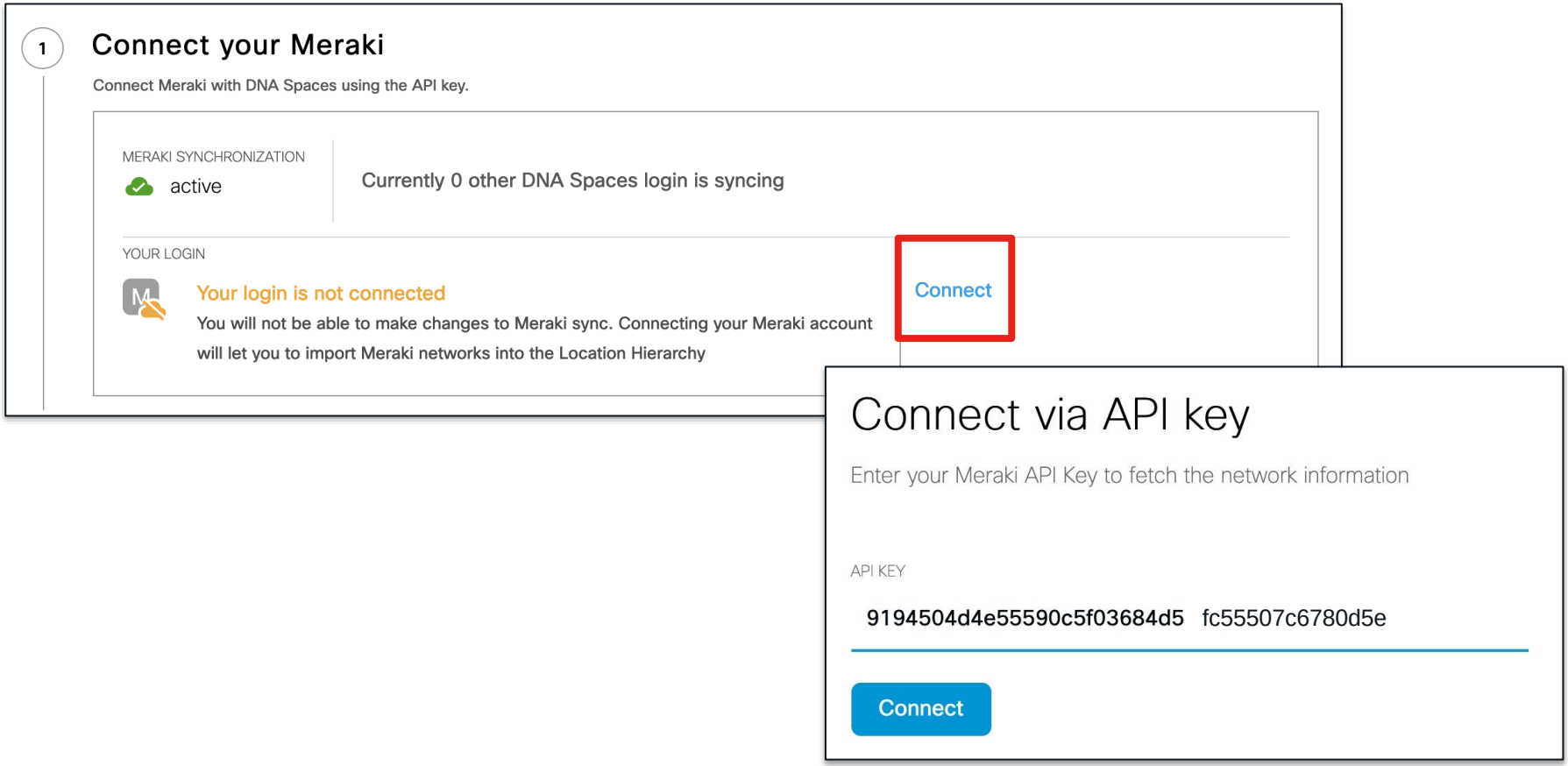
Meraki and DNA Spaces integration

2 – Add Meraki API Key



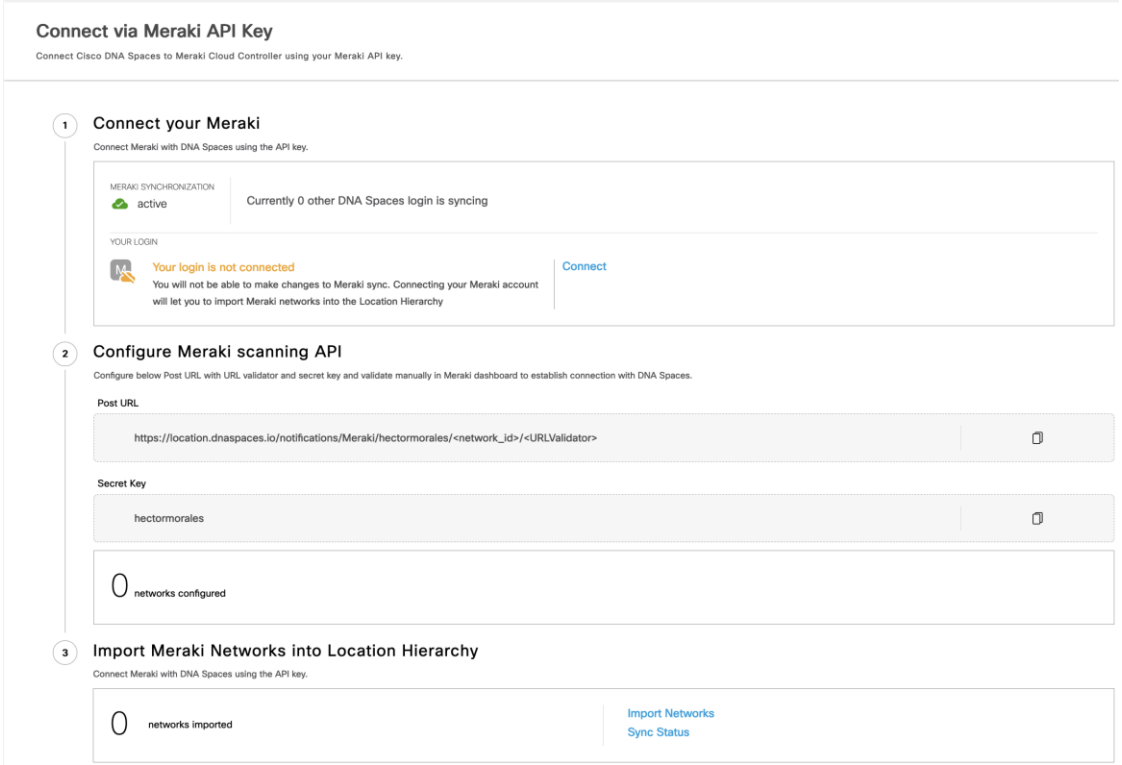
Generate an API Key in Meraki Dashboard

Meraki and DNA Spaces integration

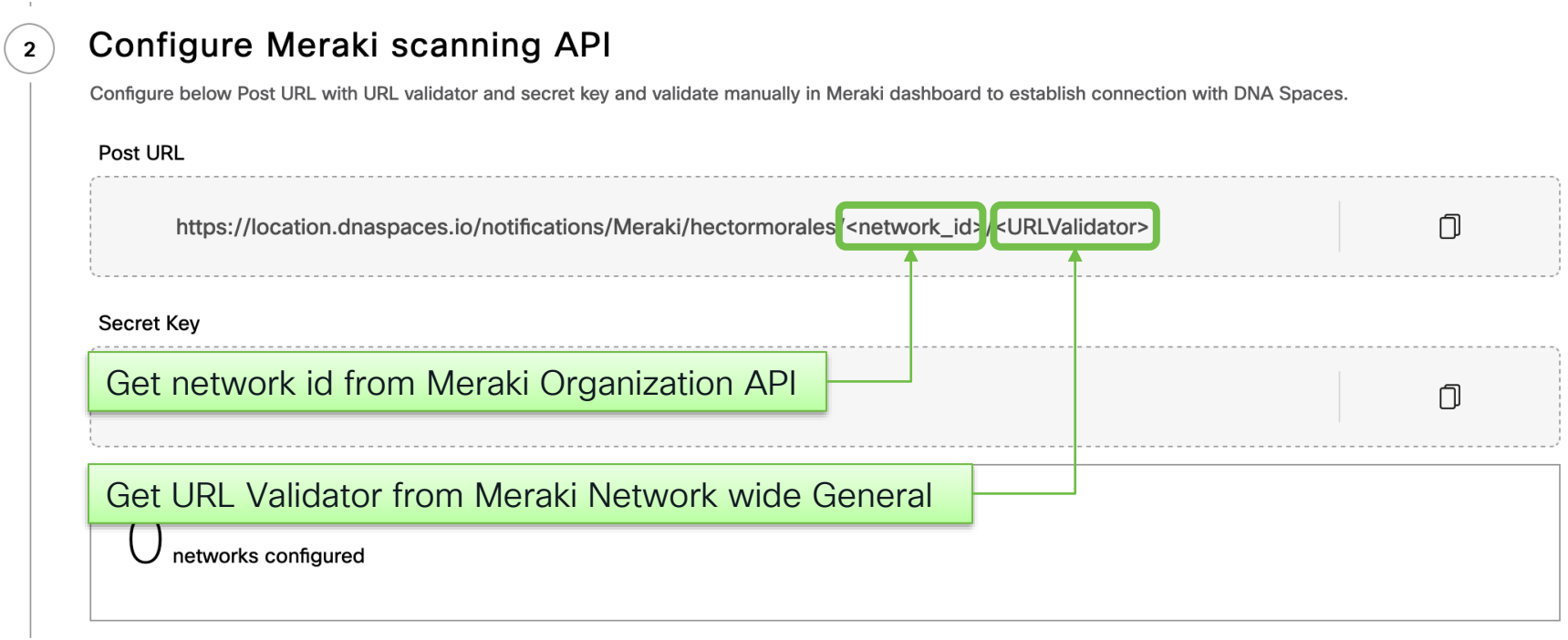


