The bridge to possible

Simplifying network management with Meraki API

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CCIE #9861

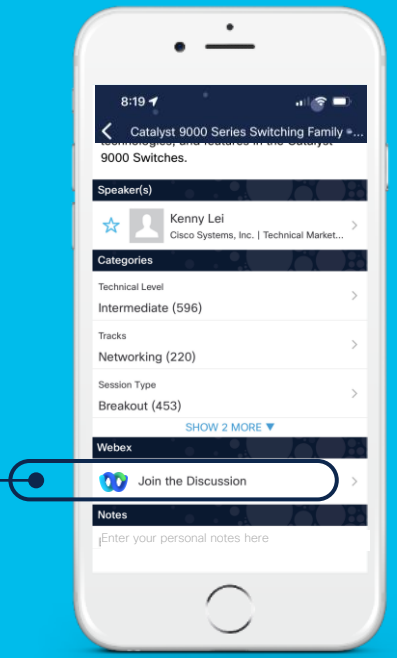
Cisco Webex App

Questions?

Use Cisco Webex App to chat
with the speaker after the session

How

1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install the Webex App or go directly to the Webex space
4. Enter messages/questions in the Webex space



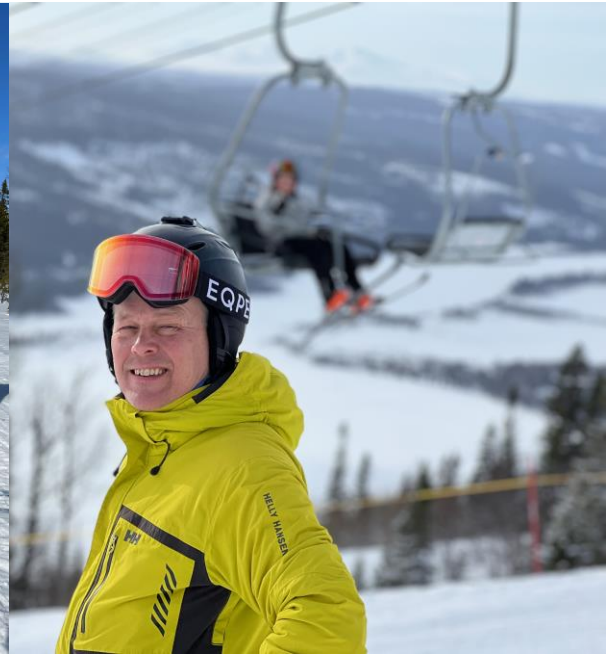
Webex spaces will be moderated until February 24, 2023.

Agenda

- The History of Network management
- Why should we change
- How do we start the journey to API's
- What can we change
- See what can be done for real

Who am I?

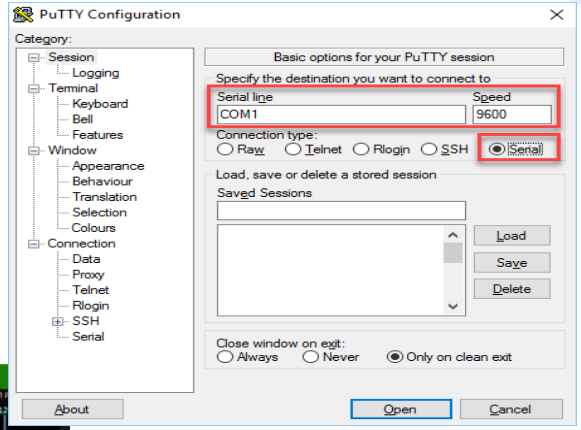
Mikael Fredriksson

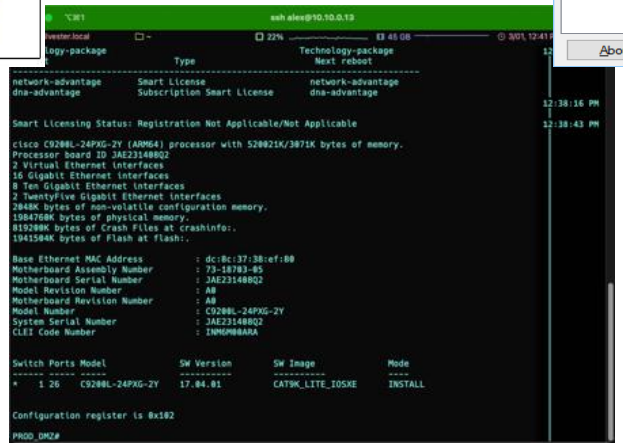


- TSA with the Meraki BU
- 2xCCIE of +20 Years
- Started with IT communication mid 90th
- Father of 3 children
- Happily married for +30 year
- First time speaker
- Passionated skiier

The history of network management

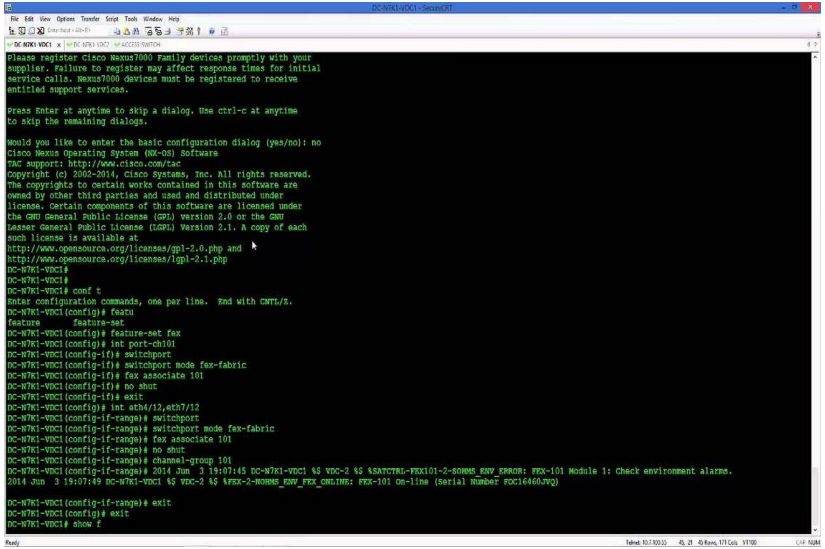
Most of us remember this I hope



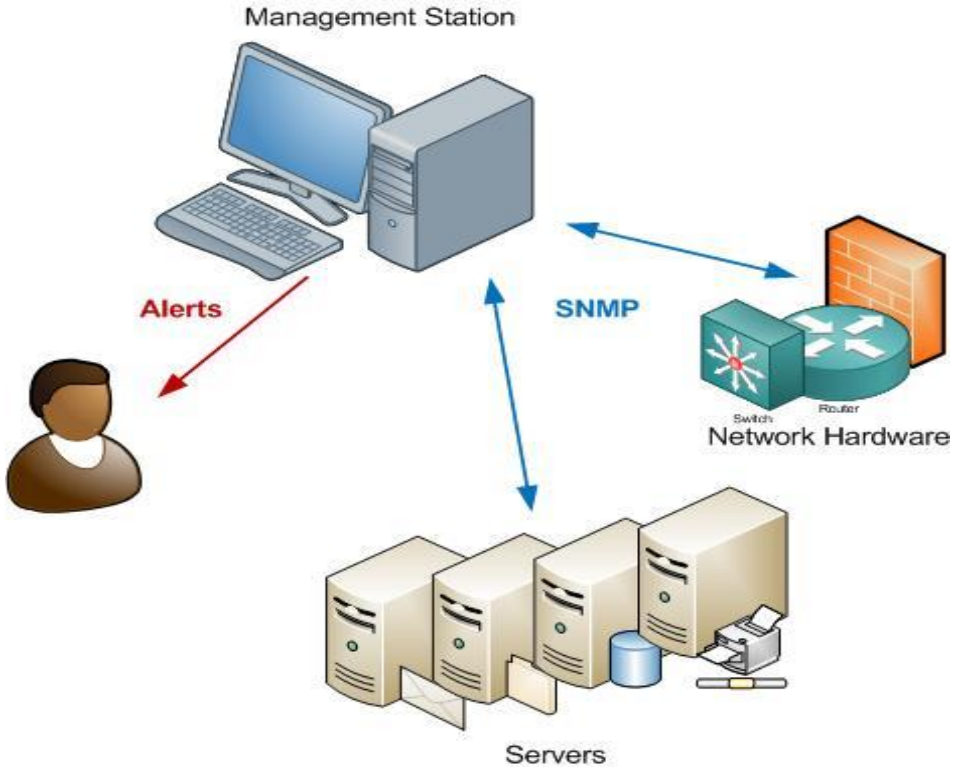


Configuration database/Golden Config

- Individual config principles
- Uppercase/Lowercase
- Scripts
- Risk for typing error

