The bridge to possible

Meraki 201: Programmatic Access

Accelerate with Intelligence

Jon Hartman, Meraki TSA, CCIE 34941
@techdojo

cisco Live!

DEVNET-2174

Cisco Webex App

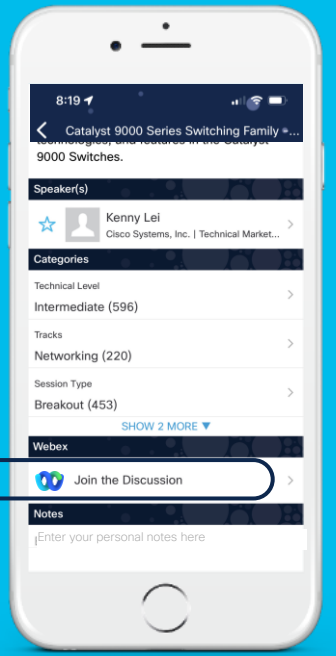
Questions?

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.

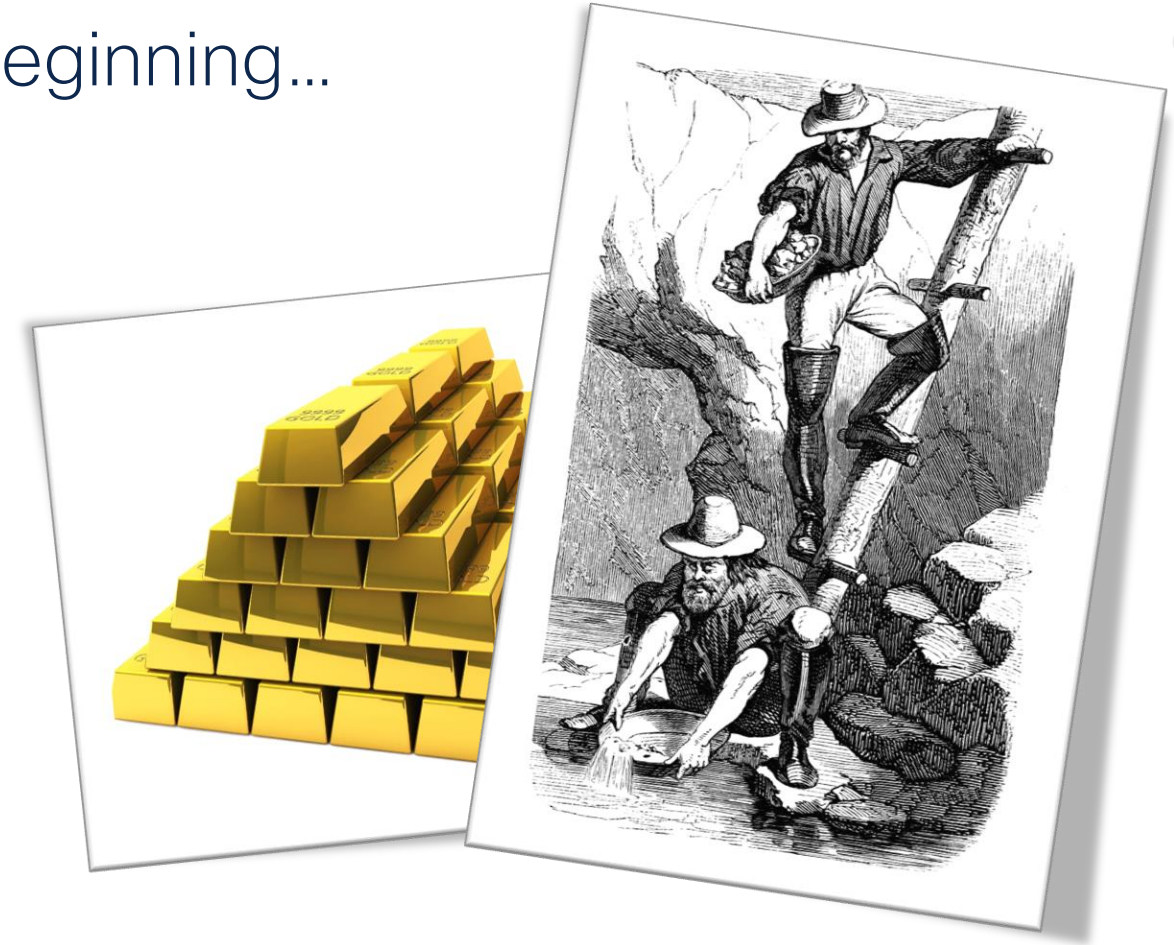


Agenda

- Introduction
- API / Webhooks
- Network as a Sensor
- MV
- Conclusion

In the beginning…

In the beginning…



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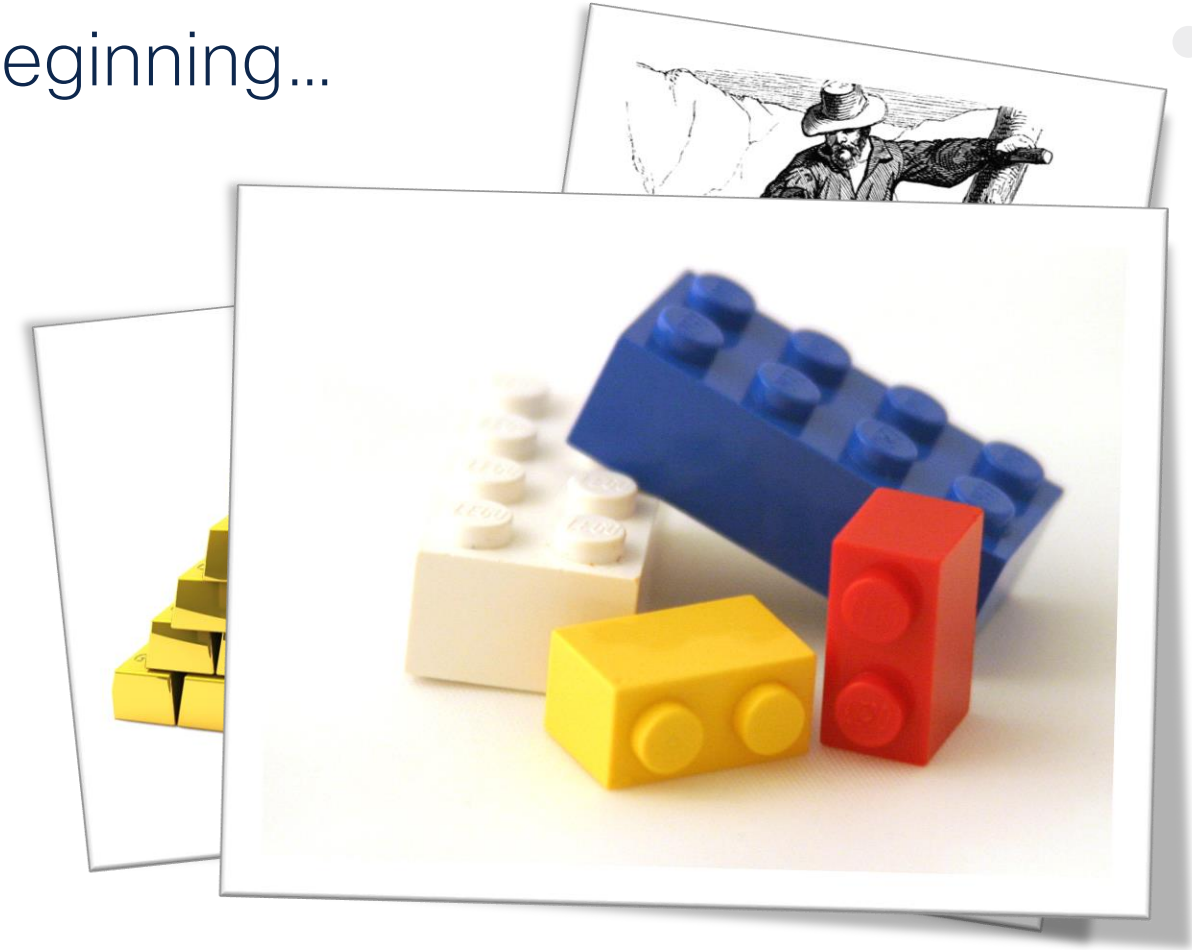

