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# Powerful Network Automation with Meraki APIs

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@theDeNap

DEVNET-1217

**CISCO** *Live!*

Barcelona | January 27-31, 2020



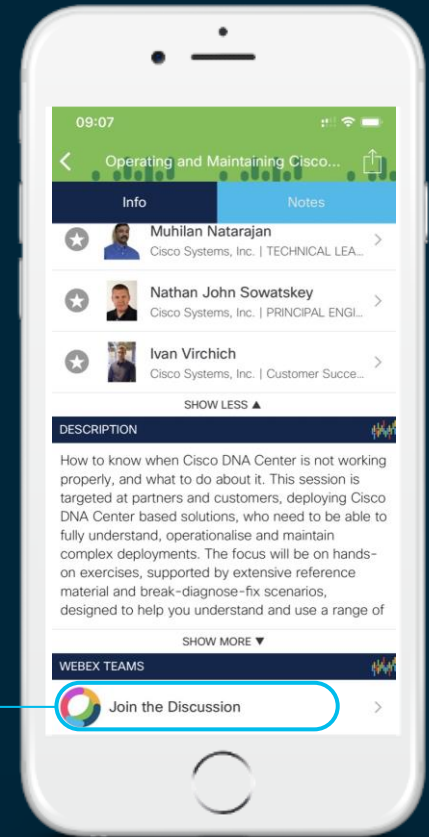
# Cisco Webex Teams

## Questions?

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

## How

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

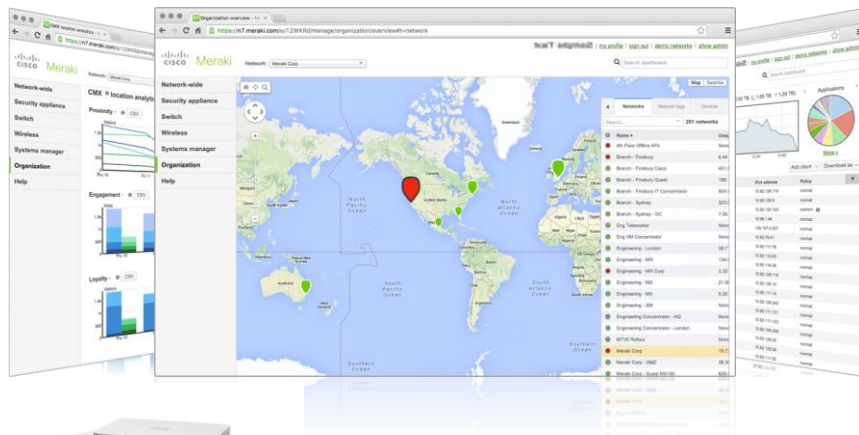


# Agenda

- The Meraki Platform
- Meraki APIs
- Dashboard API
- WebHook Alerts
- Location Scanning API
- MV Sense (Cameras)
- External Captive Portal (EXCAP)
- Wrap Up

# The Meraki Platform

# Meraki – Cloud Management for the Enterprise



MR Wireless



MX Security Appliances



MS Switches



SM  
EMM/MDM

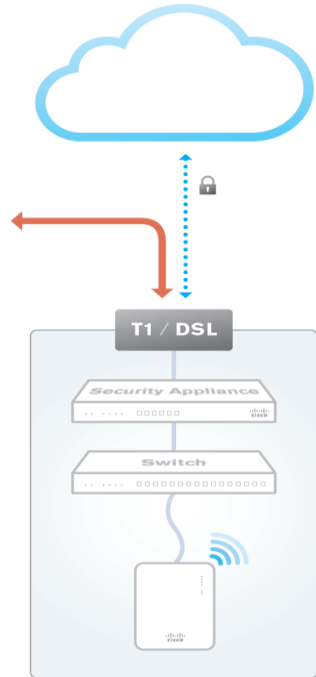


MV Camera

cisco *Live!*

## CLOUD MANAGED IT

# Brings the benefits of cloud to enterprise networks



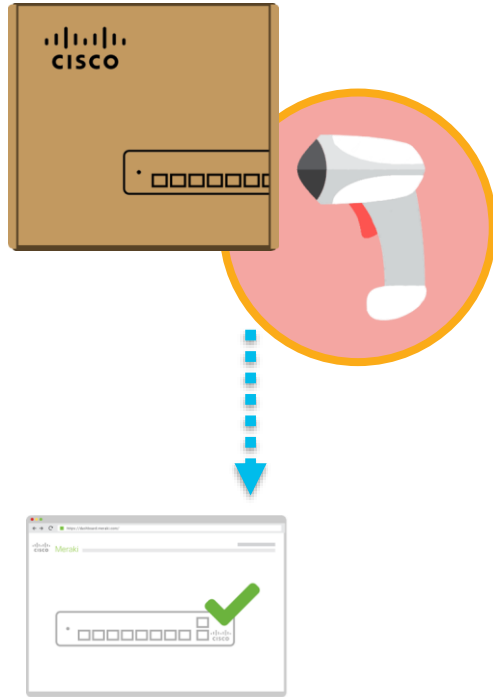
- Secure
  - No user traffic passes through the cloud
  - Fully HIPAA / PCI Compliant (level 1 certified)
  - 3<sup>rd</sup> party security audits, daily vulnerability testing
  - Automatic firmware and security updates (user-scheduled)
- Scalable
  - Unlimited throughput, no bottlenecks
  - Add devices or sites in minutes
- Reliable
  - Highly available cloud with multiple datacenters
  - Network functions even if connection to cloud is interrupted
  - 99.99% uptime SLA
  - Reliability and security information at [meraki.cisco.com/trust](https://meraki.cisco.com/trust)