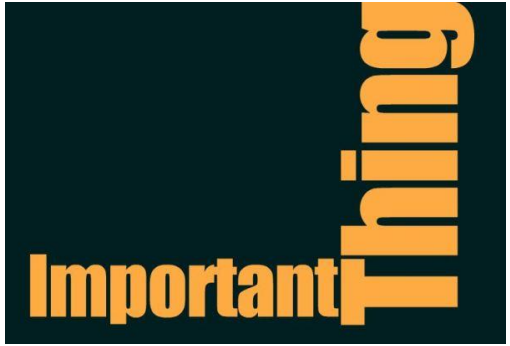


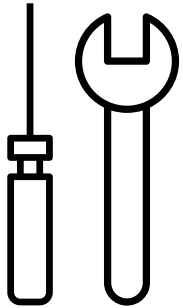
Proactive monitoring and management



Why do we use API’s?

How programmability is a competetive advantage





The potential benefits to use API for your management

Ever had to…

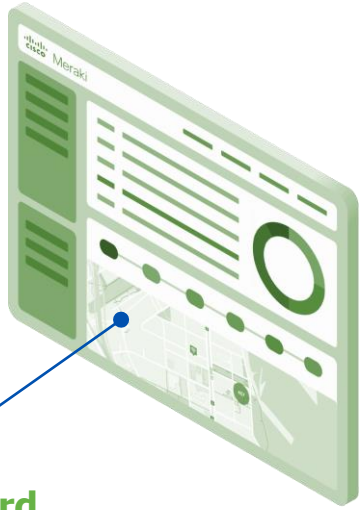
Deploy **1,000 sites**
install **5,000 switches** and
configure **170K** switch ports?

Let's do the math:
Running many devices in parallel give us an average of 10 min/device.

This include:
Unpack/repack
Powerup/Firmware/Configuration load
Prepare shipping

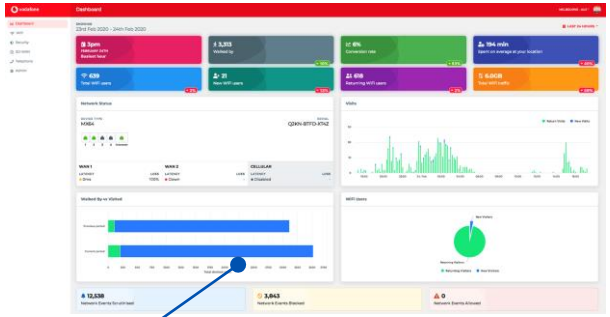
Total time 10min x 5,000 switches =
833 hours/100 working days (8hour days)

Offer customer view in your control of Single Pane



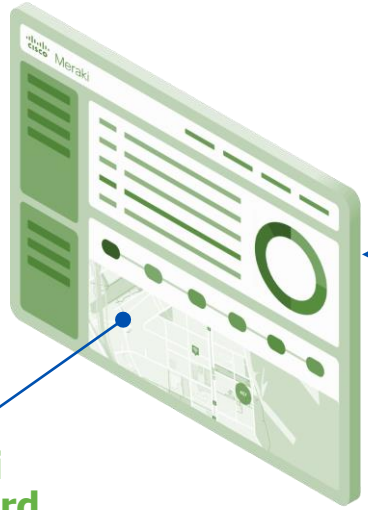
Meraki Dashboard

APIs

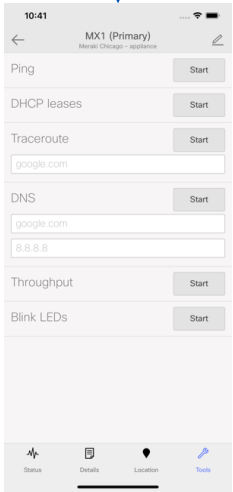


Overlay Dashboard

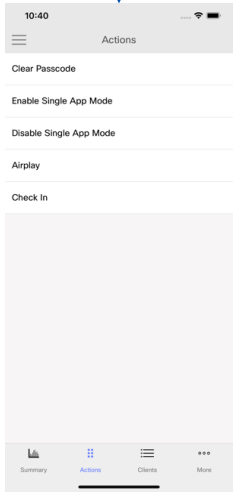
Offer dedicated application based on use case