Meraki and DNA Spaces integration

3 – Connect via Meraki API Key



Meraki and DNA Spaces integration



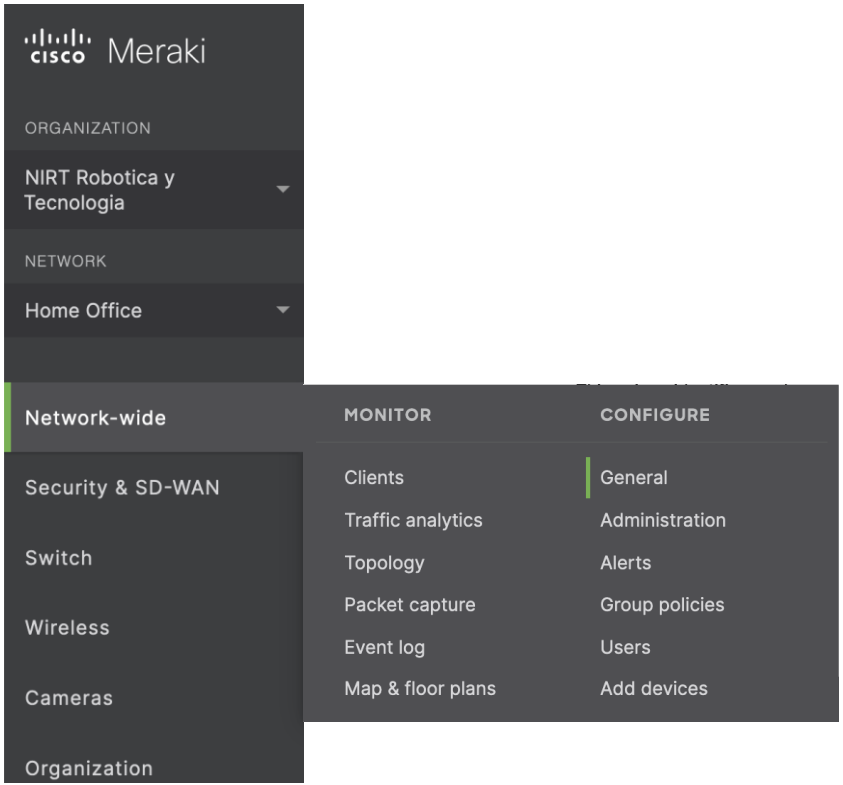
Meraki Dashboard API Documentation

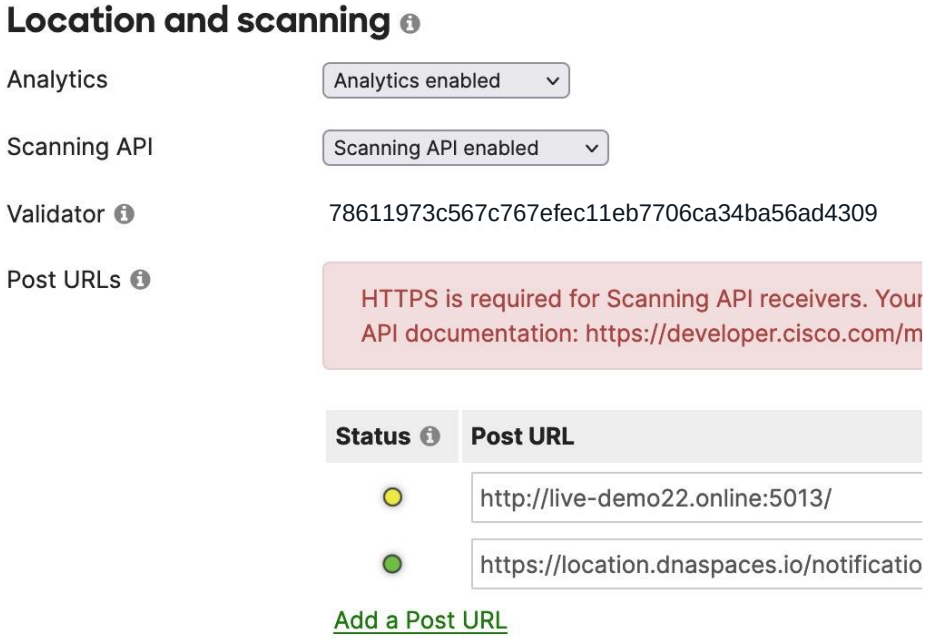
Meraki and DNA Spaces integration

Get network id from the organization