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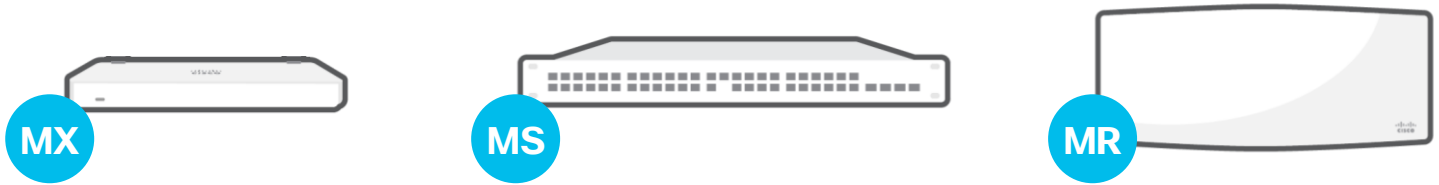

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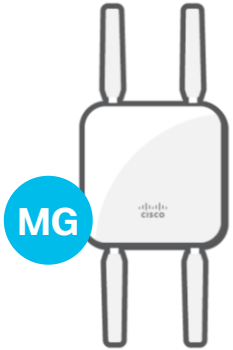

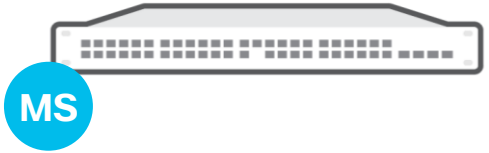

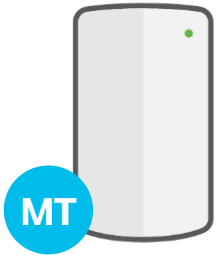

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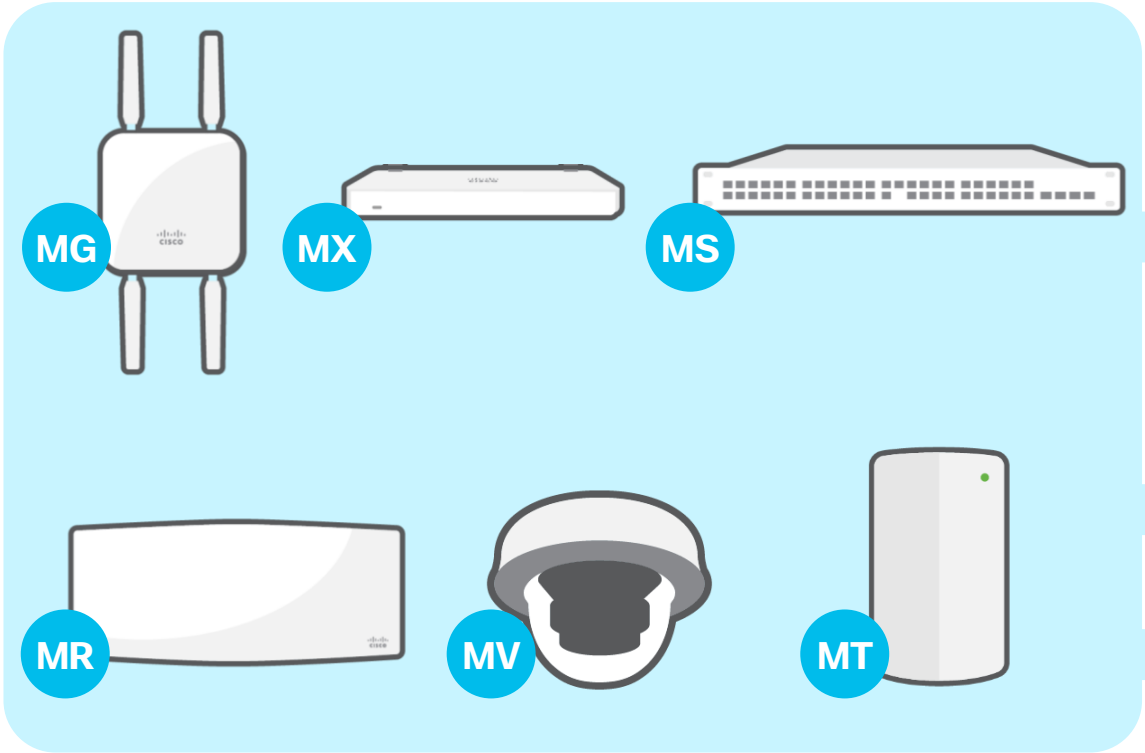