Meraki Dashboard

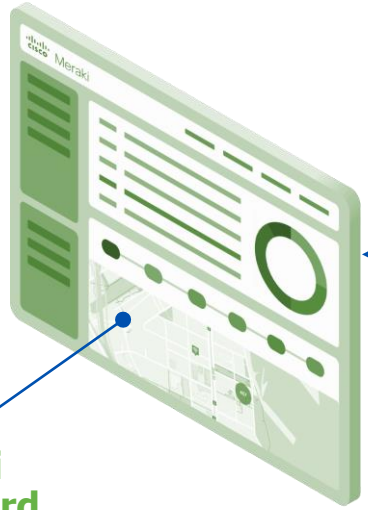


Internal

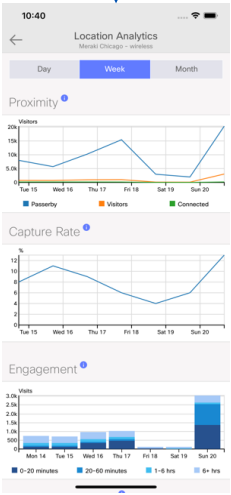


Self-service

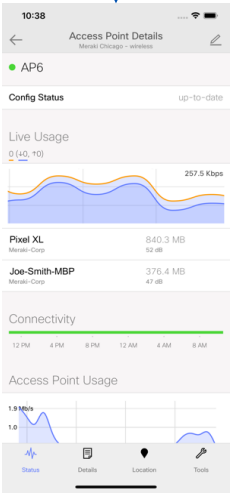
Analytics



Meraki Dashboard

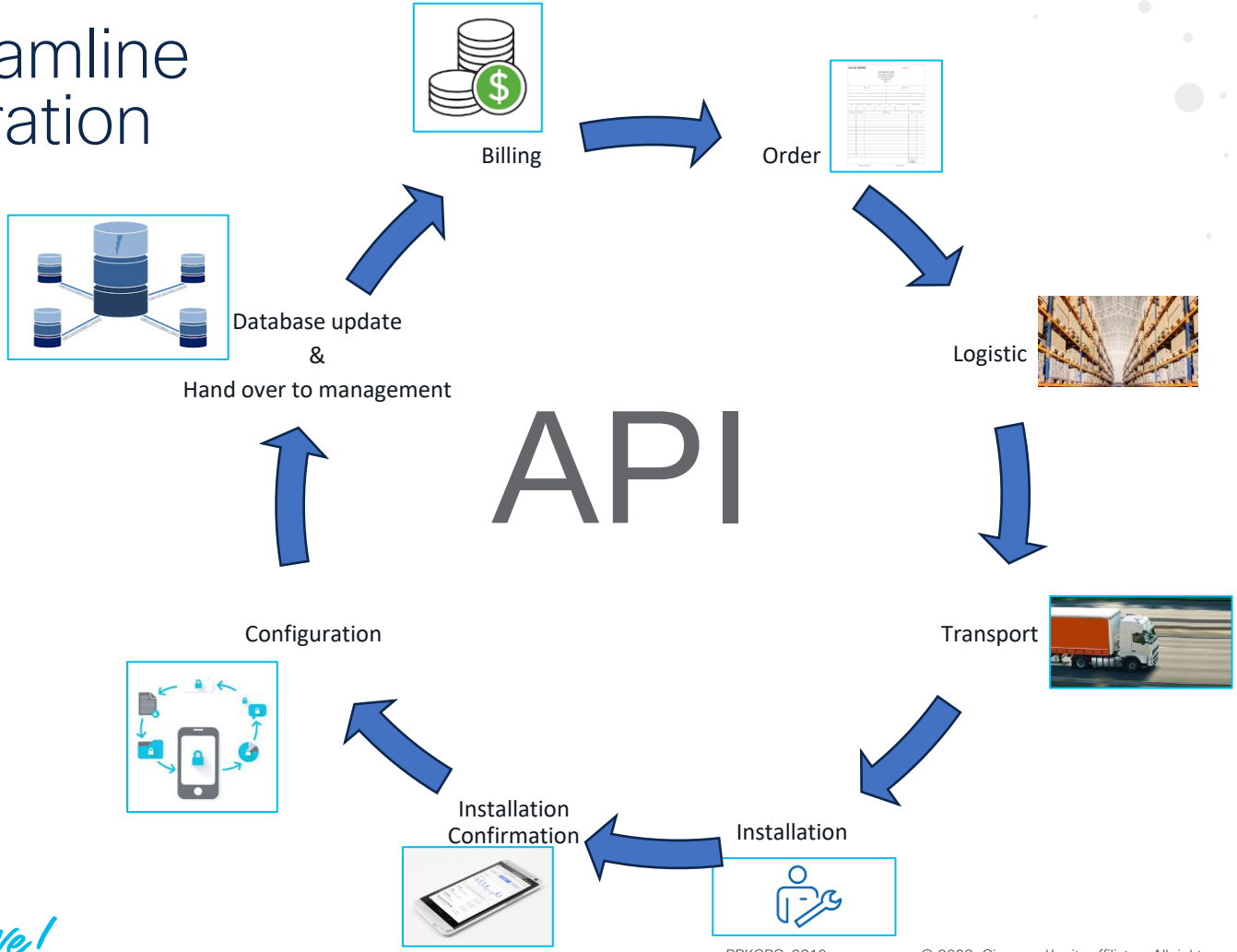


Footfall Analytics



Traffic Analytics

Streamline operation



How do we start the journey to API’s

How to start the API journey?

"What process do I start with?"

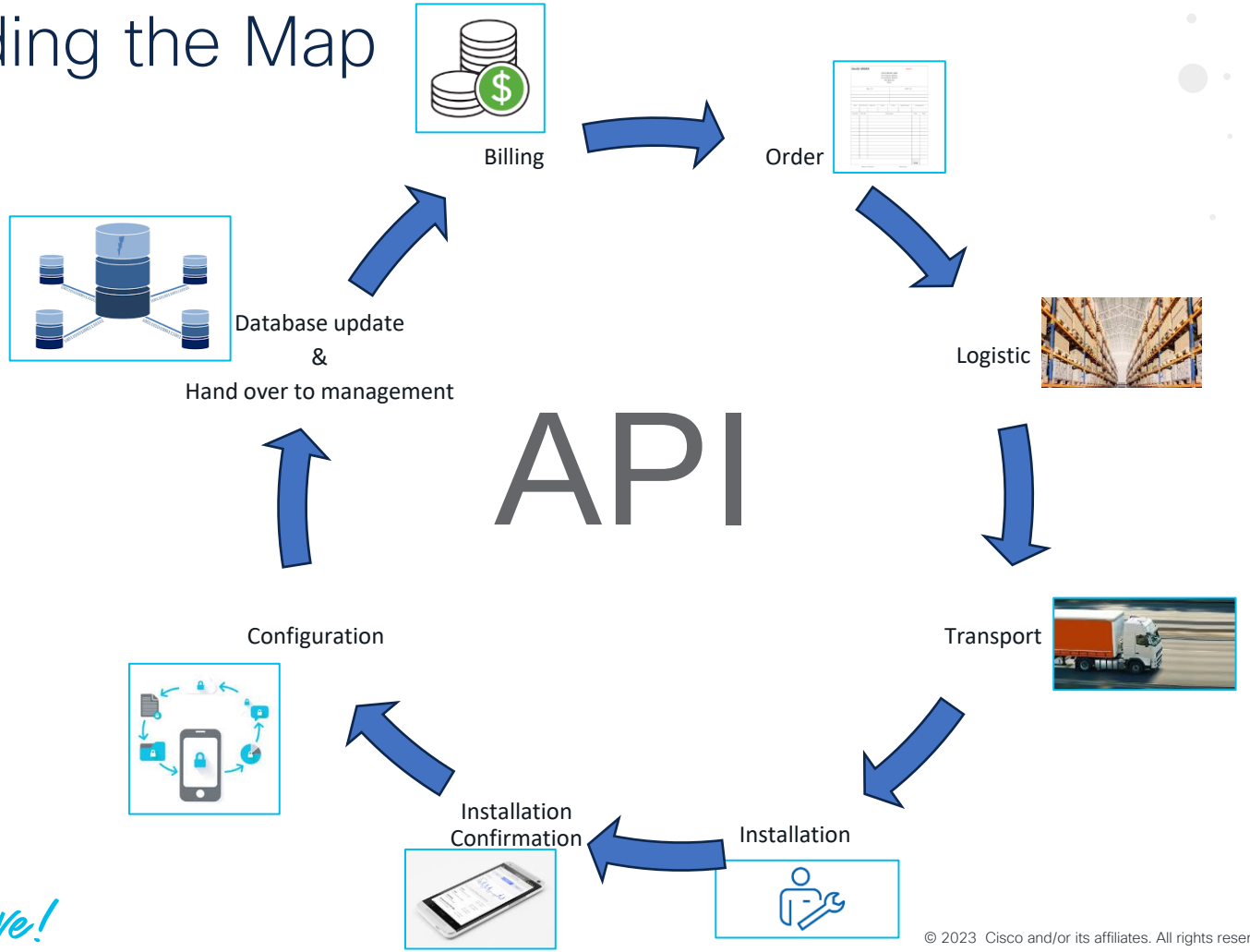
"What is the most important thing to consider
when building a service?"

"How much time and resources do I require to build the service?"

"How do I differentiate?"

"I created an offer, but I receive only few requests"

Building the Map



Ecosystem integrations. Rich API tool kit.