# Meraki APIs

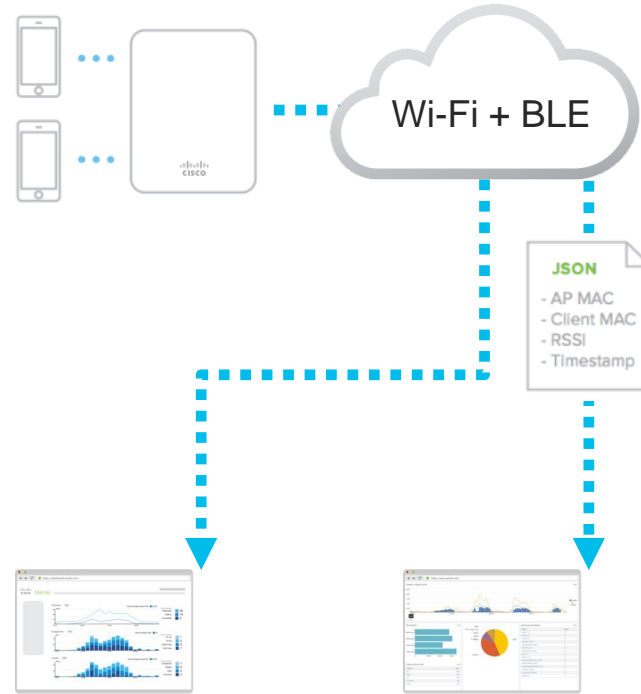


# Meraki APIs

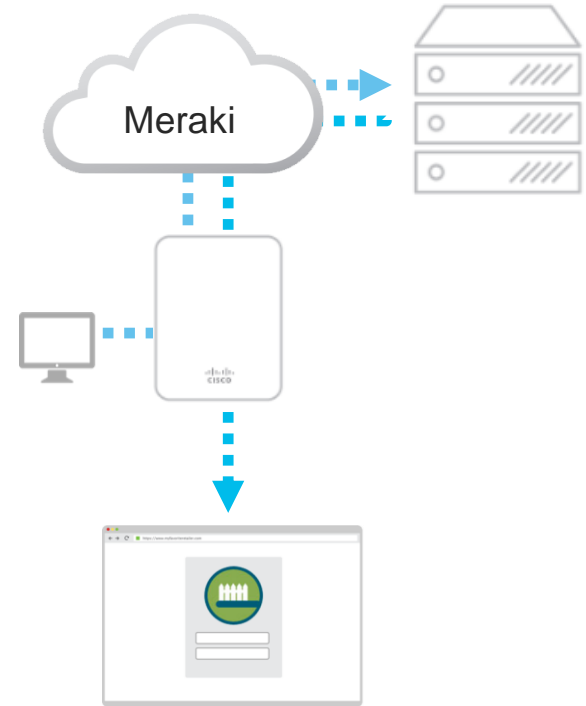
## Dashboard API



## Scanning API

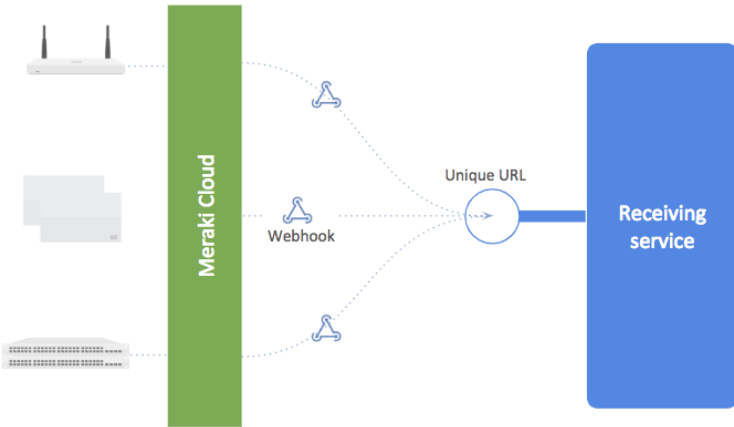


## Captive Portal API

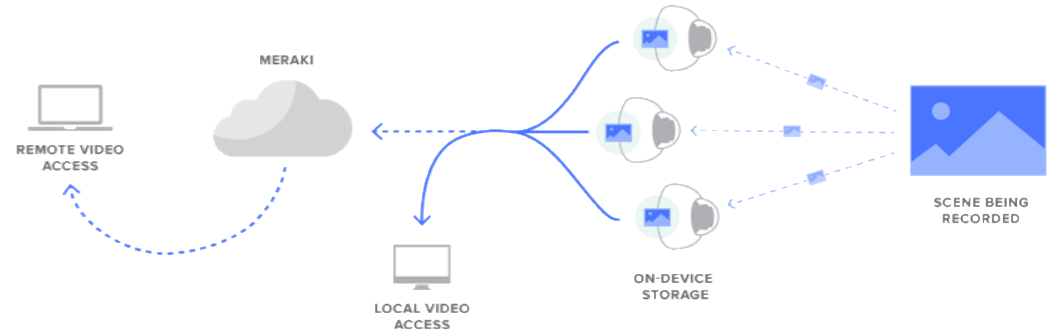


# Meraki APIs – Continued

## WebHook Alerts



## MV Sense



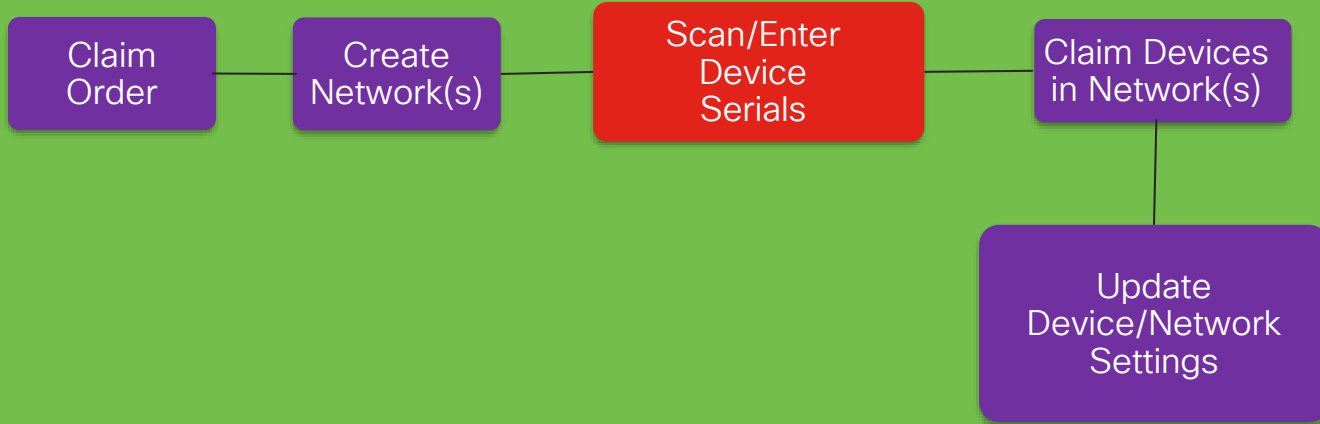
# Dashboard API

# Why use the Dashboard API?

- Service Providers: OSS/BSS integration
  - Provision the customers in the Meraki cloud
  - Allocate customer's devices
  - Assign initial network configuration template
  - Configure SNMP access for monitoring
  - Add administrator accounts for NOC staff and/or end customer access
- Enterprise: Network Automation
  - Automation of large deployment projects, e.g. many branches
  - Teleworker Off-boarding to disconnect VPN home office routers
  - Configure 1,800 stores in 9 min using Templates
  - Build your own dashboard with limited access (Add/Remove APs)