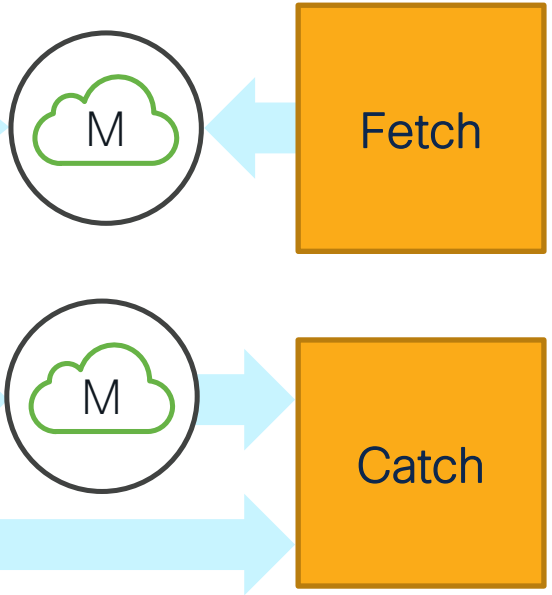

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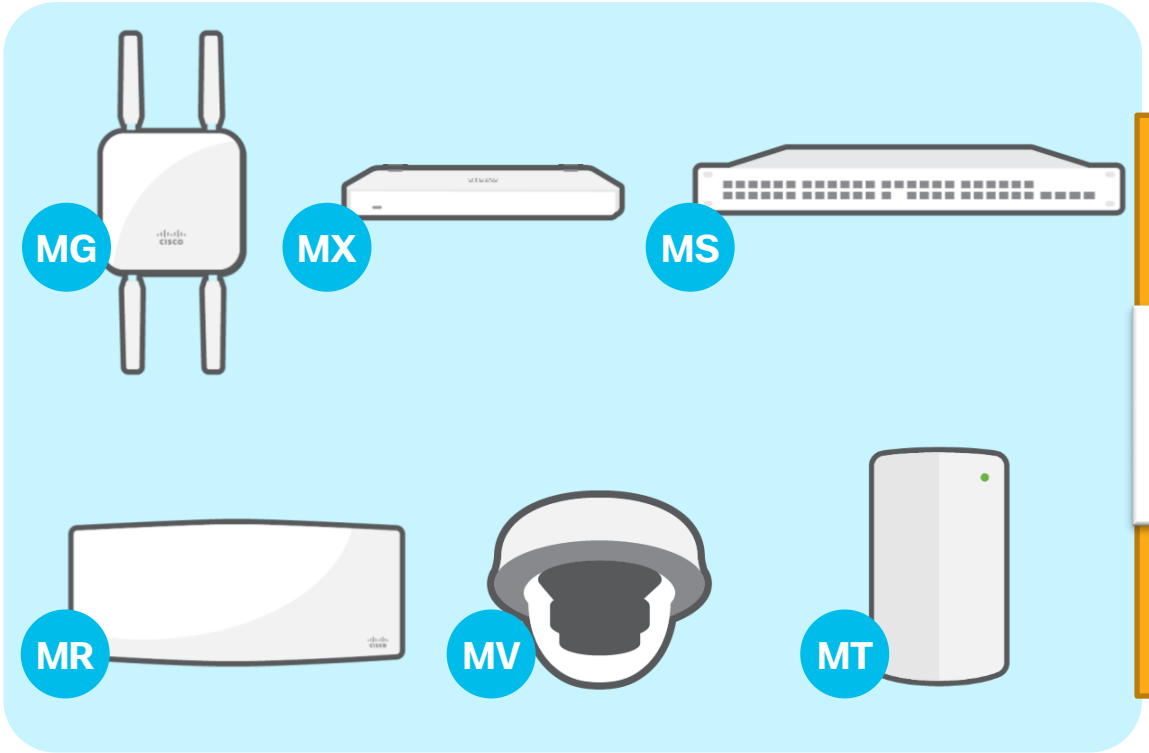
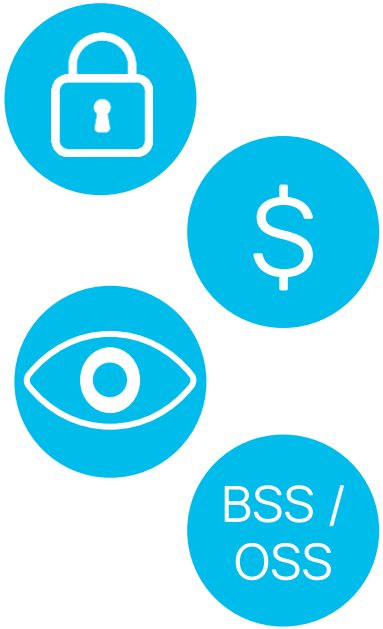


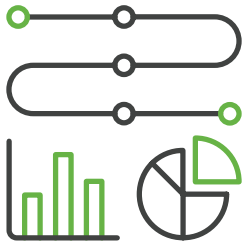
Fetch

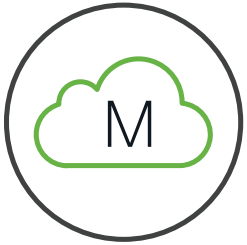
Catch



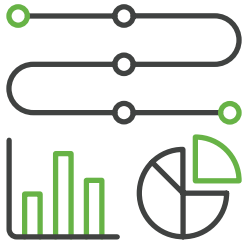
API & Webhooks

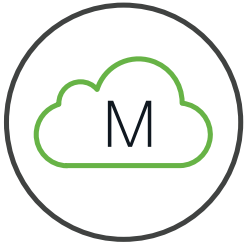
API & Webhooks





API & Webhooks





API & Webhooks

API: Key

- Privileged as user
- Treat as a credential (sensitivity, rotation)
- System ID (no SAML access)

API: Rate-limit

Megaproxy
- 50 requests per second per IP address
- violation = 429

Shard
- 10 requests per second per organization
- violation = 429, retry-after

Optimize with “action batches”

API: Pagination

Request 1

```
[
{ "serial": "Q2CL-OUDM-ANAG", "model": "mr57" },
{ "serial": "Q2EM-ENTI-STHE", "model": "mr57" },
{ "serial": "Q2FU-TURE-OFAL", "model": "mr57" },
                    <snip>
{ "serial": "Q2NE-NETW-ORKS", "model": "mr57" }
]
```

x1,000

Request 2

```
[
{ "serial": "Q2GE-TONB-OARD", "model": "mr57" },
{ "serial": "Q2SO-YOUA-RENT", "model": "mr57" },
{ "serial": "Q2LE-FTBE-HIND", "model": "mr57" }
]
```

x3

API: Pagination

Request 1

```
/inventory
```

x1,000

Request 2

```
/inventory?startingAfter=Q2NE-NETW-ORKS
```

x3

API: SDK

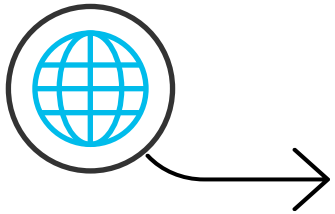
With SDK

```
response = dashboard.organizations.getOrganizations()
```

