



Géolocalisation Wi-Fi, analyse des données et CMX Cloud

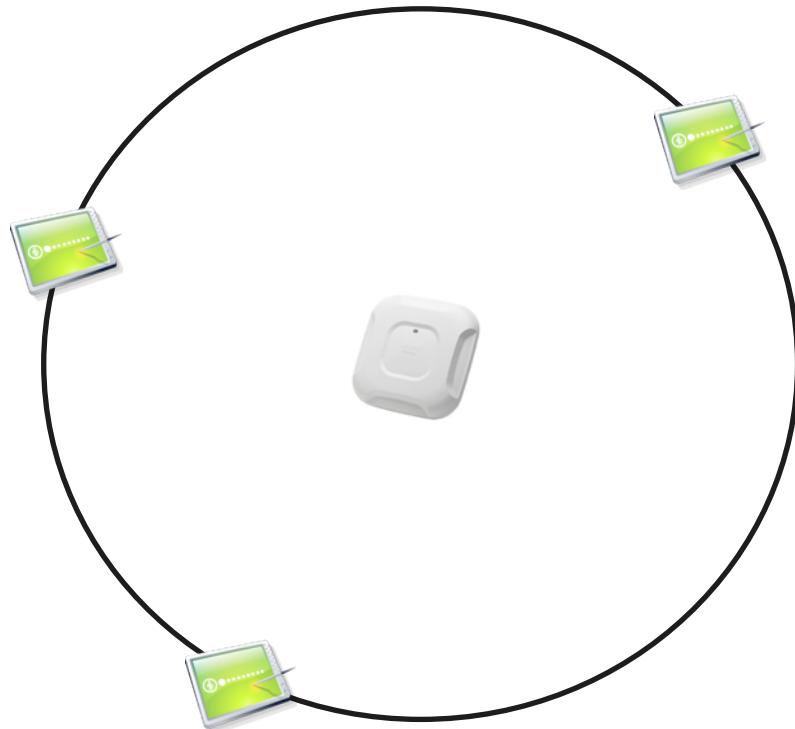
Gaetan Feige

Garnier Jérémie

Agenda

- Les techniques de géolocalisation Wi-Fi
- Cisco Connected Mobile Experiences (CMX)
- CMX Cloud
- DevNet: Getting started with CMX

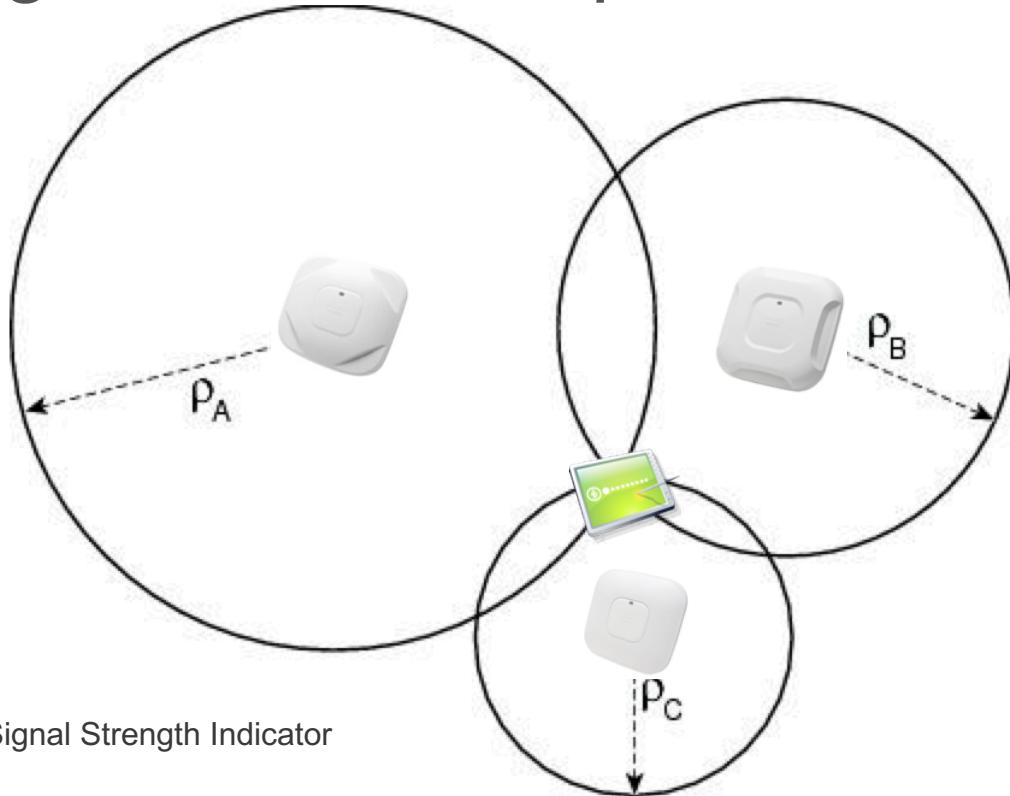
La Présence



Niveau de précision :

- présence / absence ;
- fréquence de visite ;
- visiteur / « passerby » ;
- connecté / non connecté.