BUILD

{APIs and more}

Dashboard API

- Programmability
- Automation
- Monitoring
- Reporting
- Data insights
- Snapshot API

Webhook API

- Event stream
- Automation trigger

Scanning API

- Asset tracking
- Location analytics
- Wayfinding

MQTT wireless

- Real-time location services
- Wayfinding*

Captive portal API

- Guest Wi-Fi
- Secure Onboarding

MV Sense API

- Real-time (4 Hz) data stream
- Historical time-series via REST
- Current snapshot

*Application firmware deployed on Meraki hardware

Top Use Cases for Meraki APIs

BULK PROVISIONING & CONFIGURATION

Setup 10k networks across 5 time zones

AUTOMATION

Auto-configure a switch port when a printer is plugged in

CLOUD INTEGRATIONS

Integrate with custom and 3rd party applications

ADVANCED MONITORING & ALERTING

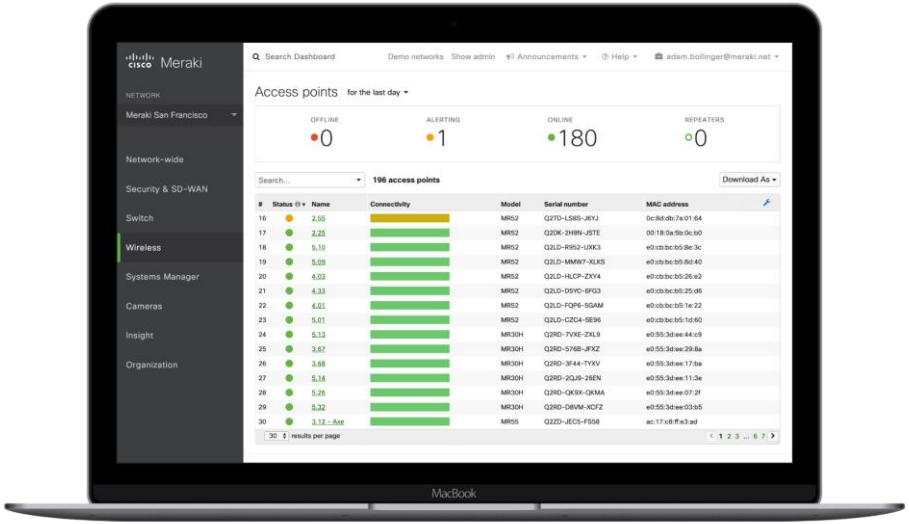
Monitor all devices and trigger a workflow if a site goes down

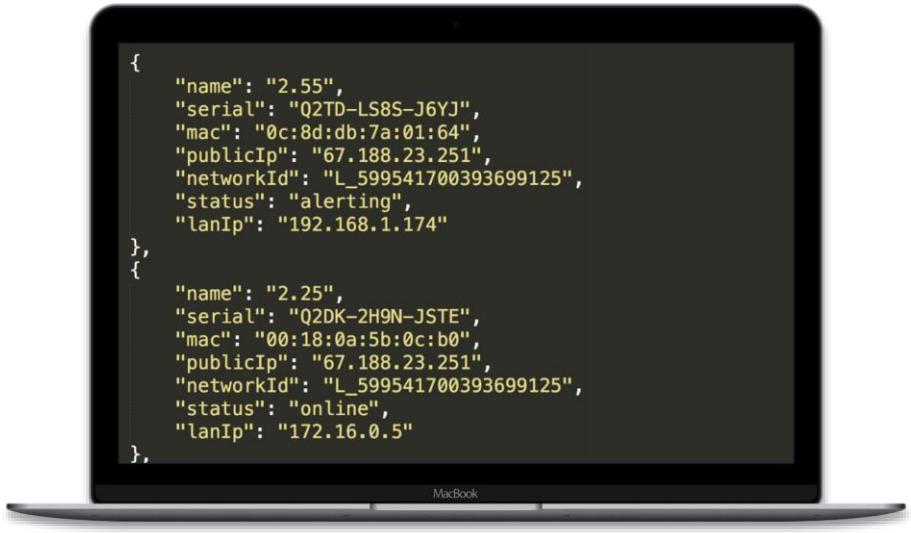
ADVANCED REPORTING & ANALYTICS

Produce a report that shows % of clients on Wi-Fi vs wired

Dashboard API

- **Example** | Meraki device info and status



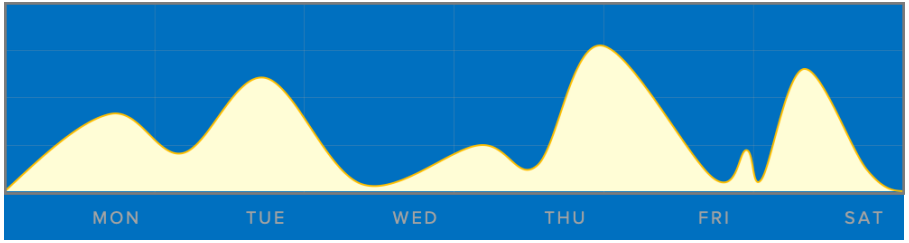


Dashboa → API

Monitoring vs Alerting

Monitoring Over Time – Dashboard REST API

E.g. latency trend over the last week



Real-Time Alerting – Webhooks

E.g. alert if the latency is greater than 200ms

ALERT 1 Thu, 7:53am: Latency for access point in conference room 3 **exceeded 200ms**

ALERT 2 Fri, 2:10am: Latency for access point in conference room 3 **exceeded 200ms**

Cloud Events via Webhook to any Web Client

Meraki | Developer Hub

Docs Explore What's new Resources Marketplace

Meraki > API > Webhook API

Overview
- Introduction
- Webhook Sample Alerts

APs came up
- Sample

APs went down
- Sample

Action Required: Upcoming firewall information changes
- Sample

Air Marshal - Rogue AP detected

Sample

JSON


```
{
  "version": "0.1",
  "sharedSecret": "foo",
  "sentAt": "2019-07-18T22:41:27.571121Z",
  "organizationId": "00000001",
  "organizationName": "Miles Monitoring Inc.",
  "organizationUrl": "https://n1.meraki.com/o//manag
  "networkId": "N_111111111111",
  "networkName": "Main Office",
  "networkUrl": "https://n1.meraki.com//n//manage/no
  "deviceSerial": "XXXX-XXXX-XXXX",
  "deviceMac": "00:00:00:aa:bb:cc",
  "deviceName": "Device Foo Bar",
  "deviceUrl": "https://n1.meraki.com//n//manage/nod
```


servicenow

pagerduty

zenoss

zapier

...

So what steps to take?

Think algebra and math

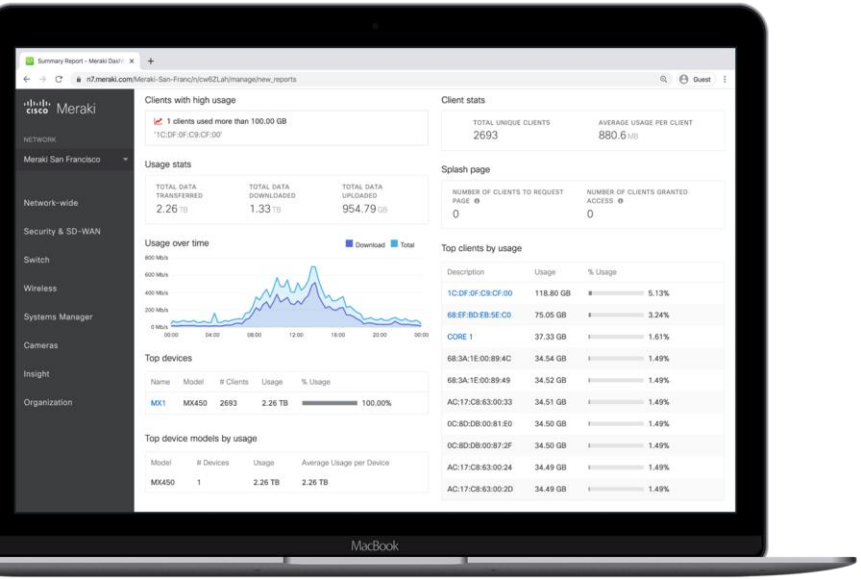
Constants – Partly coded in
(or a definition file)