Without SDK

```
url = "https://api.meraki.com/api/v1/organizations"

payload = None

headers = {
    "Content-Type": "application/json",
    "Accept": "application/json",
    "X-Cisco-Meraki-API-Key": "75dd5334bef4d2bc96f26138c163c0a3fa0b5ca6"
}

response = requests.request('GET', url, headers=headers, data = payload)
```

API: Developer Portal



meraki.io

Webhooks

Webhooks

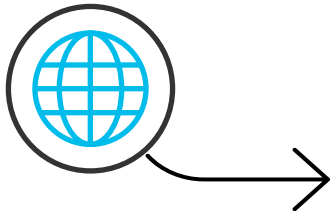
- Unsolicited
- Event-driven / real-time
- Encrypted (should be)
- Authenticated (should be)

- Reliably-transported (TCP)
- Lightweight protocol
- Verbose
- Machine-friendly formatting

Webhooks

```
{
  "sharedSecret": "secret",
  "sentAt": "2021-10-07T08:42:00.923716Z",
  "organizationId": "2930418",
  "networkId": "N_24329156",
  "deviceSerial": "Q234-ABCD-5678",
  "alertType": "Unreachable devices detected",
  "alertTypeId": "firewall_test_failed",
  "occurredAt": "2018-02-11T00:00:00.123450Z",
  "alertData": {
    "failingNodes": ”3rd Floor, AP #14"
  }
}
```

Webhooks



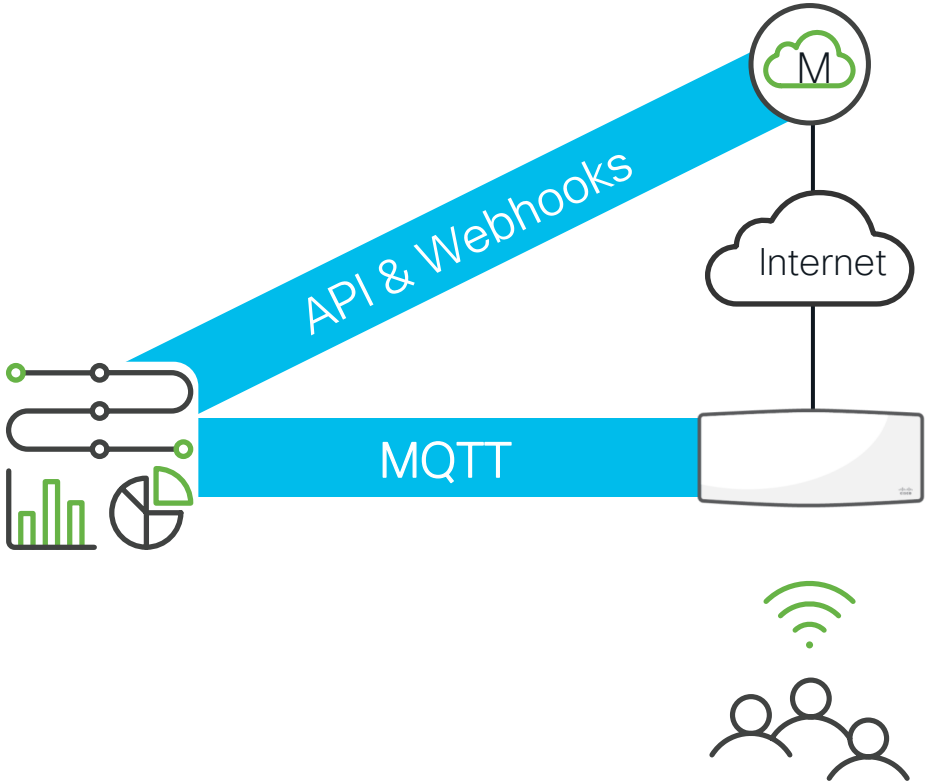
Meraki Dashboard

Webhooks: Best practices

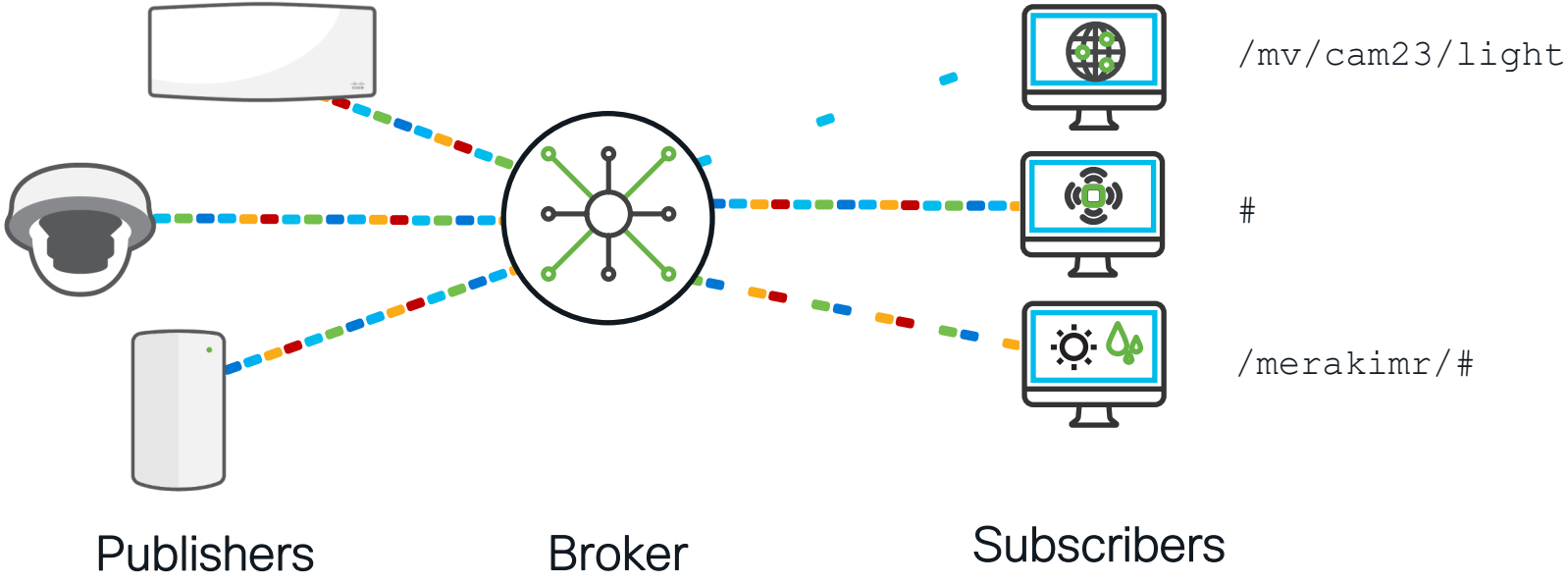
- Use HTTPS
- Track SSL/TLS certificate expiration
- Troubleshoot via triangulation
- Separate storing from processing
- Correlate webhooks event with API endpoints