La géolocalisation par Probe RSSI *



Niveau de précision :

- dans un radius de 10m 90% du temps ;
- dans un radius de 5m 50% du temps ;
- ~1-2 collectes / min.

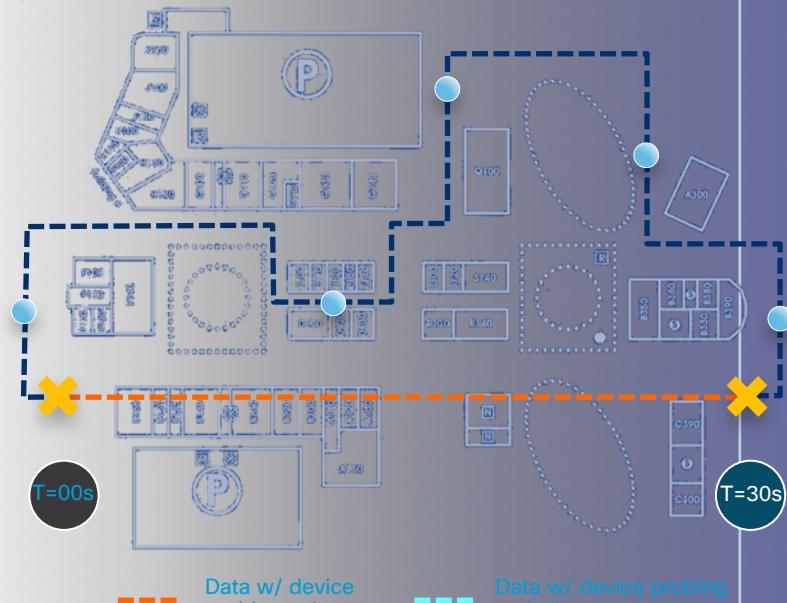
* Received Signal Strength Indicator

Exemple du comportement de l'iPhone 6 :

http://www.cisco.com/c/en/us/td/docs/wireless/controller/technotes/8-0/iPhone_roam/b_iPhone-roaming.html#concept_EB4E75D1E8F74279BFF6F080E9D4AE0C

Fast Locate (APs 3600/3700 avec WSM)

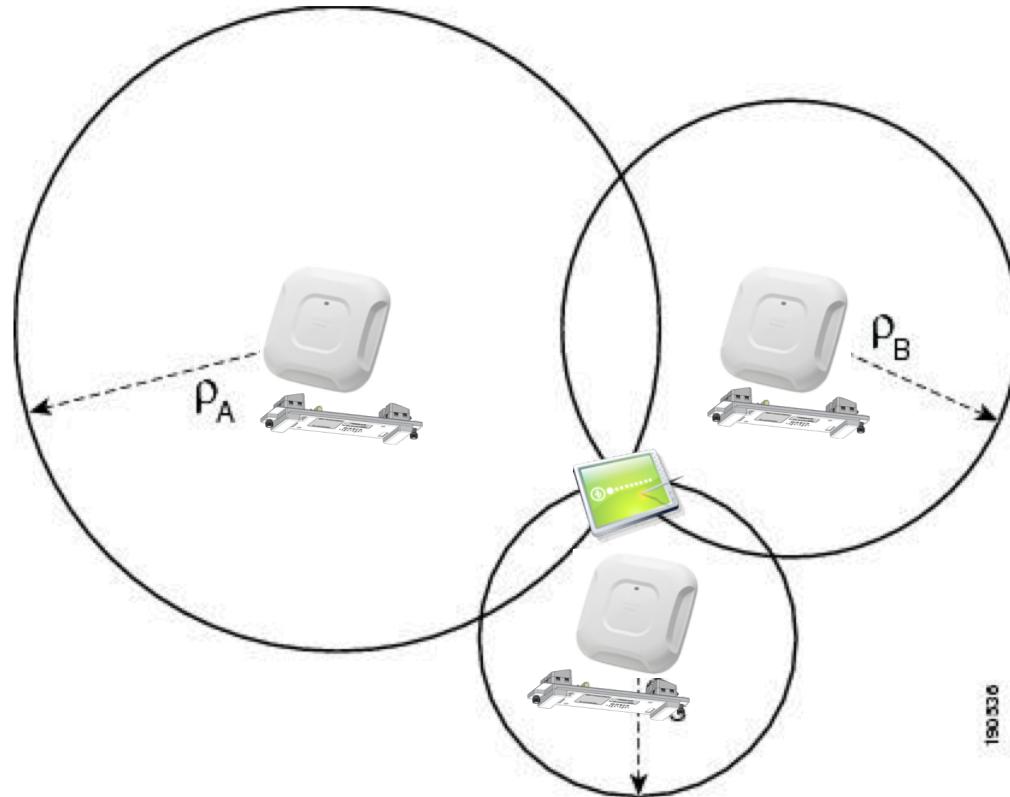
Problem: Probes are too infrequent and often not reliable