Meraki and DNA Spaces integration

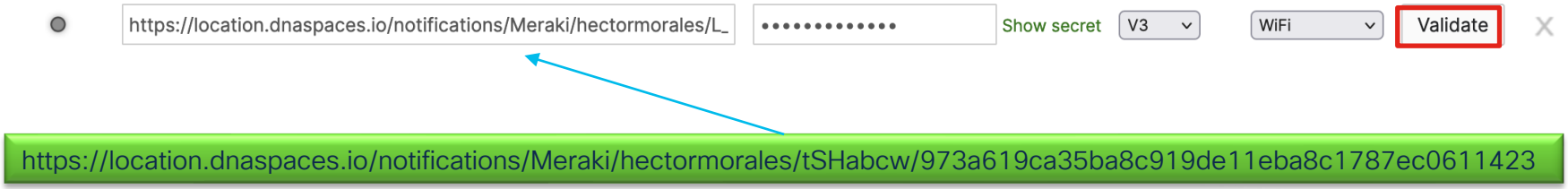
Get Validator

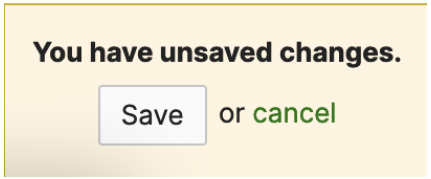




Meraki and DNA Spaces integration

Validate URL





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CO2 meter and Meraki MR as sensors