Network as a Sensor

Network as a Sensor: MQTT



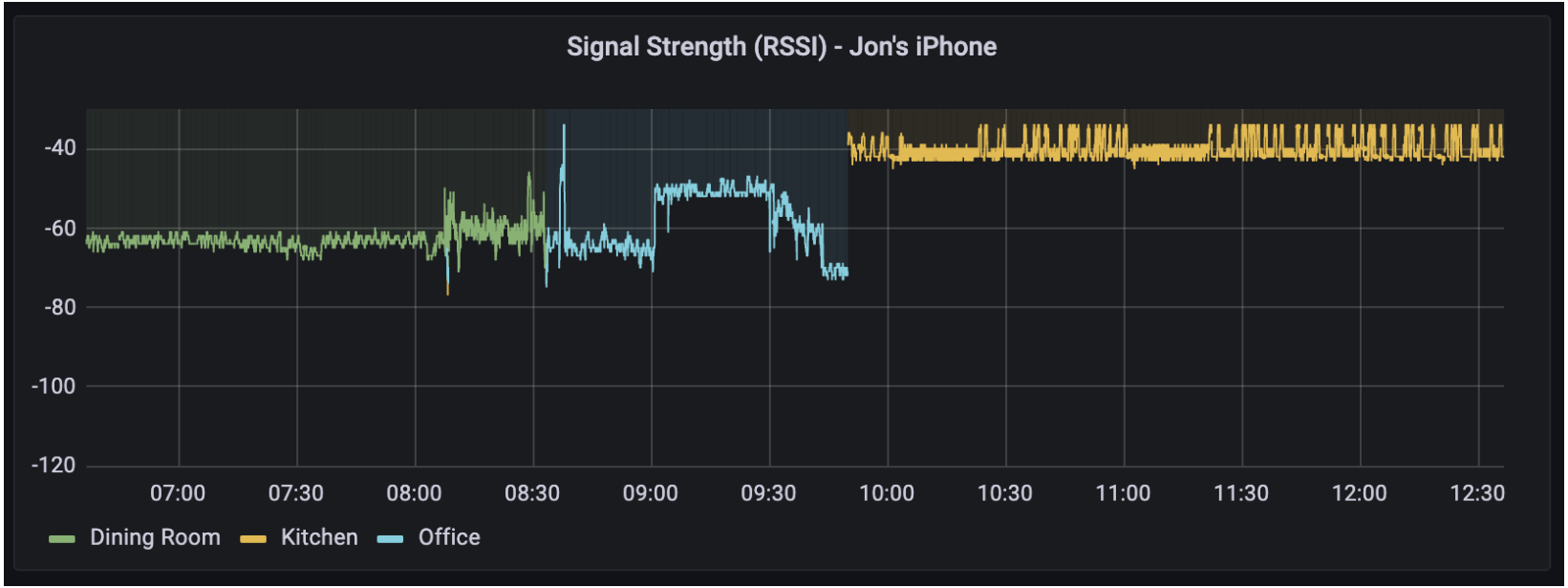
Network as a Sensor: MQTT



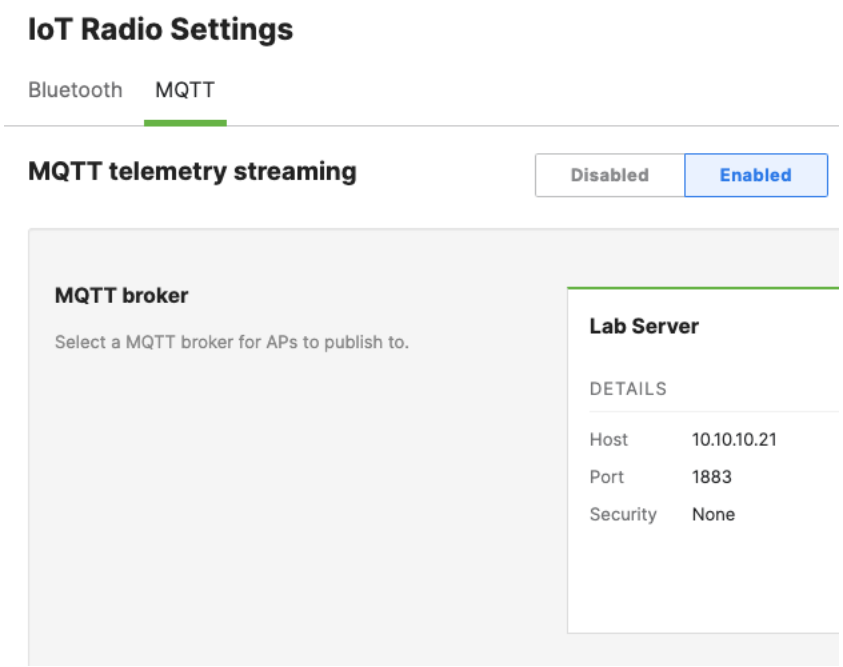
Network as a Sensor: MQTT

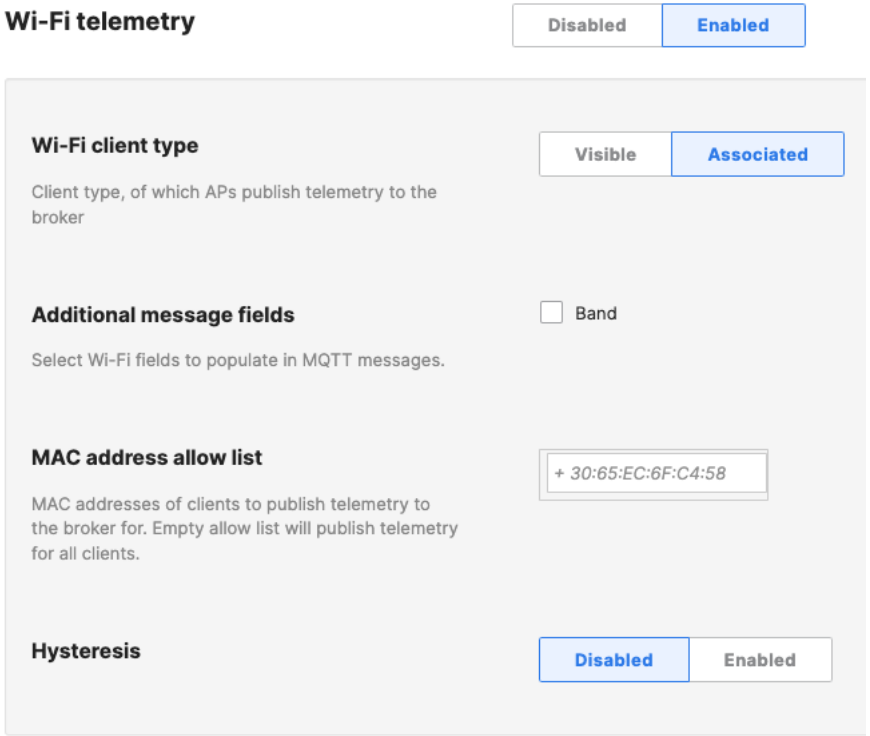
```
/merakimr {
"mrMac": ”5C:AL:EA:Bl:E0:00",
"clientType": "associated",
"clientMac": ”BA:5E:BA:11:00:00",
"timestamp": "2021-10-19 20:06:35.696",
"networkId": "N_628252148018987654",
"rssi": "-51",
"radio": "wifi"
}

/merakimr {
  "bleType": "unknown",
  "mrMac": ”0D:DB:A1:10:00:00",
  "clientMac": ”DE:AD:BE:EF:CA:FE",
  "timestamp": "2021-10-19 20:06:36.244",
  "networkId": "N_628252148018987654",
  "rawPayload": "1bff75004204018066640 7f652410000",
  "rssi": "-90",
  "radio": "ble"
}
```

Network as a Sensor: MQTT



Network as a Sensor: MQTT





Network as a Sensor: Loss & Latency

RTR: Response Time Reporter

SAA: Service Assurance Agent

IP SLA: IP Service Level Agreements

Network as a Sensor: Loss & Latency

SD-WAN & traffic shaping

Uplink configuration

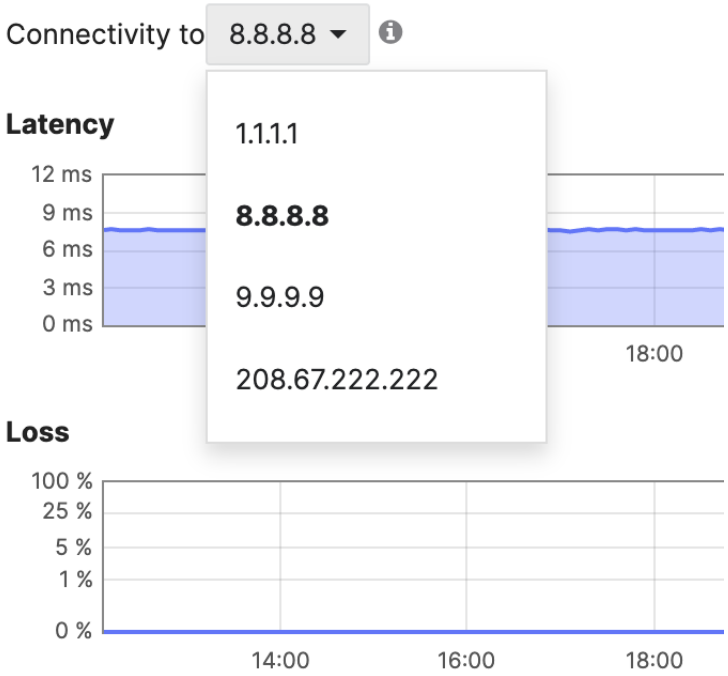
Cellular active uplink: Enabled

WAN 1: down (Mb/s) 500; up (Mb/s) 500; simple

Cellular: unlimited; details

Uplink statistics

Test Connectivity to	Description	Default