Solution: Use Network Data Packets that are Frequent

- Data Packets are sent when interacting with network (i.e., browsing, streaming, etc.)
- Use radio module on AP's to collect data packet RSSI.
- Location Refresh Rate: ~8 times per minute

Probe RSSI + Fast Locate (avec WSM)

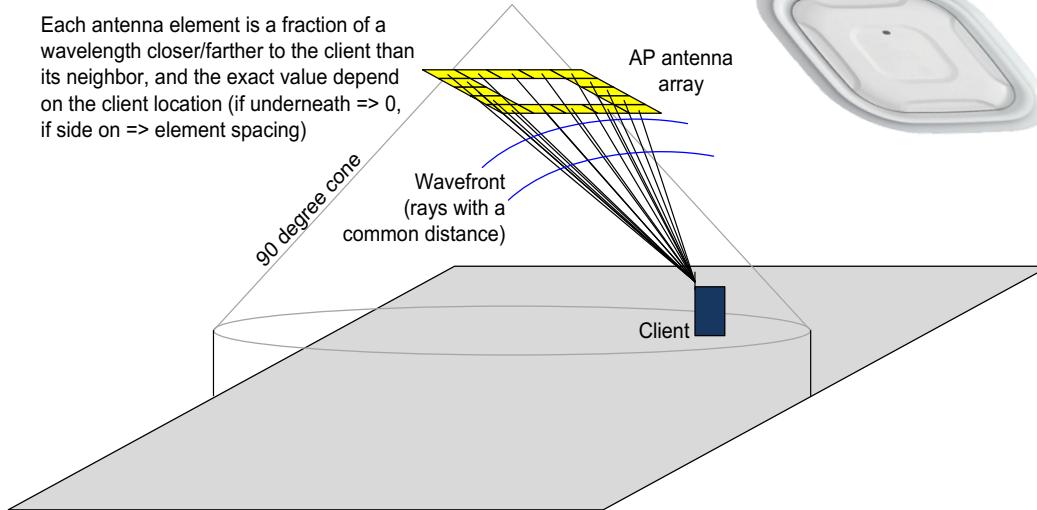


Niveau de précision :

- dans un radius de 10m 90% du temps ;
- dans un radius de 5m 50% du temps ;
- ~8 collectes / min.

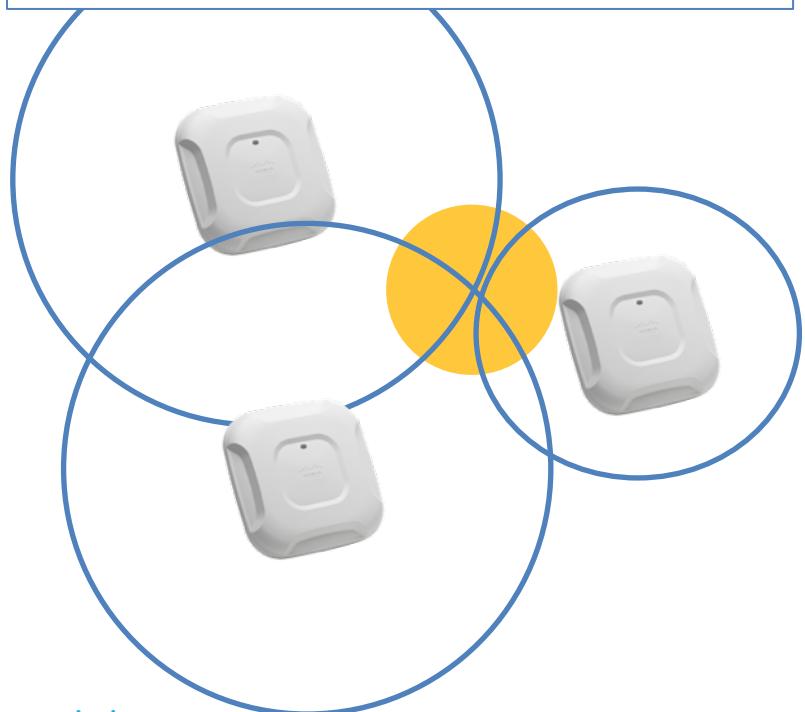
Hyperlocation with Angle of Arrival (AoA)

- Different antenna elements hear the signal a little earlier/later than others, measured by the phase of the signal.