# Deploy thousands of sites in minutes

Meraki Management Application – (web app, mobile app, script, etc)



Meraki  
API

Custom  
App

# Enabling the Dashboard API

API access

API keys

Key	Created at	Last used	
*****0327	Jul 12 2018 20:36 UTC	May 21 2019 15:02 UTC	<a href="#">Revoke</a>

Generate new API key

1. Organization > Settings > Enable API access
2. Go to My profile and Generate API key.
3. Go to <https://developer.cisco.com/meraki/api/#/rest/getting-started>

# Provisioning New Networks

- **POST** /organizations/{**organizationId**}/networks -> Network name, type
- Take the resulting networkId and
- **POST** /networks/{**networkId**}/devices/claim with device serial body

# Hardening the newly provisioned network

- Segment with VLANs – **POST** /networks/{networkId}/vlans
- Content Filtering – **PUT** /networks/{networkId}/contentFiltering
- Group Policies – **POST** /networks/{networkId}/groupPolicies
- Network Malware Settings – **PUT** /networks/{networkId}/security/malwareSettings
- Firewallled Services – **PUT** /networks/{networkId}/firewallledServices/{service}
- MX L7 Firewall Rules – **PUT** /networks/{networkId}/l7FirewallRules
- MX L3 Firewall Rules – **PUT** /networks/{networkId}/l3FirewallRules
- MR L3 Firewall Rules – **PUT** /networks/{networkId}/ssids/{number}/l3FirewallRules
- Switchport Management – **PUT** /devices/{serial}/switchPorts/{number}



# Monitoring the network

- **Client level**

- GET /networks/{networkId}/clients/{clientId}/securityEvents
- GET /networks/{networkId}/clients/{idOrMacOrIp}/events
- GET /networks/{networkId}/clients/{idOrMacOrIp}

- **Network level**

- GET /networks/{networkId}/devices/{serial}/lossAndLatencyHistory
- GET /networks/{networkId}/airMarshal
- GET /networks/{networkId}/traffic
- GET /networks/{id}/splashLoginAttempts
- GET /networks/{networkId}/clients/connectionStats
- GET /networks/{networkId}/clients/latencyStats

A decorative pattern at the top of the slide consisting of a series of vertical bars of varying heights and small circles, all in a dark red color, set against a lighter red background.

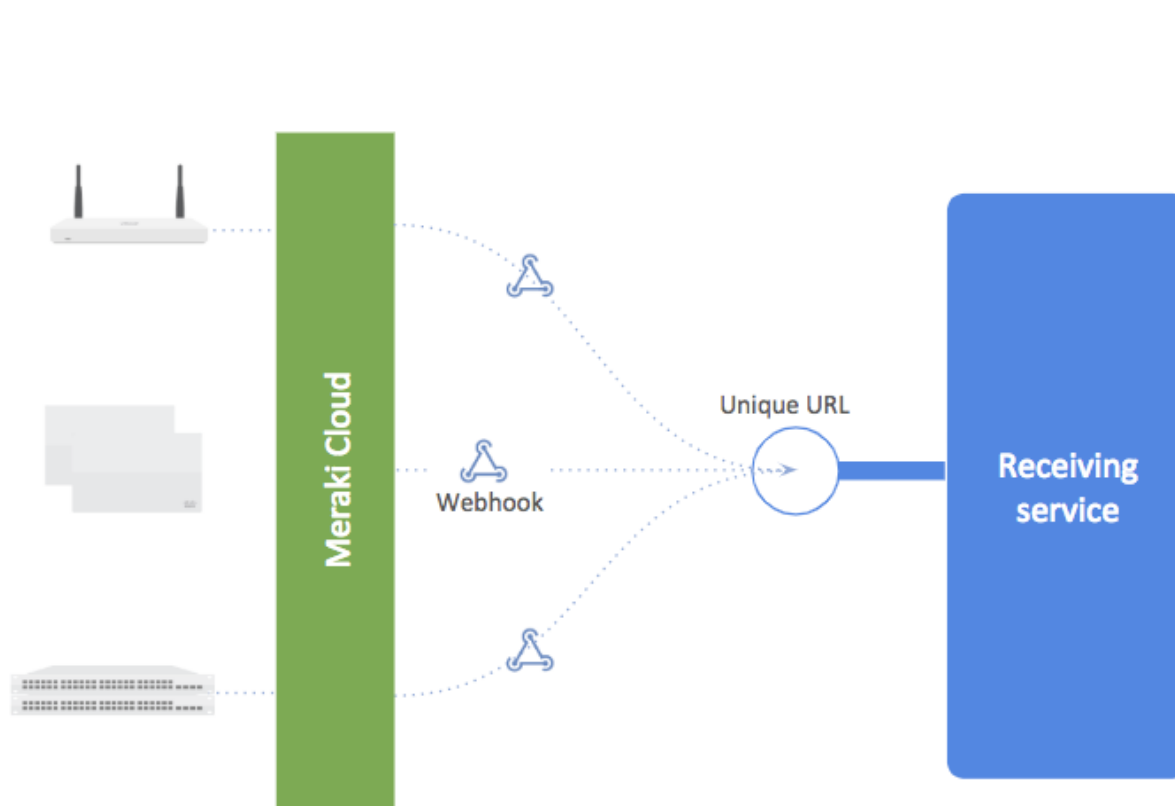
# Demo – Provision and Secure 10 networks



# Video – Deploy Meraki Network via WebEx Teams

# WebHook Alerts

# WebHook Alerts



# Example WebHook Integrations and Solutions

Generate alarms or events in your monitoring or management system



**servicenow**

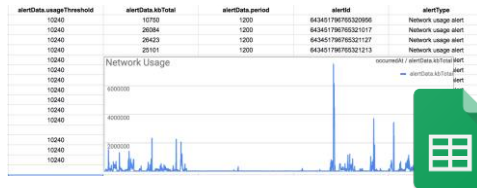
## Automate workflows based on network events

```
{
  "alertId": "643451796765250686",
  "alertType": "A switch port was disconnected",
  "deviceMac": "00:11:22:33:44:55",
  "deviceName": "Office",
  "deviceSerial": "AAAA-BBBB-CCCC"
}
```