- User access (SSO)
- Security Settings
- Branding
- Wireless/Wired settings
- Templates
- Special settings

Variables – Input fields

- Naming
- IP schema
- SSID/VLANs
- Inventory
  - Device serials
  - Licenses
- Special access users

Dashboard as template



- Think of the workflow you use in the dashboard.
- Common settings
- Clone/Copy
- Naming standards

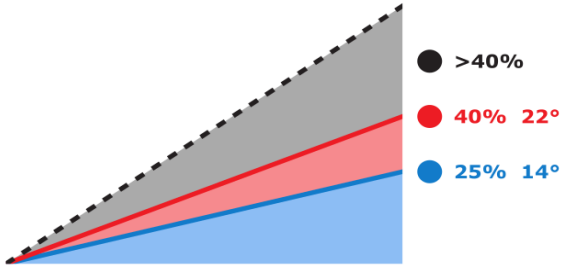
What can we change

Where to start

- Start small
- Find the low hanging fruits
- Test and Learn
- Expand
- DIY or BUY

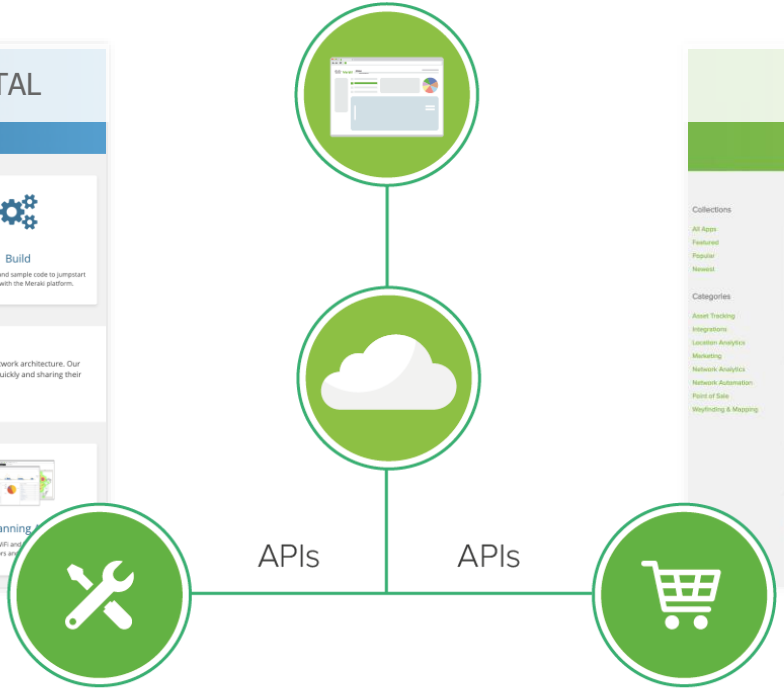
```
function getDevJob(studying, hardWork, luck) {
  var isPrepared = studying && hardWork && luck;
  if (isPrepared) {
    return true;
  } else {
    return false;
  }
}
```

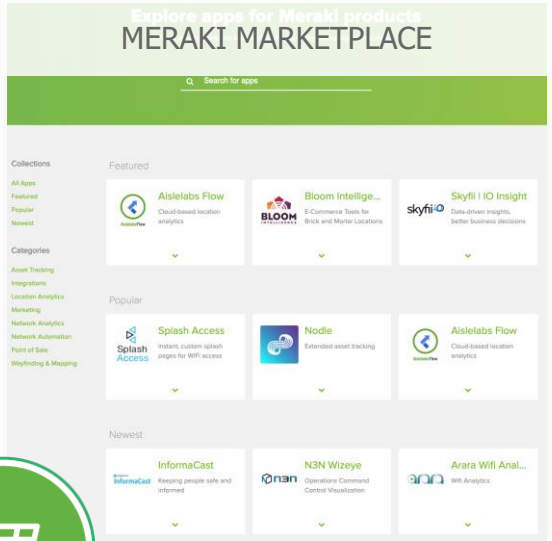
What do I need to get started?



Devnet - Sandbox

Access to a Complete Ecosystem





BUILD

create.meraki.io

BUY

apps.meraki.io

Select the outcome for your business

apps.meraki.io

BUSINESS OUTCOME SOLUTIONS

- ML Video Analytics
- Asset & People Tracking
- Real-time, Interactive Customer Experience
- POS & Wi-Fi Ordering
- Physical Security & Access Control
- Dwelling & Dormitory Experience
- Wayfinding & Mapping
- Wi-Fi Analytics & Engagement
- Smart Campus & Workplace
- Video Security

ADVANCED IT SOLUTIONS

- Automation
- Identity Services
- IT Service Management Tools
- IOT Security
- Managed Service Solutions
- Application & Performance Monitoring
- Network Monitoring & Logging
- SD-WAN Monitoring & Performance
- Network Security

apps.meraki.io

Demo

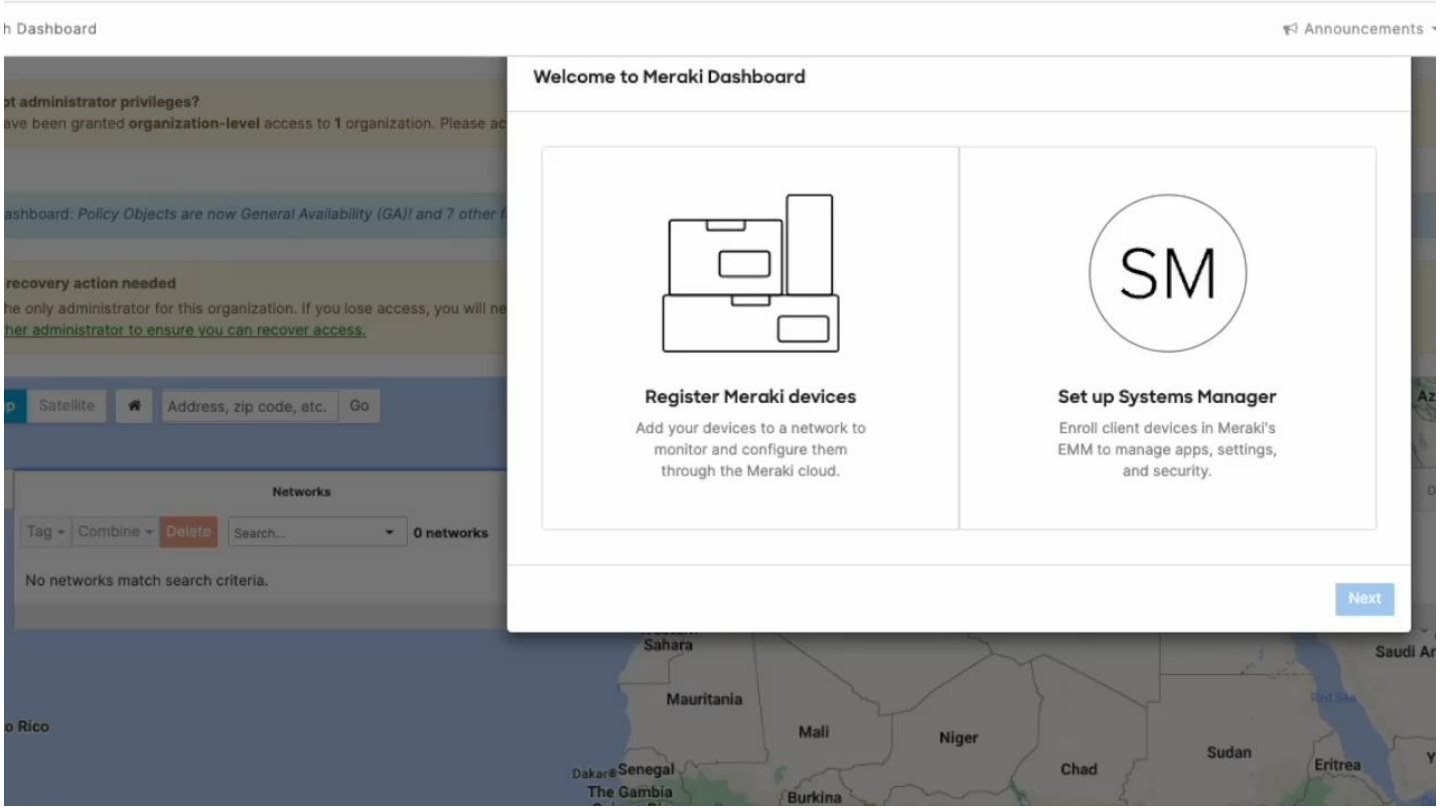
API Demo CLI Style!