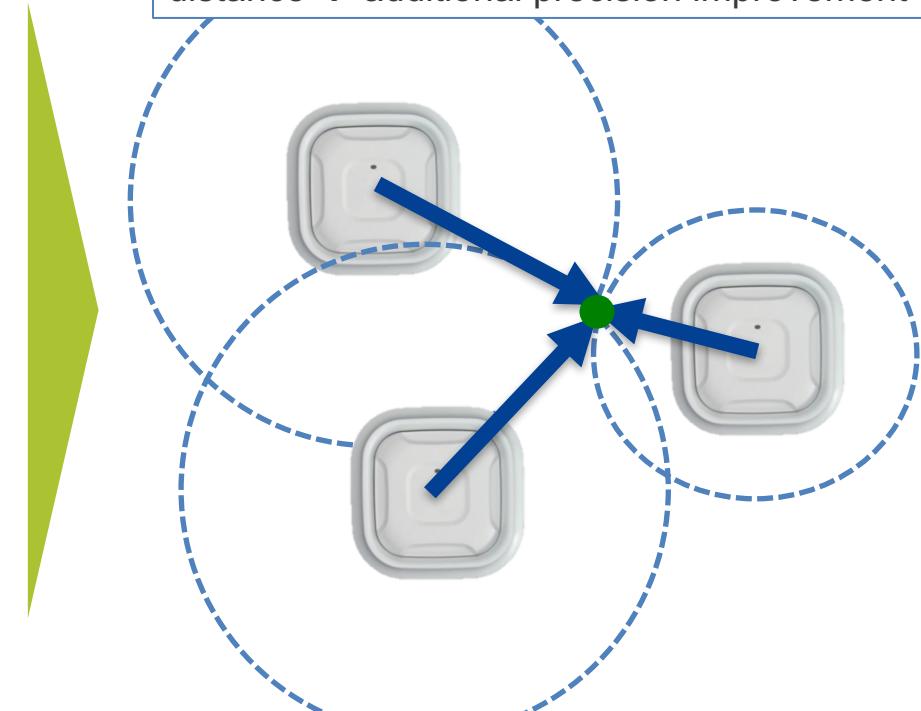


Location Accuracy Improvement

Probe RSSI: approx. distance via RSSI, but no concept of direction



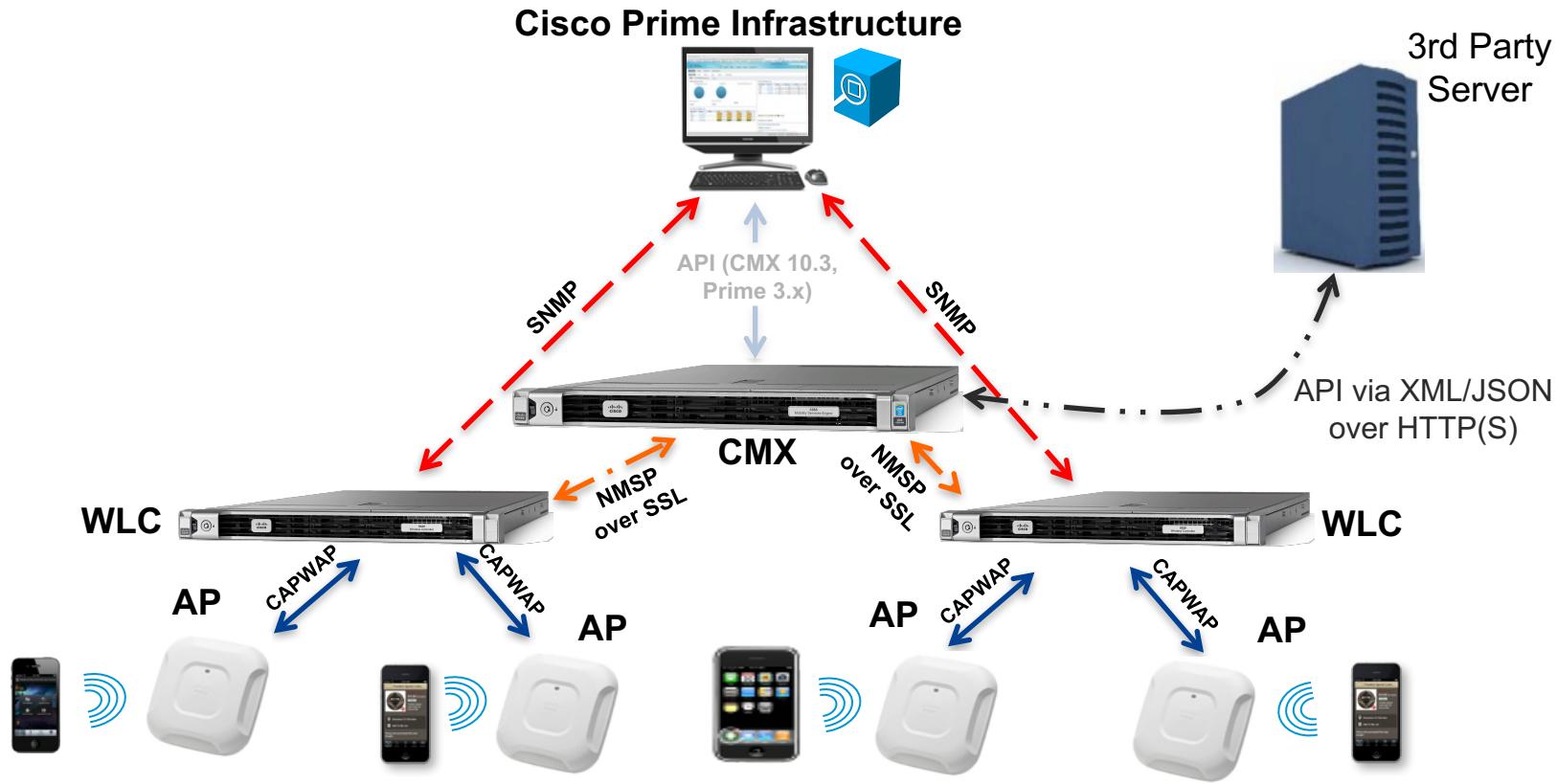
AoA: Determine direction to client in addition to distance → additional precision improvement