## Webex Teams

## Log alerts to a spreadsheet for interactive and flexible reporting

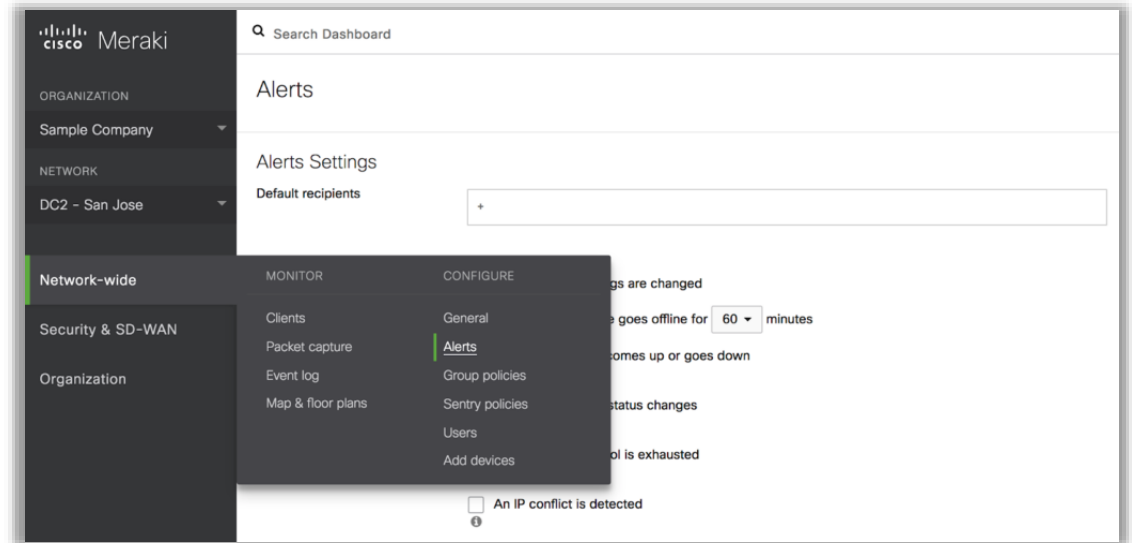


# Configuring Meraki Alerts

Login to the the [Meraki Dashboard](#).

Select the Organization and Network you wish to work with and select the Alerts menu.

**Network-wide → Alerts**



# Configuring Meraki Alerts

Add a New HTTP Server

The screenshot shows the 'Webhooks BETA' section in the Meraki dashboard. Under 'HTTP servers', there is a table with columns: Name, URL, Shared secret, and Webhook tests. A single entry is shown with the name 'PagerDuty', the URL 'https://events.pagerduty.com', and a 'show' link. Below the table is a button labeled 'Add an HTTP server'. To the right of the table is a 'Send test webhook' button with a close icon.

Name	URL	Shared secret	Webhook tests
PagerDuty	https://events.pagerduty.com	...	show Send test webhook x

Add an HTTP server

Assign the server as a recipient

The screenshot shows the 'Alerts Settings' page. Under 'Default recipients', there is a button labeled 'Webhook: PagerDuty' with a close icon and a plus sign to its right.

Webhook: PagerDuty x +

Select your alerts.

The screenshot shows the 'Security appliance' alert configuration page. It lists several alert types with checkboxes and a 'Show additional recipients' link for each. The following alerts are selected:

- ☒ Configuration settings are changed
- ☒ A security appliance goes offline for 5 minutes
- ☐ A VPN connection comes up or goes down
- ☐ The primary uplink status changes
- ☒ The DHCP lease pool is exhausted
- ☐ An IP conflict is detected
- ☒ Cellular connection state changes

Each alert has a 'Show additional recipients' link below it.

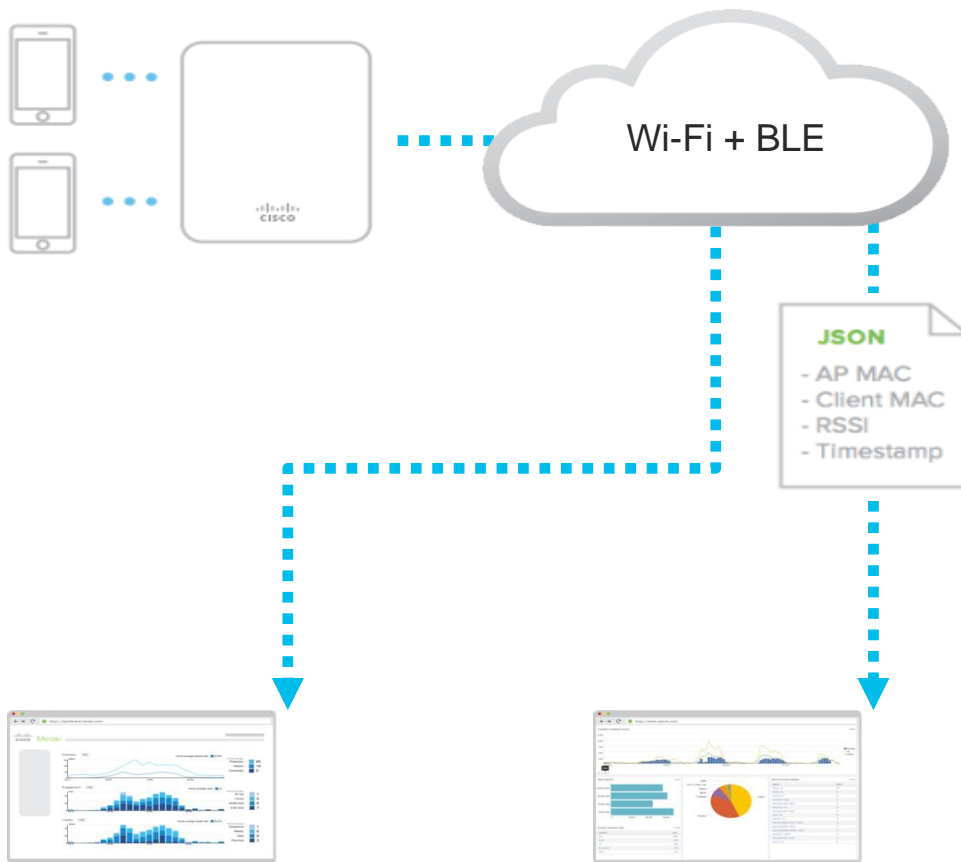




# Demo – WebHook Alerts to WebEx Teams

# Location Scanning


# Location Scanning API




```
{  
  "apMac": <string>,  
  "apTags": [<string>, ...],  
  "apFloors": [<string>, ...],  
  "observations": [  
    {  
      "clientMac": <string>,  
      "ipv4": <string>,  
      "ipv6": <string>,  
      "seenTime": <string>,  
      "seenEpoch": <integer>,  
      "ssid": <string>,  
      "rssi": <integer>,  
      "manufacturer": <string>,  
      "os": <string>,  
      "location": {  
        "lat": <decimal>,  
        "lng": <decimal>,  
        "unc": <decimal>,  
        "x": [<decimal>, ...],  
        "y": [<decimal>, ...]  
      },  
    }, ...  
  ]  
}
```