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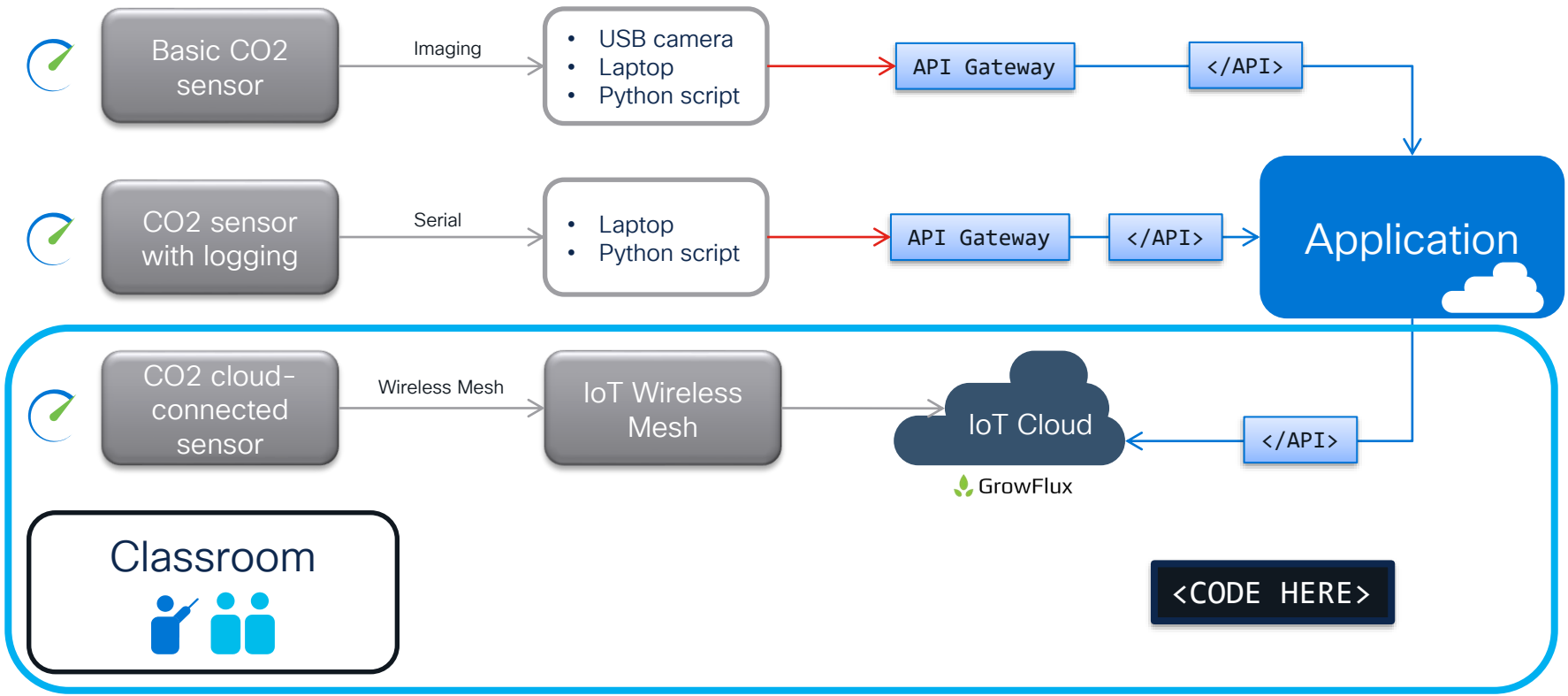
Solution components