Résumé des techniques de géolocalisation

	Good	Better	Best	
Metric	Presence	Probe RSSI	Fast Locate (modular APs)	Hyperlocation (Angle of Arrival)
Loc. Accuracy	In/Out/Passerby	5 - 10m (50 - 90%)	5 - 10m (50 - 90%)	2 - 3m (50 - 90%)
Loc. Refresh Rate	~1-2 per min	~1-2 per min	~8 per min (connected clients) ~1-2 per min (probing clients)	~8 per min (connected clients) ~1-2 per min (probing clients)
Client Type	Probing and connected clients	Probing and connected clients, BLE Beacons, RFID/WiFi Tags	Connected clients through Fast Locate, rest as of with Probe RSSI	Connected clients through AoA, rest as of with Probe RSSI
AP Density	Any AP deployment	Site Survey	Site Survey	Site Survey
AP Type	AP 700, AP 1K, 2K, 3K	AP 700, AP 1K, 2K, 3K (CleanAir APs for BLE beacons)	AP 3600/3700	AP 3600/3700
AP Module	Not required	Not required	WSM gen 1 (AIR-RM3000M=) or WSM gen 2 (AIR-RM3010L-E-K9=)	WSM gen 2 (AIR-RM3010L-E-K9=) + Circular Antenna (AIR-ANT-LOC-01=)
AP placement in maps required	No	Yes	Yes	Yes
Compatible with Mobility Express	Yes	No	No	No
WLC Release	WLC 7.6 and above	WLC 7.0 and above	WLC 7.6 and above	WLC 8.1MR3
Recommended CMX Release	CMX 10.2.1 or above	MSE 8.0 CMX 10.2.1 or above	MSE 8.0 CMX 10.2.1 or above	CMX 10.2.1 or above

L'architecture Wi-Fi avec Cisco MSE (CMX 10.x)

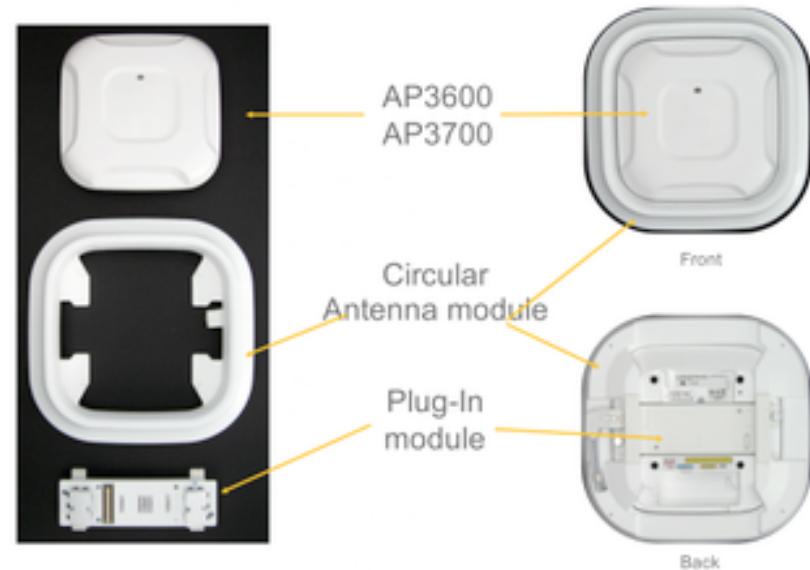


Quelques mots sur MSE et CMX

- Jusqu'à MSE 8.0, « MSE » est le nom du serveur et du logiciel aussi.
- CMX 10.x est le successeur de MSE 8.0 côté logiciel.
On aurait pu l'appeler MSE 10.x.
On aurait pu...
- A partir de CMX 10.x, « MSE » reste le nom du serveur et CMX devient le nom du logiciel.
CMX 10.x tourne sur le serveur MSE 3365.