# Dashboard Configuration and API Flow

Analytics

Analytics enabled 

CMX API

CMX API enabled 

Validator 

ffffffffffffsdkfjsdalkfhda868c4c25b9d6325035f5

Validated <http://mysite-zzz.dynamic-m.com:1880/cmx2>

Post URLs 

Post URL

Secret

API Version

<http://mysite-zzz.dynamic-m.com:1880/cmx2>

.....

Show secret

2.0 

Validate

X

## POST URL

<https://YourServer.com>

## [GET]

YourServer responds with the **Validator** key defined by your Meraki Dashboard network.

## [POST]

YourServer receives a JSON array of client observations, which includes a user defined **Secret** that can be used to ensure the integrity of the data.

# Wi-Fi Location Scanning Elements

Name	Format	Description
apMac	string	MAC address of the observing AP
apTags	[string]	JSON array of all tags applied to the AP in dashboard
apFloors	[string]	JSON array of all floorplan names on which this AP appears
clientMac	string	Device MAC
ipv4	string	Client IPv4 address and hostname, in "hostname/address" format; only "/address" if no hostname, null if not available
ipv6	string	Client IPv6 address and hostname, in "hostname/address" format; only "/address" if no hostname, null if not available
seenTime	ISO 8601 date string	Observation time in UTC; example: "1970-01-01T00:00:00Z"
seenEpoch	integer	Observation time in seconds since the UNIX epoch
ssid	string	Client SSID name; null if the device is not connected
rssi	integer	Device RSSI as seen by AP
manufacturer	string	Device manufacturer; null if manufacturer could not be determined
os	string	Device operating system; null if the OS could not be determined
location	location	Device geolocation; null if location could not be determined
lat	decimal	Device latitude in degrees N of the equator
lng	decimal	Device longitude in degrees E of the prime meridian
unc	decimal	Uncertainty in meters
x	[decimal]	JSON array of x offsets (in meters) from lower-left corner of each floorplan
y	[decimal]	JSON array of y offsets (in meters) from lower-left corner of each floorplan

# Bluetooth Scanning Elements

Name	Format	Description
apMac	string	MAC address of the observing AP
apTags	[string]	JSON array of all tags applied to the AP in dashboard
apFloors	[string]	JSON array of all floorplan names on which this AP appears
clientMac	string	Device MAC
seenTime	ISO 8601 date string	Observation time in UTC; example: "1970-01-01T00:00:00Z"
seenEpoch	integer	Observation time in seconds since the UNIX epoch
rsi	integer	Device RSSI as seen by AP
location	location	Device geolocation; null if location could not be determined
lat	decimal	Device latitude in degrees N of the equator
lng	decimal	Device longitude in degrees E of the prime meridian
unc	decimal	Uncertainty in meters
x	[decimal]	JSON array of x offsets (in meters) from lower-left corner of each floorplan
y	[decimal]	JSON array of y offsets (in meters) from lower-left corner of each floorplan