https://youtu.be/_igfuAqxo_U

```
Mikael-Fredriksson-MBP:~ mikael.fredriksson$
```

API-Demo with an UI!

https://youtu.be/THrU_MDZmmA



After some practise you are ready for the red slops

Complete your Session Survey

- Please complete your session survey after each session. Your feedback is very important.
- Complete a minimum of 4 session surveys and the Overall Conference survey (open from Thursday) to receive your Cisco Live t-shirt.

- All surveys can be taken in the Cisco Events Mobile App or by logging in to the Session Catalog and clicking the "Attendee Dashboard" at https://www.ciscolive.com/emea/learn/sessions/session-catalog.html

Additional learning

- Cisco Meraki: Enabling Infrastructure as Code - BRKMER-2663
- Meraki Dashboard Automation using Python - LABMER-2405
- Enhanced Automation of a Meraki-based Environment - DEVNET-2200
- Meraki APIs 101 - DEVNET-1314
- Innovate with Meraki APIs and its Partner Marketplace - DevNet-1338
- Meraki 202 - Programmatic Action: Simplicity at Scale - DEVNET-2177
- Automate Meraki Alerting & Response with Webhooks and AWS Lambda - DEVWKS-2845
- Introduction to the Meraki Dashboard API - DEVWKS-1494
- Intro to Meraki Dashboard API Python Library - DEVNET-1303
- Cloud Management and Monitoring for Catalyst Walk-in Lab – LABCOC-2236
- World of Solution to meet our technology partners and the Meraki team

Thank you

CISCO Live!

ALL IN

Appendix

Code for the CLI demo

```
import meraki
import time

API_KEY = 'API-Key2'
dashboard = meraki.DashboardAPI(API_KEY,
    suppress_logging='True'
)
organization_id = 'Org-id'
name = 'Big-City'
product_types = ['appliance', 'switch', 'wireless',
cellularGateway', 'sensor']
 network_id =''
print ('Create the network')
response =
dashboard.organizations.createOrganizationNetwork(
    organization_id, name, product_types,
    timeZone='Europe/Stockholm',
    notes='API demo'
)
network_id = response['id']
print ('Add devices to the Network')
serials = ['Qxxx-xxxx-xxxx', 'Qxxx-xxxx-xxxx', 'Qxxx-xxxx-
xxxx','Qxxx-xxxx-xxxx']
response = dashboard.networks.claimNetworkDevices(
    network_id, serials
)
print ('Create additional Administrators')
email = 'jondoe@acme.com'
name = 'Super-Admin
org_access = 'full'
response =
dashboard.organizations.createOrganizationAdmin(
    organization_id, email, name, org_access,
)
```

```
print ('Enable VLANs')
response =
dashboard.appliance.updateNetworkApplianceVlansSettings(
    network_id,
    vlansEnabled=True
)
print ('Update VLAN-1')
vlan_id = '1'
response =
dashboard.appliance.updateNetworkApplianceVlan(
    network_id, vlan_id,
    name='Management',
    subnet='192.168.1.0/24',
    applianceIp='192.168.1.1',
    dhcpHandling='Run a DHCP server',
    dhcpLeaseTime='1 day',
    dnsNameservers='opendns',
)
print ('Create VLAN-10 Corp')
name = 'Kista-Data'
id_ = '10'
response =
dashboard.appliance.createNetworkApplianceVlan(
    network_id, id_, name,
    subnet='192.168.110.0/24',
    applianceIp='192.168.110.1',
)
vlan_id = id_
response =
dashboard.appliance.updateNetworkApplianceVlan(
    network_id, vlan_id,
    dhcpHandling='Run a DHCP server',
    dhcpLeaseTime='1 day',
    dnsNameservers='opendns',
)
```

```
print ('Update Guest SSID')
response = dashboard.wireless.updateNetworkWirelessSsid(
    network_id, 1,
    name='Branch-Guest',
    enabled=True,
    authMode='open',
    ipAssignmentMode='Bridge mode',
    splashPage='Click-through splash page',
    useVlanTagging=True,
    defaultVlanId=20,
)
print ('Update Splashpage')
response =
dashboard.wireless.updateNetworkWirelessSsidSplashSettin
gs(
    network_id, 1,
    redirectUrl='https://dn.se',
    useRedirectUrl=True,
    welcomeMessage='Välkommen!',
)
print ('Updating Device name and installation address')
address = ('Big-Place Big-City Big Country')
serials = [' Qxxx-xxxx-xxxx', 'Qxxx-xxxx-xxxx', 'Qxxx-xxxx-
xxxx','Qxxx-xxxx-xxxx']
devices = ['MX', 'MS', 'MR', 'MG']
for serial in serials:
    for devicename in devices:
        response = dashboard.devices.updateDevice(
        serial,
        name = devicename,
        address = address,
        moveMapMarker = True
)
```

Code for the UI demo part 1 of 2

```
#!/usr/bin/ python3
import meraki
import json
import sys
import time

API_KEY = 'Your API-Key'
dashboard = meraki.DashboardAPI(API_KEY)
def create_network():
   response = dashboard.organizations.createOrganizationNetwork(
   organization_id, nw_name, product_types,
   timeZone='Europe/Amsterdam'
)
def get_network_id():
   response = dashboard.organizations.getOrganizationNetworks(
   organization_id, total_pages='all'
)
   for nw in response:
      if (nw["name"]) == nw_name:
         nw_id = (nw["id"])
         return nw_id
def claim_device(nw_id):
   network_id = nw_id
   response = dashboard.networks.claimNetworkDevices(
      network_id, [serials]
   )
def update_device(serials):
   serial = serials
   response = dashboard.devices.updateDevice(
   serial,
a    name = devicename,
   address = address,
   moveMapMarker = True
   )
```

```
def add_ssid(nw_id,ssid_name,ssid_key):
   network_id = nw_id
   response = dashboard.wireless.updateNetworkWirelessSsid(
   network_id, 0,
   name = 'Corp-Data',
   enabled = True,
   vlanId = 10,
   authMode = '8021x-radius',
   ipAssignmentMode ='Bridge mode',
   wpaEncryptionMode = 'WPA3 Transition Mode',
   lanIsolationEnabled = False,
   radiusServers = [{'host':'192.168.1.1', 'port':1812 ,'secret':'secret'}, {'host':'192.168.2.2', 'port':1812, 'secret':'secret'
   )
   response = dashboard.wireless.updateNetworkWirelessSsid(
   network_id, 1,
   name = ssid_name,
   enabled = True,
   vlanId = 100,
   authMode = 'psk',
   ipAssignmentMode ='Bridge mode',
   psk = ssid_key,
   encryptionMode = 'wpa',
   wpaEncryptionMode = 'WPA3 Transition Mode',
   lanIsolationEnabled = False
   )
  response = dashboard.wireless.updateNetworkWirelessSsid(
   network_id, 1,
   name = ssid_name,
   enabled = True,
   vlanId = 100,
   authMode = 'psk',
   ipAssignmentMode ='Bridge mode',
   psk = ssid_key,
   encryptionMode = 'wpa',
   wpaEncryptionMode = 'WPA3 Transition Mode',
   lanIsolationEnabled = False
   )
```