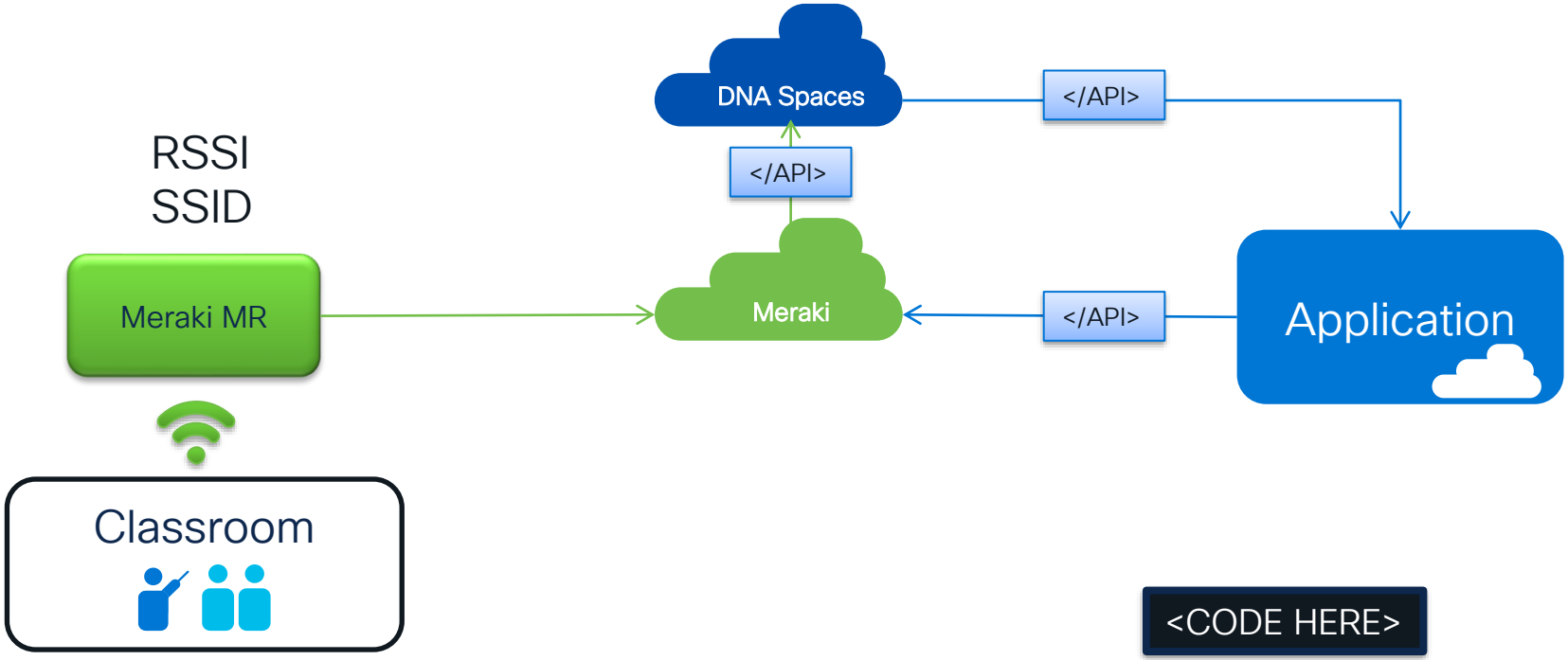
1. Get CO2 room values
2. Get number of people on the room
3. Dynamic Room Calibration
4. Dynamic Thresholds
5. Publish room information
6. Inform when actions must be taken