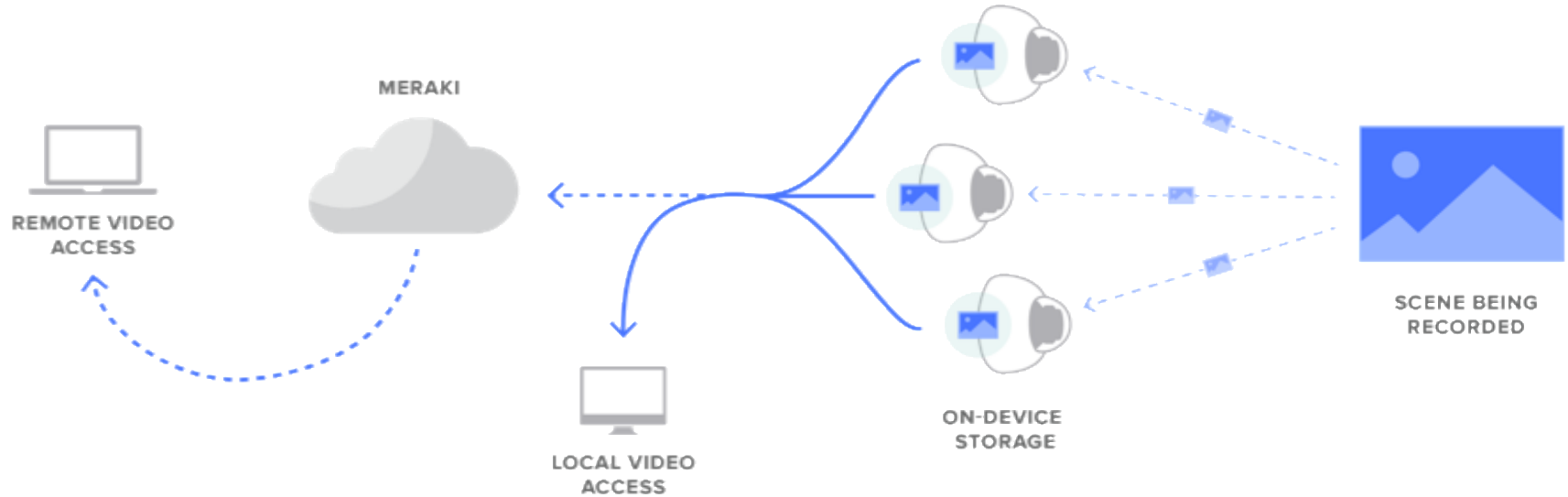


# Demo – Location Scanning

# MV Sense



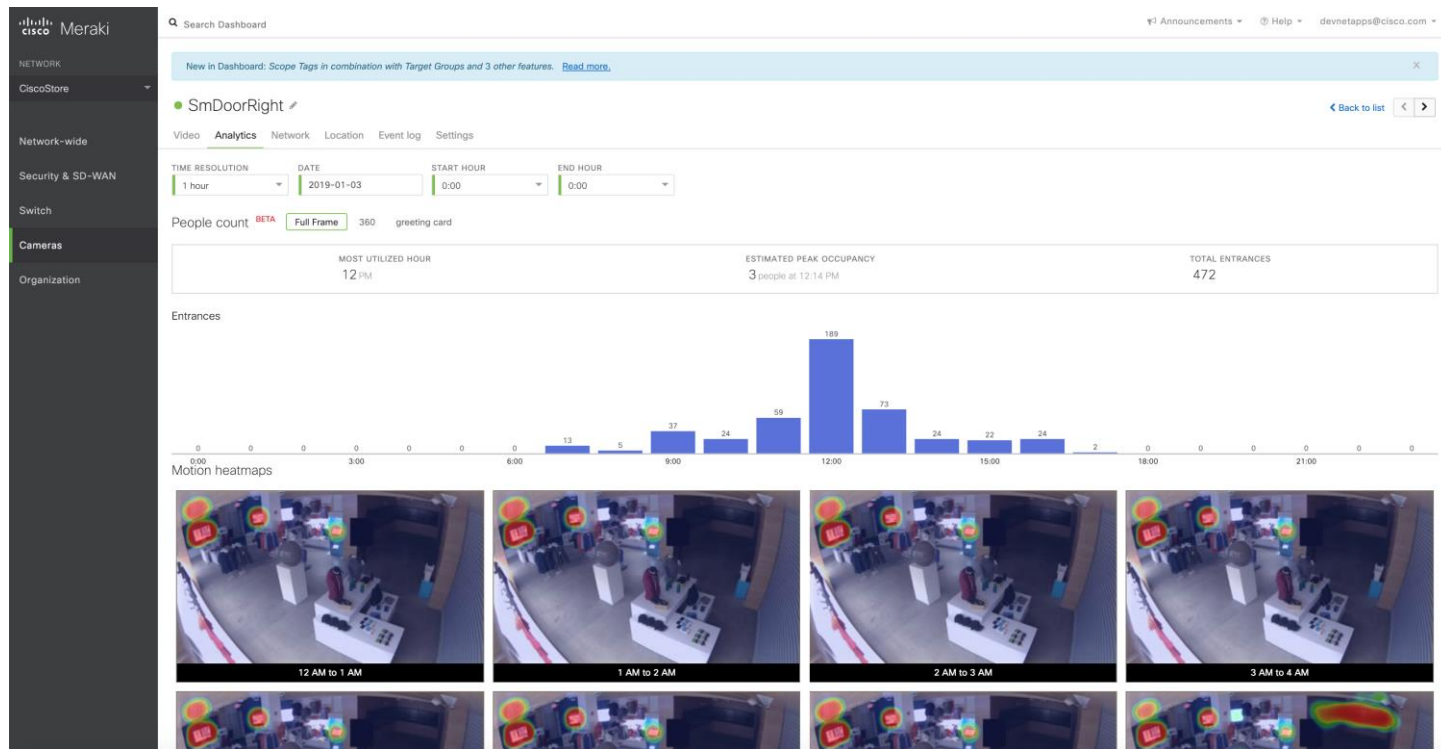
# MV Sense



# Dashboard: People detection in video

The screenshot displays the Cisco Meraki dashboard interface. On the left is a dark sidebar with navigation links: NETWORK, CiscoStore, Network-wide, Security & SD-WAN, Switch, Cameras, and Organization. The main content area has a top header with a search bar, 'Announcements', 'Help', and a user profile. Below this is a blue banner with a message about 'Scope Tags'. The central section is titled 'SmDoorRight' and includes tabs for 'Video', 'Analytics', 'Network', 'Location', 'Event log', and 'Settings'. A 'Motion search' filter is active, and a 'Hide People' button is visible. The video feed shows a retail store interior with several people. Three individuals in the foreground are highlighted with yellow bounding boxes, while others are obscured by black redaction boxes. The video player at the bottom features a timeline from 12:00 PM to 12:45 PM, with the current time set at 12:15:13 PM. Playback controls like play, pause, and seek are also present.

# Dashboard: People Count Analytics



# Dashboard: Interest Zones

The screenshot displays the Cisco Meraki dashboard interface. On the left is a dark sidebar with navigation links: NETWORK, CiscoStore, Network-wide, Security & SD-WAN, Switch, Cameras (highlighted), and Organization. The main content area has a top header with a search bar, user information (devnetapps@cisco.com), and a blue notification banner about 'Scope Tags'. Below the banner, the 'POS' entity is selected, and the 'Settings' tab is active within the 'Zone config' section. A sub-menu at the top includes Video Settings, Quality and Retention, Night Mode, Motion Alerts, Wireless, Zones (selected), and Sense. The 'Zone config' area shows a 'New Zone' button and three existing zones: 'Mens Jackets & Shirts', 'PoS', and 'Queue'. Each zone is represented by a thumbnail image and includes 'DELETE' and 'EDIT' options.

# MV Sense Analytics API

- Returns an overview of aggregate analytics data for a timespan
  - /devices/[serial]/camera/analytics/overview
- Returns all configured analytics zones for this camera
  - /devices/[serial]/camera/analytics/zone
- Return historical records for analytic zones
  - /devices/[serial]/camera/analytics/zones/[zoneId]/history
- Returns most recent record for analytics zones
  - /devices/[serial]/camera/analytics/recent
- Returns live state from camera of analytics zones
  - /devices/[serial]/camera/analytics/live

# MV Sense Real Time with MQTT

- MQTT is a Client Server publish/subscribe messaging transport protocol.
- MV Camera MQTT client publishes people detection count
- Meraki Camera Notification is sample app
  - App watches people count during off-hours
  - When unexpected people are detected it send alert message using WebEx Team bot.