Code for the UI demo part 2 of 2

```
response = dashboard.wireless.updateNetworkWirelessSsid(
    network_id, 2,
    name = 'Guest',
    splashPage = 'Click-through splash page',
    enabled = True,
    authMode = 'open',
    ipAssignmentMode ='NAT mode',
    splashTimeout = '240 minutes'
    )

    response = dashboard.wireless.updateNetworkWirelessSsidSplashSettings(
    network_id, 2,
    splashMethod = 'Click-through splash page',
    splashTimeout = 240,
    welcomeMessage = 'This is our Company Guest WiFi,\nDo not use this network for any illegal activities'
    )
if __name__ == "__main__":


    print('File: ',str(sys.argv[0]))
    print('Input')
    jsonData = json.loads(sys.stdin.readline())
    print(jsonData)


    nw_name = jsonData['nw_name']
    address = jsonData['address']
    ssid_name = jsonData['ssid_name']
    ssid_key = jsonData['ssid_key']
    serials = jsonData['serials']
    devicename = jsonData['devicename']
```

```
# Creation of the network
    organization_id = 'Org-ID'
    product_types = ['appliance', 'switch', 'wireless']
    create_network()
    time.sleep(1)


# Add device to the network
    # Grab Network-ID
    nw_id = get_network_id()
    time.sleep(1)
    # Clain device to network
    claim_device(nw_id)
    time.sleep(1)


# Create SSID
    #print(SSID_Info)
    add_ssid(nw_id,ssid_name,ssid_key)
    time.sleep(1)
    # Update name and address to device
    update_device(serials)
    time.sleep(1)
```

Use Cases

Automation at Nationwide Rental Company

CUSTOMER PROFILE

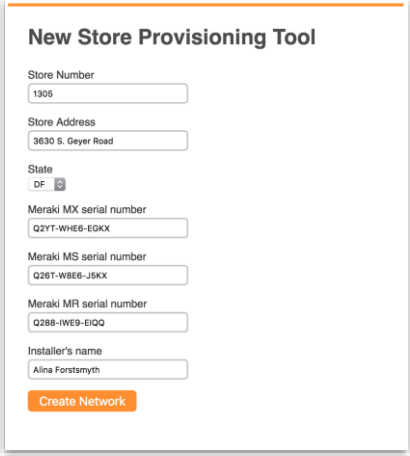
$4B **2006 revenue**	18,000 **employees**	2,000 **retail locations**

CHALLENGE

- Automate deployment of 2,000+ nation-wide locations over 4 months
- Streamline and simplify operations to reduce overhead and costs

SOLUTION

- Rapid, fully automated network setup and provisioning with the Meraki dashboard API
- Automate setup of all networks, bind them to configuration templates via an elegant web tool built for the field deployment team



Products used

- MS | MR | MX

APIs used

- Dashboard API

Built by

- Customer

“At-Home” IoT Wireless Experience for Dorms

CUSTOMER PROFILE

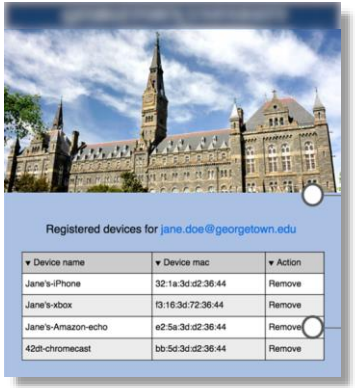
Private research university	17,500+ **students**	4 **campus locations**

CHALLENGE

- Easily onboard student IoT devices that speak to each other in dorm with registration portal
- Provide seamless IoT support with Tier 1 management portal

SOLUTION

- Tech partner developed device registration and Tier 1 management portals utilizing the Meraki dashboard and captive portal APIs
- Students easily onboard and manage their IoT devices with devices grouped to communicate with each other
- Tier 1 management portal for Georgetown network services team to support/troubleshoot



Products used

- MR

APIs used

- Dashboard API
- Captive portal API

Built by

- Technology partner

The Meraki Digital Workplace

CHALLENGE

- Meraki IT wanted a fully automated provisioning solution for Teleworker kits for Meraki employees
- Hundreds of devices need to be provisioned
- The dashboard GUI is great, however the task would take too many clicks

SOLUTION

- Automated provisioning using the dashboard API
  - Meraki devices need to be added to inventory
  - Each teleworker kit requires its own dashboard network
  - Lock down the network config. by binding to a template
  - Bind the network to a specific device from the inventory

```
# Claim device into network
response = conn.post do |request|
  request.url "/api/v0/networks/#{network_id}/devices/claim"
  request.headers['X-Cisco-Meraki-API-Key'] = "#{dash_api_key}"
  request.headers['Content-Type'] = 'application/json'
  request.body = "{\"serial\":\"#{serial}\"}"
end
```