Get CO2 room values



GrowFlux API Documentation

Get number of people on the room



Sensors and Room Utilization Application Integration

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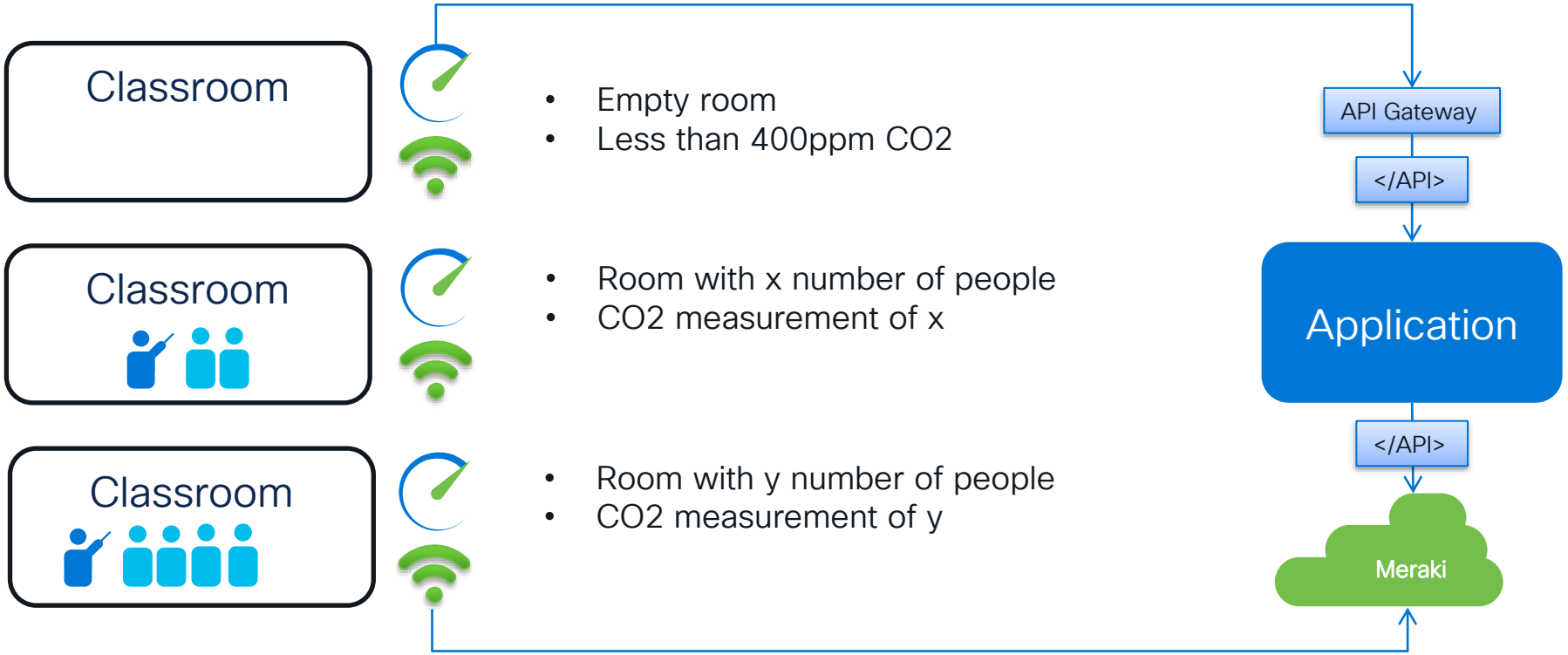
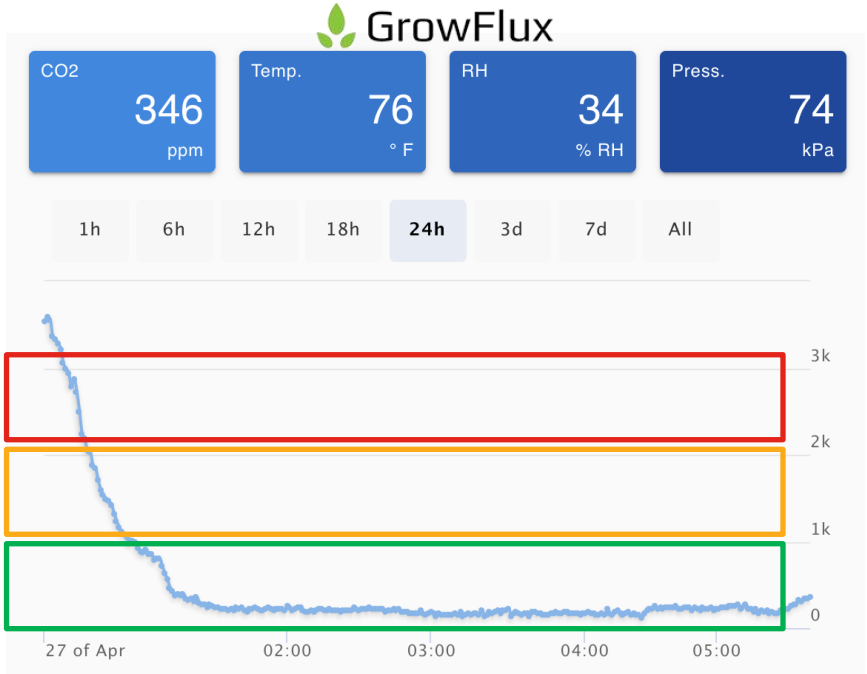
Dynamic Room Calibration