Hyperlocation Solution Components

- AP 3600 / 3700
 - AIR-CAP3602I-E-K9
 - AIR-CAP3702I-E-K9
 - AIR-AP-BRACKET-2
- WSM gen 2
(a.k.a. Hyperlocation Module)
 - AIR-RM3010L-E-K9=
- Circular Antenna
 - AIR-ANT-LOC-01=



Connected Mobile Experiences

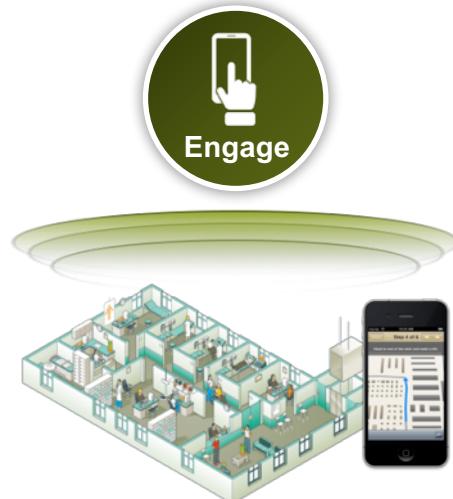
Cisco Connected Mobile Experience (CMX)



- Presence and location detection
- Analytics



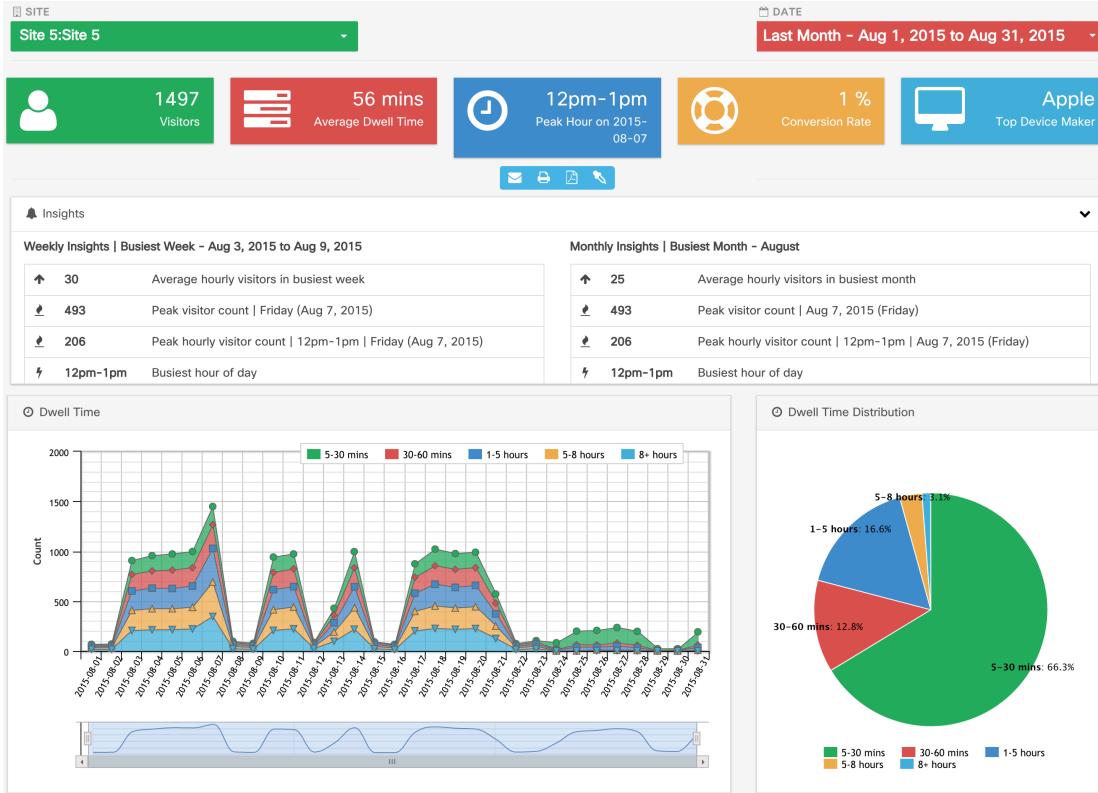
- Easy Wi-Fi login, custom or social
- Zone-based, custom splash pages