8.8.8.8	Google	◉
9.9.9.9	Quad9	○
208.67.222.222	OpenDNS	○
1.1.1.1	Cloudflare	○



Network as a Sensor: Loss & Latency

Status	Network name	Interface	VoIP provider ▼	VoIP server address	VoIP health	MOS	Loss	Latency	Jitter
●	Hartman Household	WAN 1	Default Gateway	184.17.64.1		4.4	0.00%	5.8 ms	3.4 ms
●	Hartman Household	WAN 1	Cisco WebEx	cisco.webex.com		4.4	0.00%	60 ms	710 µs
●	Hartman Household	WAN 1	Christmas Music - Shoutcast	174.142.242.123		4.4	0.00%	41 ms	670 µs
●	Hartman Household	WAN 1	Christmas Music - iHeart Radio	151.101.201.132		4.4	0.00%	7.6 ms	740 µs

Network as a Sensor: Loss & Latency

Get Organization Devices

Uplinks Loss And Latency


```
{
  "networkId": "L_628252148018187961",
  "serial": "Q2MY-GNZL-6CXM",
  "uplink": "wan1",
  "ip": "1.1.1.1",
  "timeSeries": [
    {
      "ts": "2023-01-07T16:54:37Z",
      "lossPercent": 0,
      "latencyMs": 8.4
    },
    ... < snip >
    {
      "ts": "2023-01-07T16:58:36Z",
      "lossPercent": 0,
      "latencyMs": 8.4
    }
]
}
```

Meraki Vision

Meraki Vision

Meraki Vision

Meraki Vision: API

generateDeviceCameraSnapshot

/devices/{serial}/camera/generateSnapshot

Body

```
{
    "timestamp": "2021-04-30T15:18:08Z",
    "fullframe": false
}
```