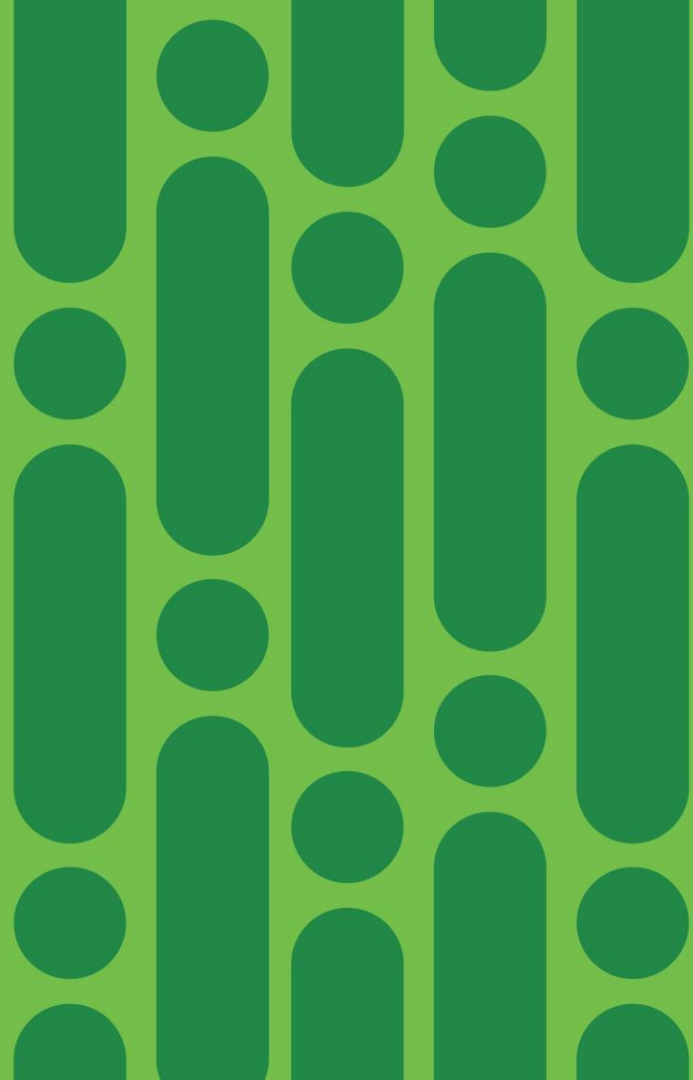


When detected people start monitoring mode  
Condition : Total people Count > Threshold in past 10 frame



# Demo – MV Sense REST and MQTT

# External Captive Portals

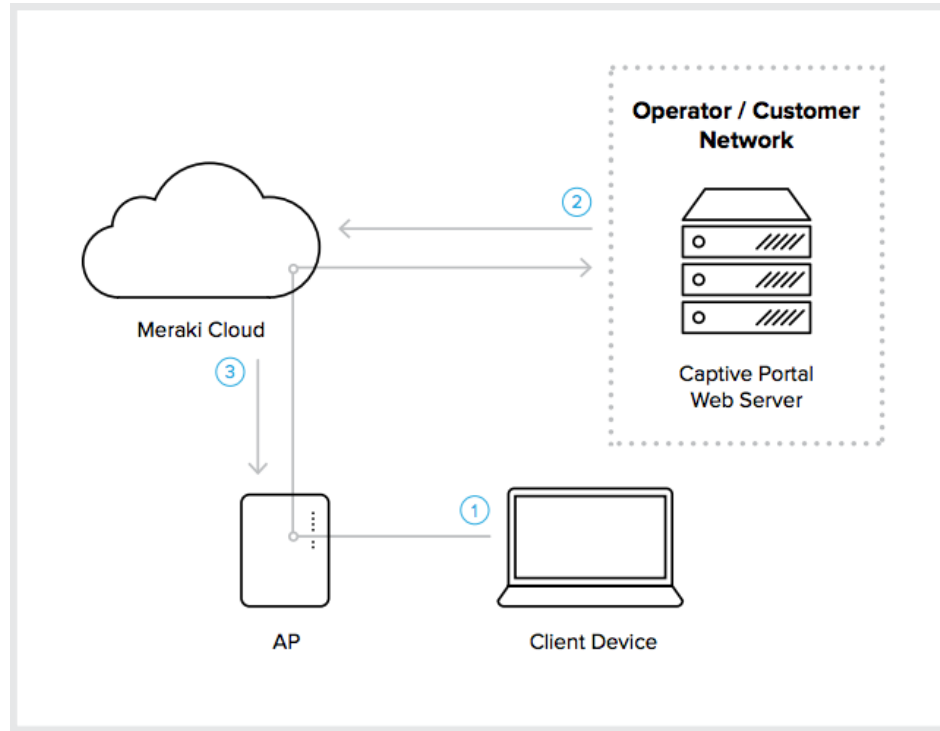




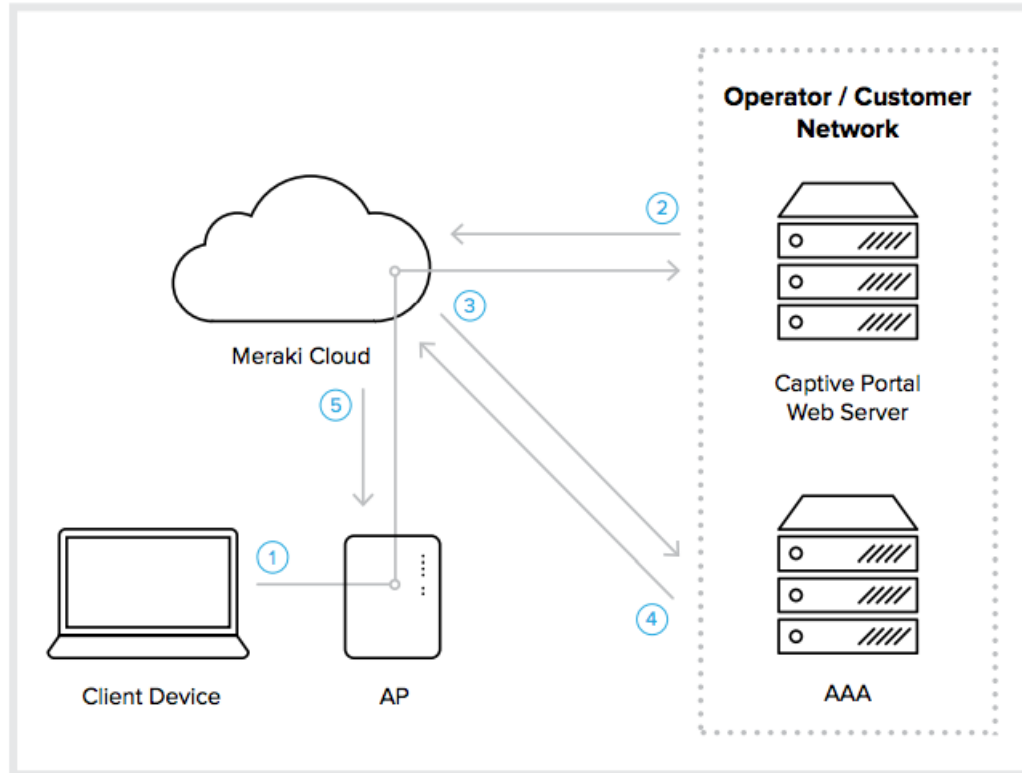
# External Captive Portal (EXCAP)