Dynamic Thresholds



CO2 levels + People in the room

Danger zone

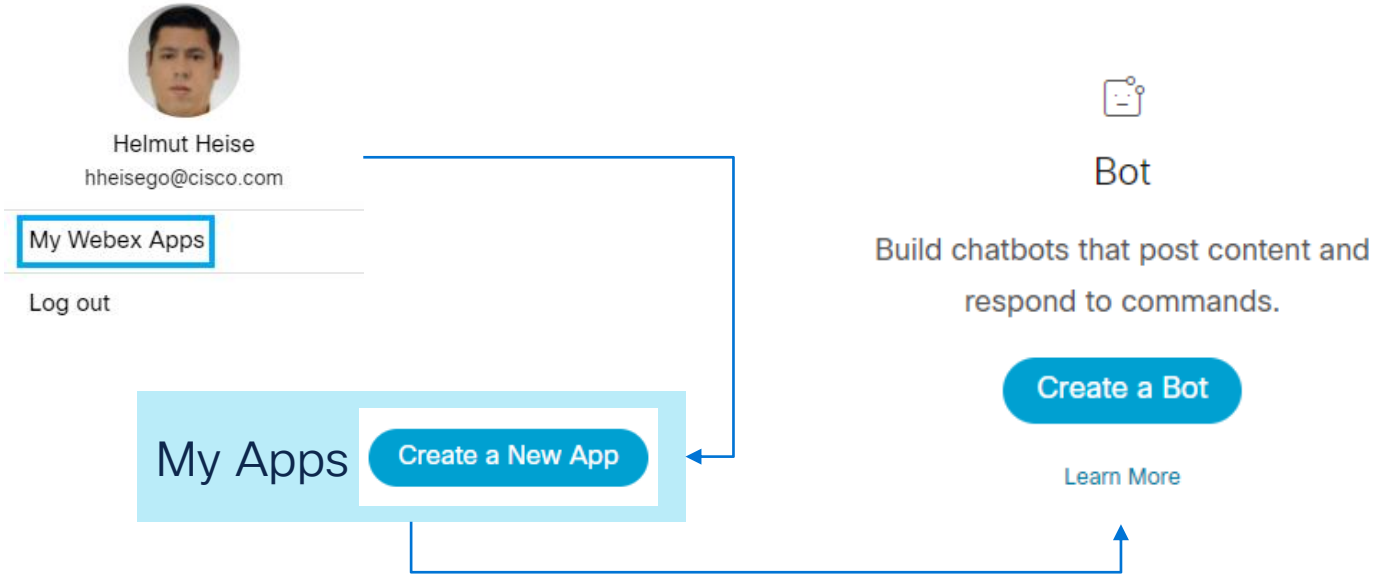
Safe zone

<CODE HERE>

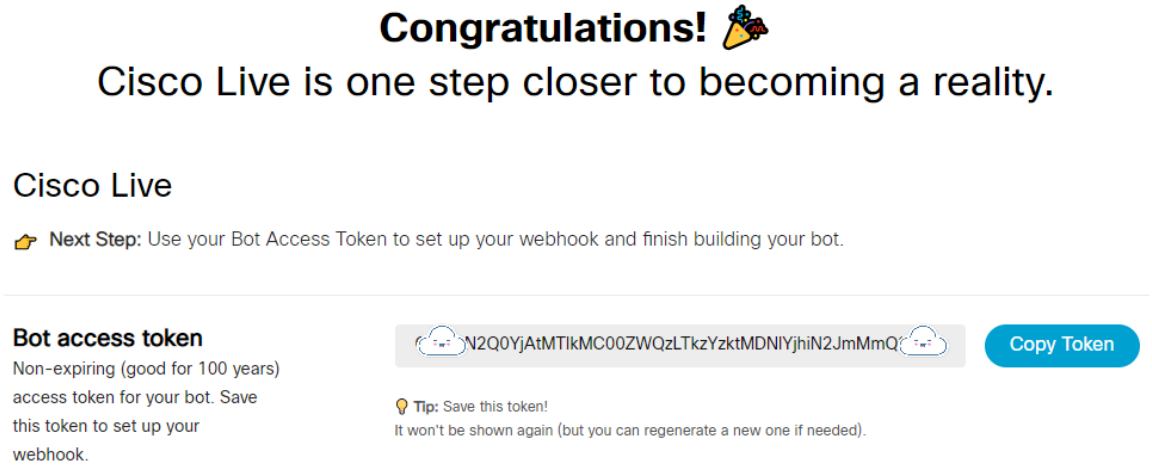
Webex Bot – real-time information

Create a Bot account

https://developer.webex.com/



Get your bot's access token



Webex Python SDK

https://github.com/CiscoDevNet/webexteamssdk

```
[ec2-user@ip-172-31-31-54 live]$ pip3 install webexteamssdk
```

Bot and ~~API~~ Auth

```python
import requests
from webexteamssdk import WebexTeamsAPI
from flask import Flask, request
from flask_httpauth import HTTPBasicAuth

# Bot Token and object #
BOTOKEN = "OWUxN2Q0YjAtMTlkMC00ZWQzLTkzYzktMDNlYjhiN2JmMmQ2MzQ2ZjRkMzEtZDc5_PF84_1eb65fdf-9643-417f-9974-ad72cae0e10f"
live_bot = WebexTeamsAPI(access_token=BOTOKEN)

### Flask ###
app = Flask(__name__)

auth = HTTPBasicAuth()

users = {
    "hemorale": "Cisco123",
    "hheisego": "Cisco123"
}

@auth.verify_password

def verify_password(username, password):

    if username in users and password in users[username]:

        return username
```