- App-based mobile engagement
- Context-aware in-venue experiences

APIs

CMX Presence



Presence Analytics

- ✓ Analytics based on in/out, visitor/passerby, connected/probing
- ✓ Auto Report Generation
- ✓ Reports customization
- ✓ No maps required

CMX Location

> RACK-APs
> RCDN-5
> SJC-1
▼ SJC-14
1st Floor
2nd Floor
3rd Floor
4th Floor
4th-floor-sandbox
> SJC-17
> SJC-18
> SJC-19
> SJC-21
> SJC-22
> SJC-24

Reports

- 3 Regions - Today
- 2 buildings last month
- SJC-14 (System Ca...)
- 3 RegionHcs - Last...
- 17 BuildingHcs - To...
- 3 RegionHcs - Today**
- 4th Floor (SJC-14 > ...)
- 4th Floor (SJC-14 > ...)
- 17 Buildings - Today
- 17 Buildings - Today

Activity Map

20 APs, 15 Connected Clients, 27 Detected Clients, 2 Zones, 2 Beacons, 0 Interferers, 1 Tags

Back to World Map System Campus / SJC-14 / 3rd Floor MAC Address, Username, IP, SSID or... 🔍 ⟳ ⚙️ ℹ️ ≡



Legend (Beacons)

- Known (Green)
- Missing (Red)
- Misplaced (Yellow)
- Rogue (Blue)

3 RegionHcs - Today

Visitors | Sep 15, 2015 |

1,346 Total Visitors

1,287 Repeat Visitors - 96% 59 New Visitors - 04%

Average Dwell Time | Sep 15, 2015 |

1 HR 27 MINS Average Dwell Time of All Visitors

1hr 30mins Repeat Visitors 26mins New Visitors

HOURLY TREND



of Visits

1500
1000
500
0

12am 1am 2am 3am 4am 5am 6am 7am 8am 9am 10am

Or Compare Data to: [Previous](#) | [Average](#)

HOURLY TREND



Avg Dwell - Per Visit (min)

150
100
50
0

12am 1am 2am 3am 4am 5am 6am 7am 8am 9am 10am

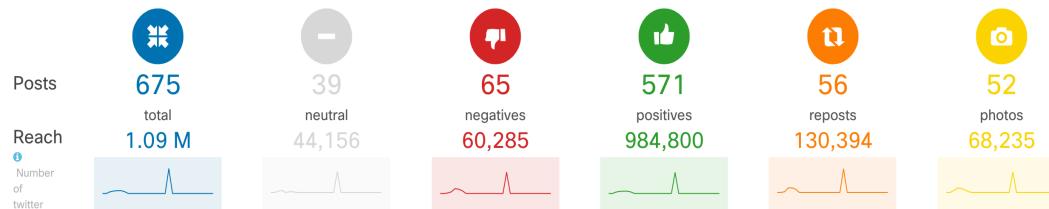
Or Compare Data to: [Previous](#) | [Average](#)

Analytics and Location

- ✓ Analytics, Social Analytics and Map location
- ✓ Heatmaps
- ✓ Clients, RFID tags, Rogue APs, Interferences, BLE beacons location
- ✓ Verticalization & Zone Tagging
- ✓ Auto Report Generation
- ✓ Zones comparison

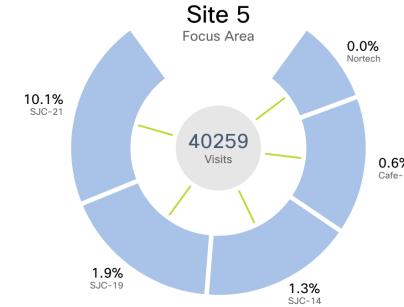
CMX Location

Stats



Correlation

August 2015 |



Path

Sep 15, 2015 |



Analytics and Location

- ✓ Analytics, Social Analytics and Map location
- ✓ Heatmaps
- ✓ Clients, RFID tags, Rogue APs, Interferences, BLE beacons location
- ✓ Verticalization & Zone Tagging
- ✓ Auto Report Generation
- ✓ Zones comparison