# EXCAP Architecture



# EXCAP with AAA



# Configuration in Meraki – Type of captive portal

## Splash page

- ☐ None (direct access)  
Users can access the network as soon as they associate
- ☒ Click-through  
Users must view and acknowledge your splash page before being allowed on the network
- ☐ Sponsored guest login  
Guests must enter a valid sponsor email and own email address before being allowed on the network
- ☐ Sign-on with Meraki authentication  
Users must enter a username and password before being allowed on the network
- ☐ Sign-on with SMS Authentication  
Users enter a mobile phone number and receive an authorization code via SMS.  
After a trial period of 25 texts, you will need to connect with your Twilio account on the [Network-wide settings](#) page.
- ☐ Cisco Identity Services Engine (ISE) Authentication ⓘ  
Users are redirected to the Cisco ISE web portal for device posturing and guest access
- ☐ Systems Manager Sentry enrollment ⓘ  
Only devices with Systems Manager can access this network
- ☐ Billing (paid access) ⓘ  
Users choose from various pay-for-access options, or an optional free tier

# Configuration in Meraki – Walled Garden

Captive portal strength



Allow non-HTTP traffic prior to sign-on

Walled garden



Walled garden is enabled

Walled garden ranges

\*.ngrok.io

[What do I enter here?](#)

Controller disconnection  
behavior

The splash page for this SSID relies on the Meraki Cloud Controller. What should happen to new clients if your Internet uplink is down or the controller is otherwise unreachable?

- ☐ Open: devices can use the network without seeing a splash page, unless they are explicitly blocked
- ☐ Restricted: only currently associated clients and whitelisted devices will be able to use the network
- ☒ Default for your settings: Open

# Configuration in Meraki – The Splash page

## Splash page

SSID: Lyoli

Splash pages on this SSID are enabled because a click-through splash page is enabled. You can change this setting on the [access control subtab](#).

### Official themes ⓘ

- ☐ Modern <sup>NEW</sup>
- ☐ Fluid

### Custom themes ⓘ

[Create something new](#)

### Custom splash URL

☒ Or provide a URL where users will be redirected:

[What is this?](#)

# Captive Portal APIs

**PUT/networks/{networkId}/ssids/{number}/splashSettings**

## Parameters

splashPage – type of splash page  
walledGardenEnabled  
walledGardenRanges

## Parameters

splashUrl  
useSplashUrl

**GET/networks/{networkId}/splashLoginAttempts**



# External Captive Portal Deployment



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Associate Level

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Professional Level

Expert Level

Engineering



Software



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DEVNET-2864: Getting ready for Cisco DevNet Certifications

Offered daily at 9am, 1pm & 4pm at Meet DevNet

- Attend a **brownbag session**

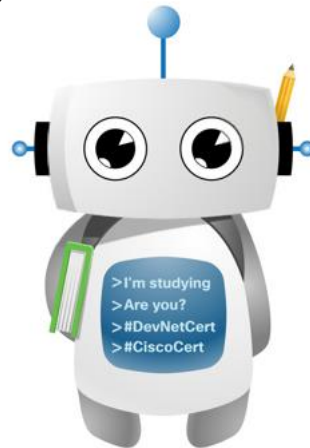
DEVNET-4099: DevNet Certifications: Bringing software practices & software skills to

Offered daily 12:15-12:45 in the DevNet Zone Theater

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- Scan this code to **sign up** for the latest updates or go to <http://cs.co/20eur02>

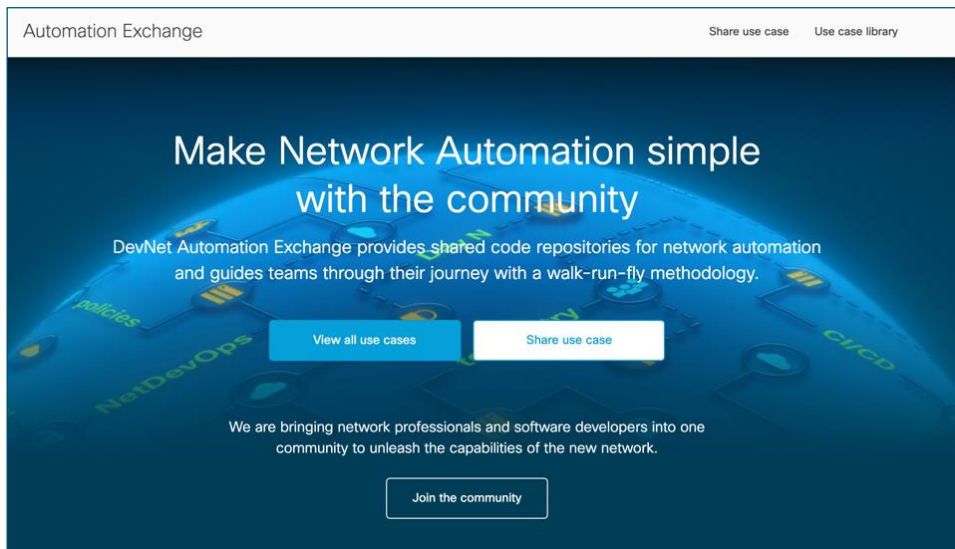


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# Find shared code repositories of use cases for network automation & more

Don't miss our 5  
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demos in the  
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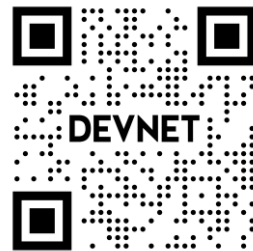
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Offered Monday 2pm & 5pm, Tuesday & Wednesday 10am, 2pm & 5pm, and Thursday 10am & 5pm at Meet DevNet

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Scan this code or go to the URL to **learn more**



<http://cs.co/20eur01>

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- All surveys can be taken in the Cisco Events Mobile App or by logging in to the Content Catalog on [ciscolive.com/emea](https://ciscolive.com/emea).

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