Products used

- Z1 / Z3 teleworker

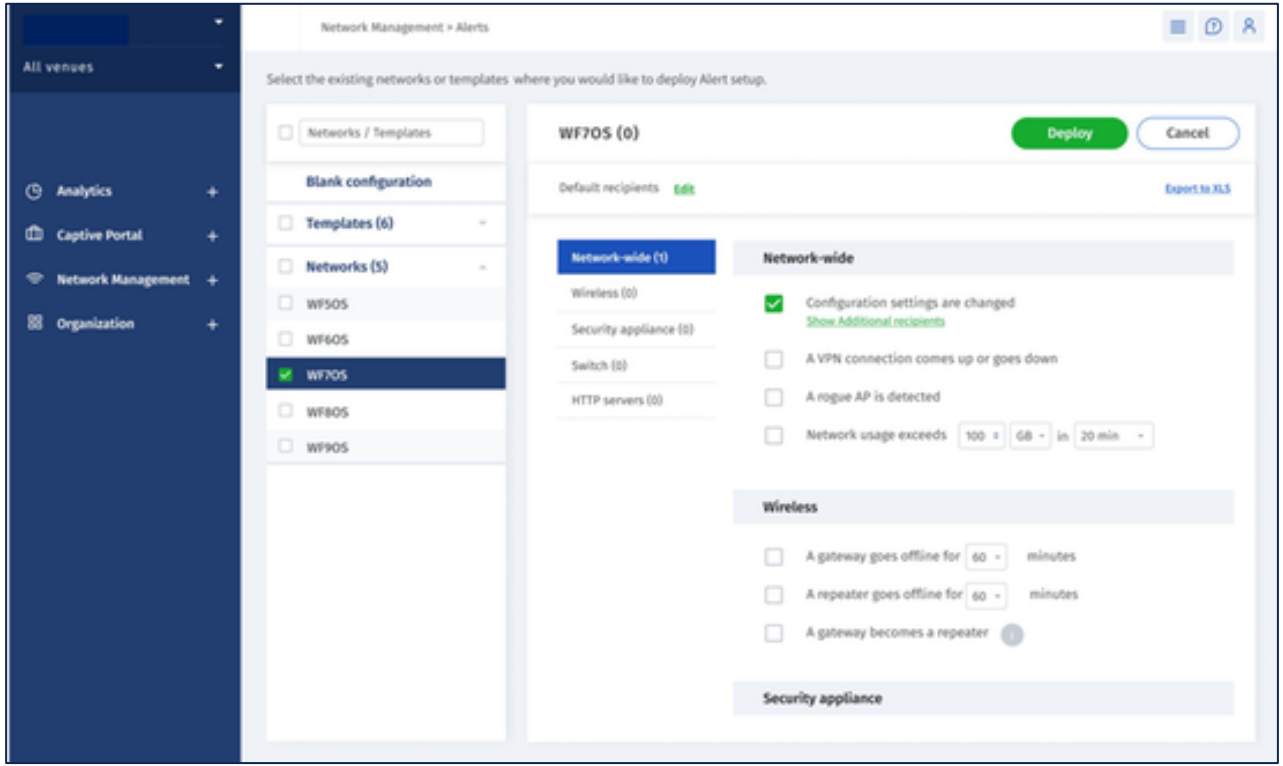
APIs used

- Dashboard API

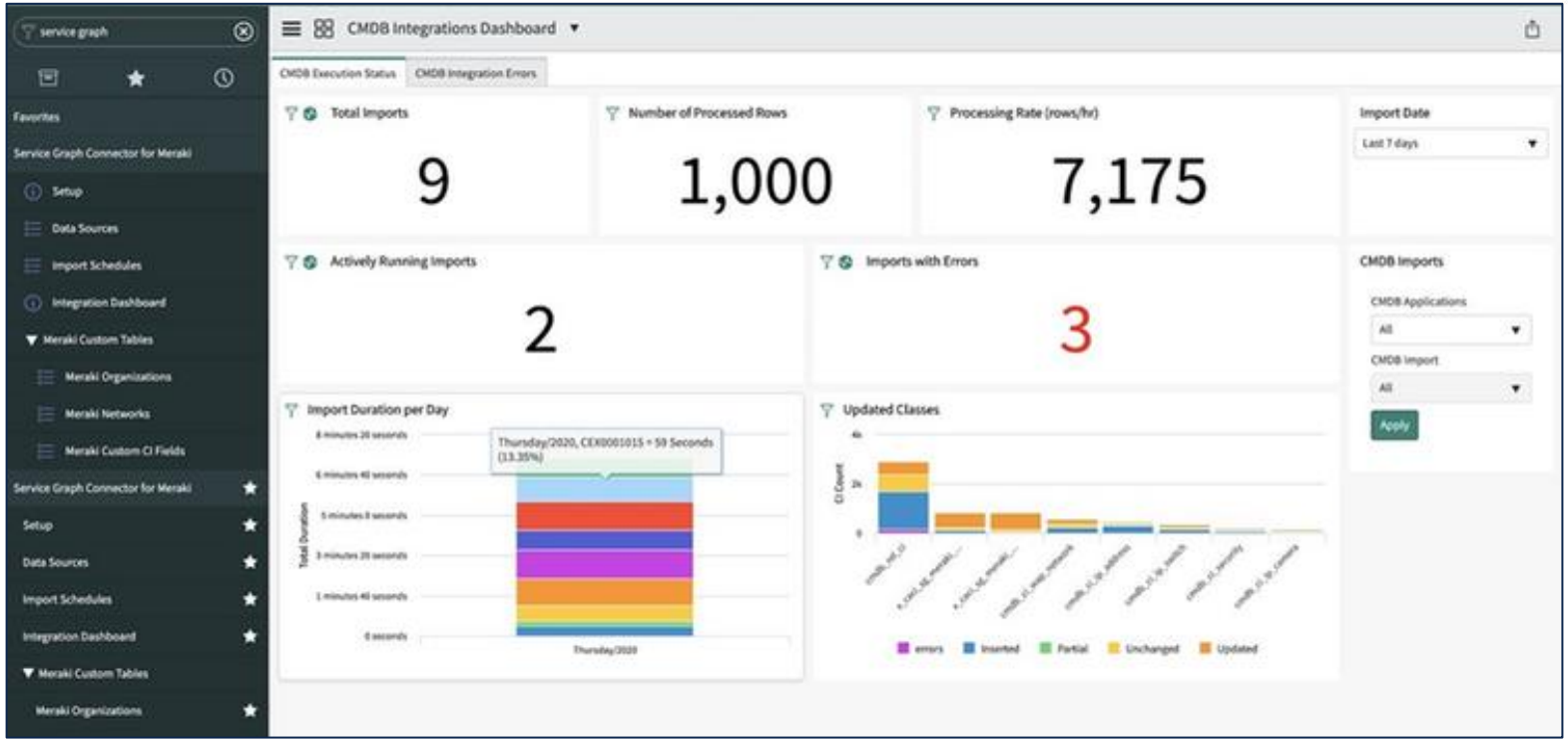
Built by

- Meraki IT

Boundless Automation

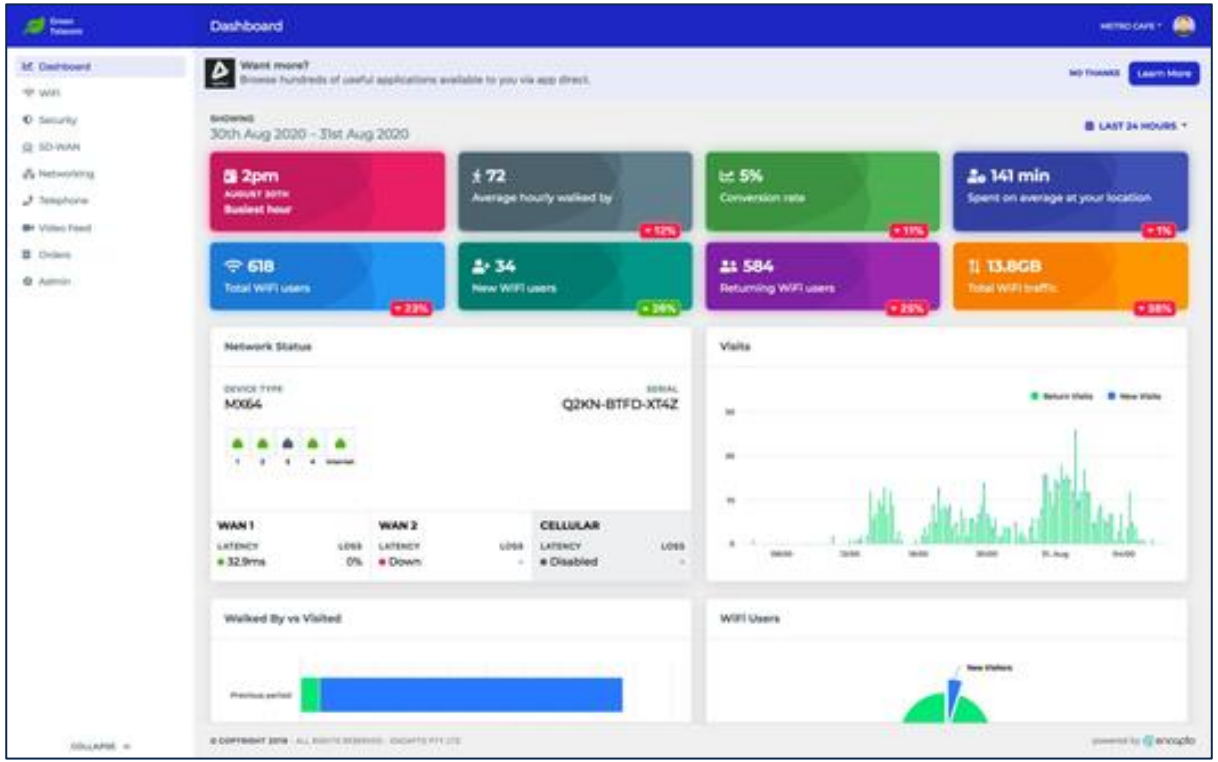


Service Now Connector



Auvik Networks

Encapto



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