Response

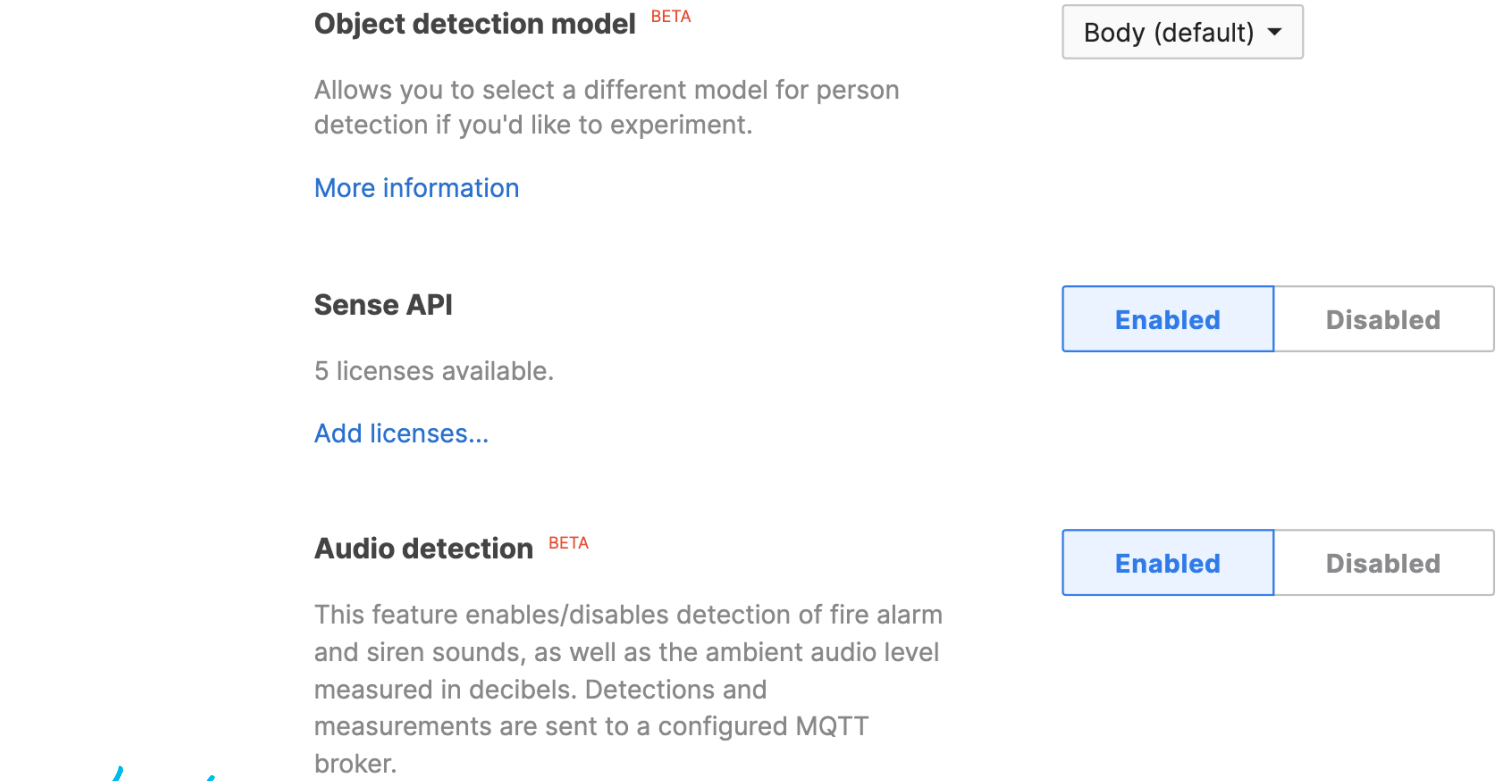
```
{
    "url": "https://spn4.meraki.com/stream/jpeg/snapshot/b2d123asdf423qd22d2",
    "expiry": "Access to the image will expire at 2023-02-11T03:12:39Z."
}
```

Meraki Vision: Webhooks


```
{
  "sentAt": "2023-01-11T02:18:16.316788Z",
  "organizationId": "410499",
  "networkId": "L_628252148018187961",
  "deviceSerial": "Q2NV-4CTA-CHQX",
  "deviceName": "MV - Stairs",
  "deviceModel": "MV2",
  "alertId": "6282521480330016 65",
  "alertType": "Motion detected",
  "alertTypeId": "motion_alert",
  "occurredAt": "2023-01-11T02:15:42.428999Z",
  "alertData": {
    "timestamp": 1673403342.429,
    "imageUrl": ”https://<redacted>"
  }
}
```

Meraki Vision: RTSP

Meraki Vision: MV Sense



Meraki Vision: MV Sense

Custom CV

Allows you to deploy custom models to detect specified objects

Add or delete custom models

Enabled | Disabled

MQTT Broker

Allows you to select the MQTT Broker that this camera will publish to.