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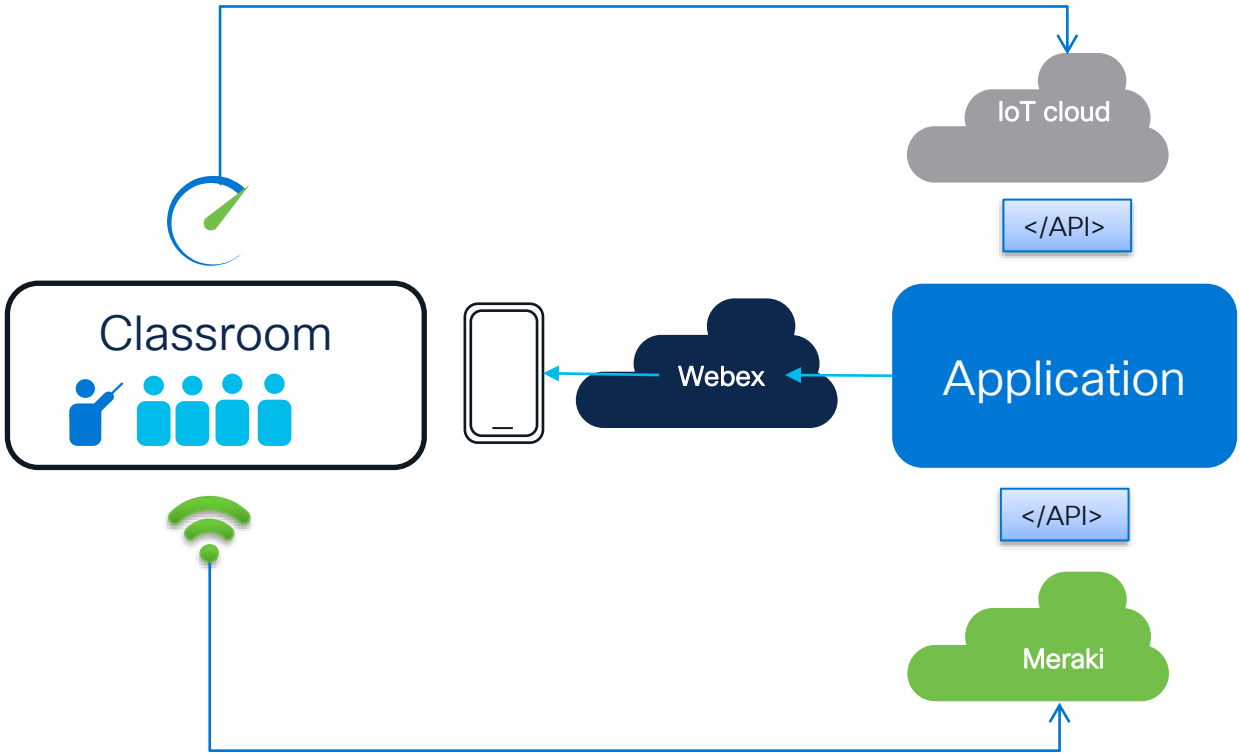
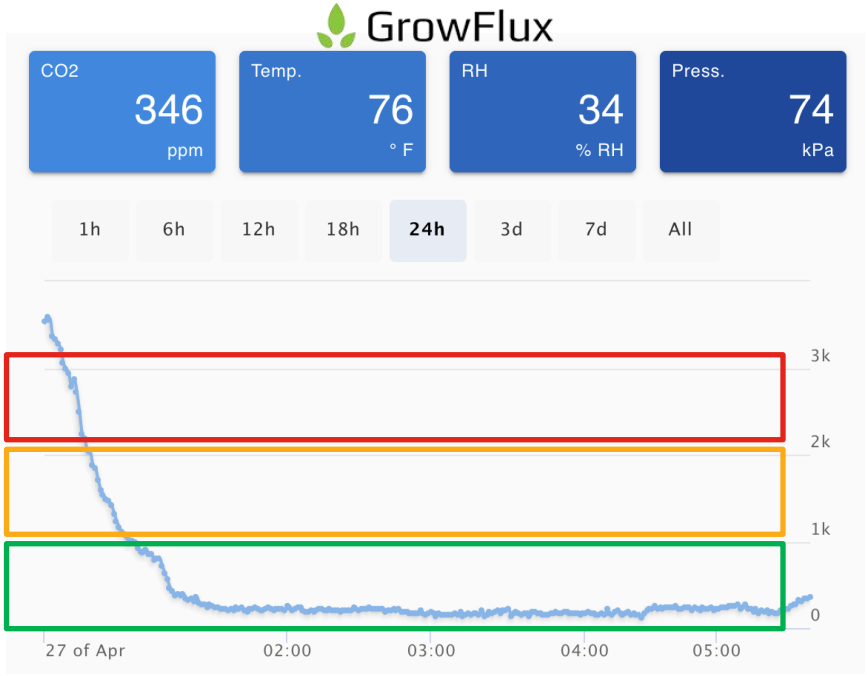
Publish room information



- Room with y number of people
- CO2 measurement of y
- Provide room insights based on data
- Inform via Webex Bot

Inform when actions must be taken



CO2 levels

Red zone → Better run!!

Yellow zone → Open windows

Green zone → Be happy

Demo
Putting all together

Our demo running live...

Cisco Live Yesterday, 8:29 PM

Device mac: c2:3a:b0:30:3c:29
RSSI: -55
CO2: 333 | Devices count: 1

Timestamp: 2022-06-11 20:29:21.530
CO2 levels: 333
Temperature: 20.04
Humidity: 59.48
Voltage: 3.42
Pressure: 74.14

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Q&A

References

1) O'Keeffe J, Freeman S, Nicol A-M. The basics of SARS-CoV-2 transmission [evidence review]. Vancouver, BC: National Collaborating Centre for Environmental Health; 2021 Mar 21. Available from: https://ncceh.ca/documents/evidence-review/basics-sars-cov-2-transmission.

2) CO2 measurements in instrumental and vocal closed room settings as a risk reducing measure for a Coronavirus infection. Manfred Nusseck, Bernhard Richter, Ludwig Holtmeier, Dominik Skala, Claudia Spahn. medRxiv 2020.10.26.20218354; doi: https://doi.org/10.1101/2020.10.26.20218354

3) Eykelbosh, A. Indoor CO2 Sensors for COVID-19 Risk Mitigation: Current Guidance and Limitations. Vancouver, BC: National Collaborating Centre for Environmental Health. 2021 May. https://ncceh.ca/documents/field-inquiry/indoor-co2-sensors-covid-19-risk-mitigation-current-guidance-and

4) Changes in CO2 concentration in the conference room from “Recommendations for ventilation of indoor spaces to reduce COVID-19 transmission”, Chung-Yen Chen et-al. 5 August 2021. https://www.sciencedirect.com/science/article/pii/S092966462100365X

5) University of Colorado at Boulder. "Carbon dioxide levels reflect COVID-19 risk: Research confirms value of measuring carbon dioxide to estimate infection risk." ScienceDaily. ScienceDaily, 7 April 2021. <www.sciencedaily.com/releases/2021/04/210407143809.htm>.

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