Add or edit MQTT Brokers

Lab Server 1

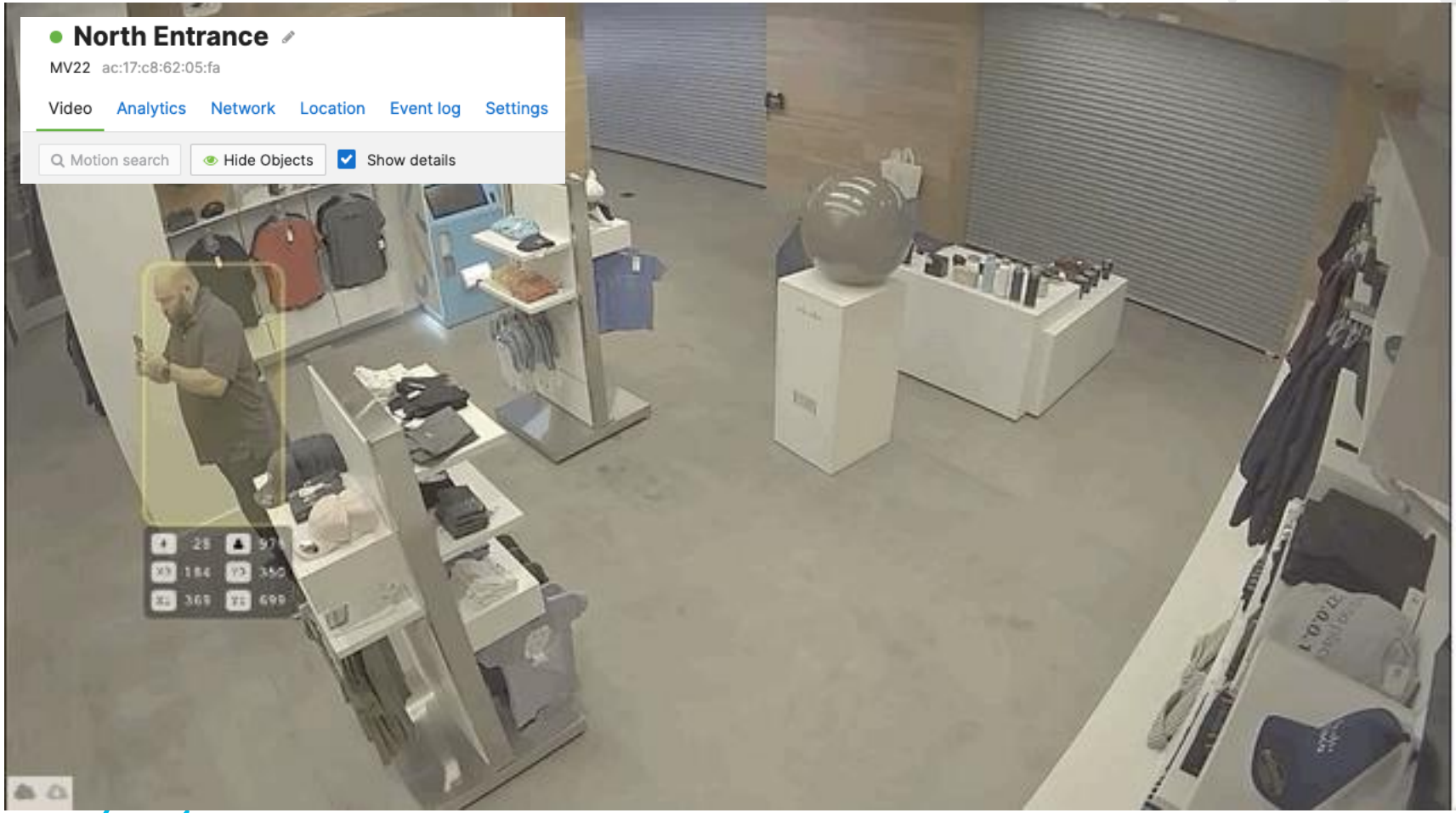
MQTT Topics

Topic	Area of Interest	Details
/merakimv/Q2EV-R6FG-BCSV/raw_detections	Entire image	Object detections from whole camera frame
/merakimv/Q2EV-R6FG-BCSV/audio_detections	Camera	Audio detections from the camera's microphone
/merakimv/Q2EV-R6FG-BCSV/audio_analytics	Camera	Measurements from the camera's microphone (dB)
/merakimv/Q2EV-R6FG-BCSV/light	Camera	Measurements from the camera's light sensor (lux)

Meraki Vision: MV Sense

Raw Detections

```
/merakimv/Q2EV-R6FG-BCSV/raw_detections {
    "objects" :
    [
        {
            "confidence" : 97,
            "frame" : 276907,
            "oid" : 186,
            "type" : "person",
            "x0" : 0.938, "x1" : 0.856,
            "y0" : 0.642, "y1" : 0.256
        }
    ],
    "ts" : 1673450962973
}

/merakimv/Q2EV-R6FG-BCSV/0 {"ts":1673550196820, "counts":{"person":0}}
```



Meraki Vision: MV Sense

Audio Detections

```
/merakimv/Q2HV-24HB-TMZ9/audio_detections [
    {
        "confidence" : 0.99293702840805054,
        "id" : 9,
        "name" : "siren",
        "ts" : "1673453302565"
    }
]
```

Meraki Vision: MV Sense

Audio Analytics

```
/merakimv/Q2HV-24HB-TMZ9/audio_analytics {
    "audioLevel" : -47,
    "ts" : 1673453184801
}
```

Light

```
/merakimv/Q2HV-24HB-TMZ9/light {"lux": 30.8}
```

Meraki Vision

Fetch screen capture via API

Receive motion alert via webhooks

Video stream for 3rd party processing

Acquire sensor data via MQTT

Real-time or historical object counts

MV Sense

MT: Meraki Things (IoT sensors)

MT10 – Temp (Ambient) & Humidity

MT11 – Temp (Probe)

MT12 – Water Leak

MT14 – Air Quality

MT20 – Door Open/Close

MT30 – Smart Button

API

Webhooks

MQTT

Final Thoughts

Final thoughts

- Get a proper IDE and learn how to use it (PyCharm, VS Code, etc…)
- Maintain proper API key hygiene (rotation, sensitivity, exclusion from code)
- Choose the optimal way to acquire data (frequency, contention, source)
- Consider execution method (cron job, sleep timer, listener)

Related Sessions

LABMER-2405	Meraki Dashboard Automation using Python
BRKMER-2663	Cisco Meraki: Enabling Infrastructure as Code
DEVNET-2177	Meraki 202 - Programmatic Action: Simplicity at Scale

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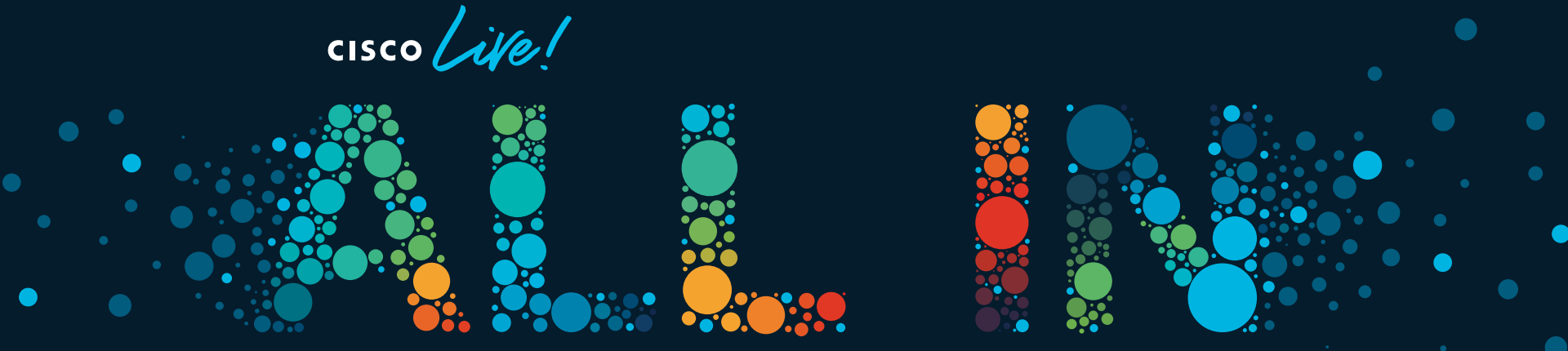
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