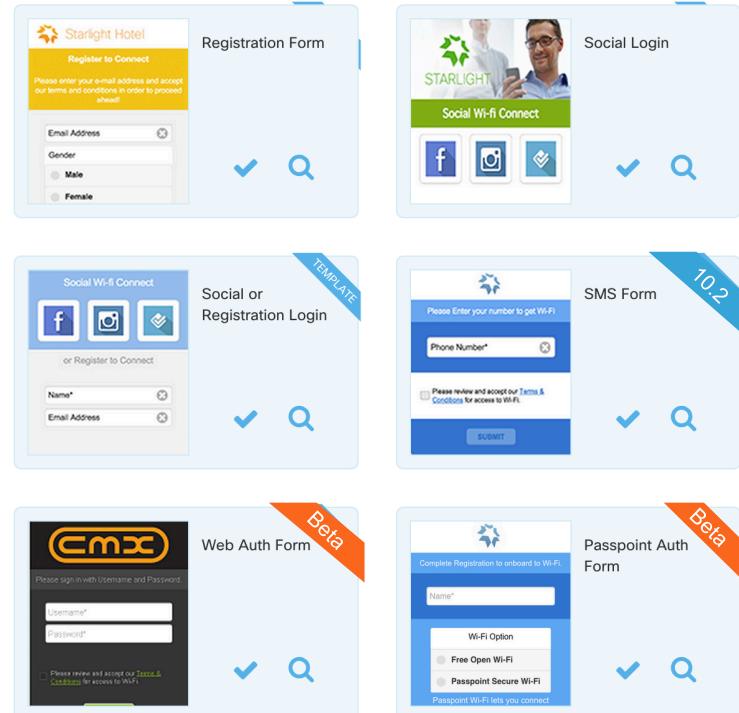


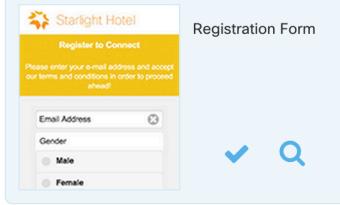
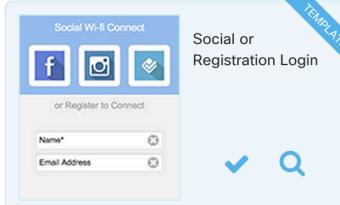
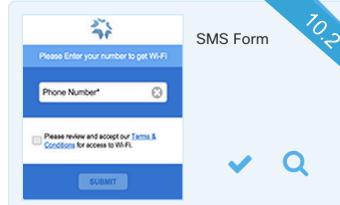
CMX Connect: Guest Access made easy

-  **Location specific custom guest access**
Portal and post-auth URL on per site basis
-  **Multiple access methods**
Web passthrough, social media or SMS
-  **Customized access and promotion**
Proximity-based landing pages and video
-  **Understand who is in your location**
Enhanced analytics
-  **Multi-language support**
User-friendly

Templates (7)

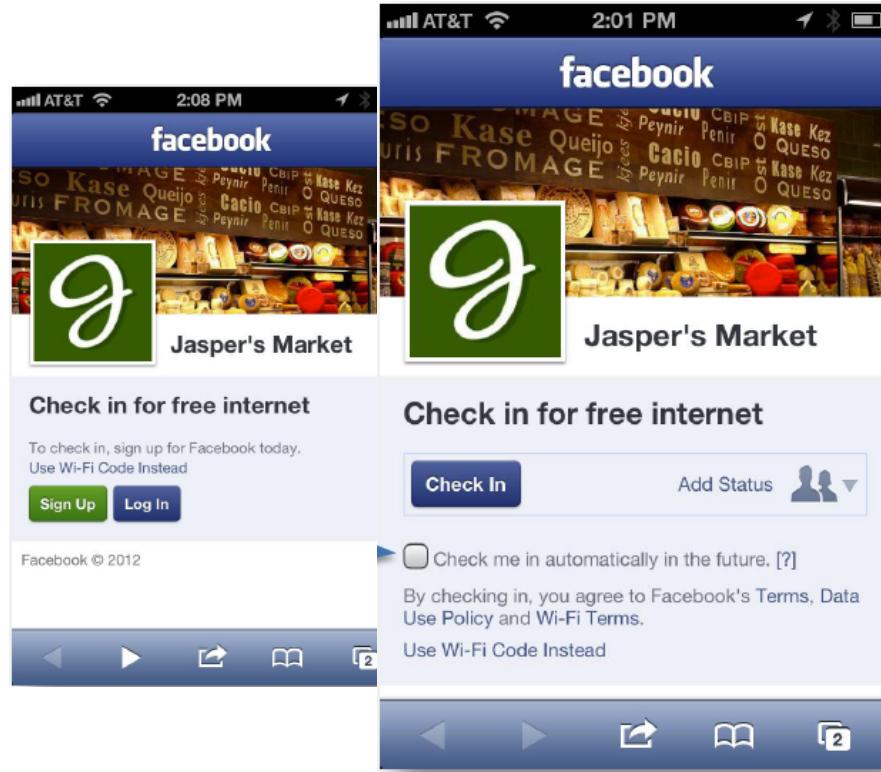
Select template to create your own Portal



 Registration Form	 Social Login
 Social or Registration Login	 SMS Form
 Web Auth Form	 Passpoint Auth Form

Guest Access – CMX for Facebook Wi-Fi

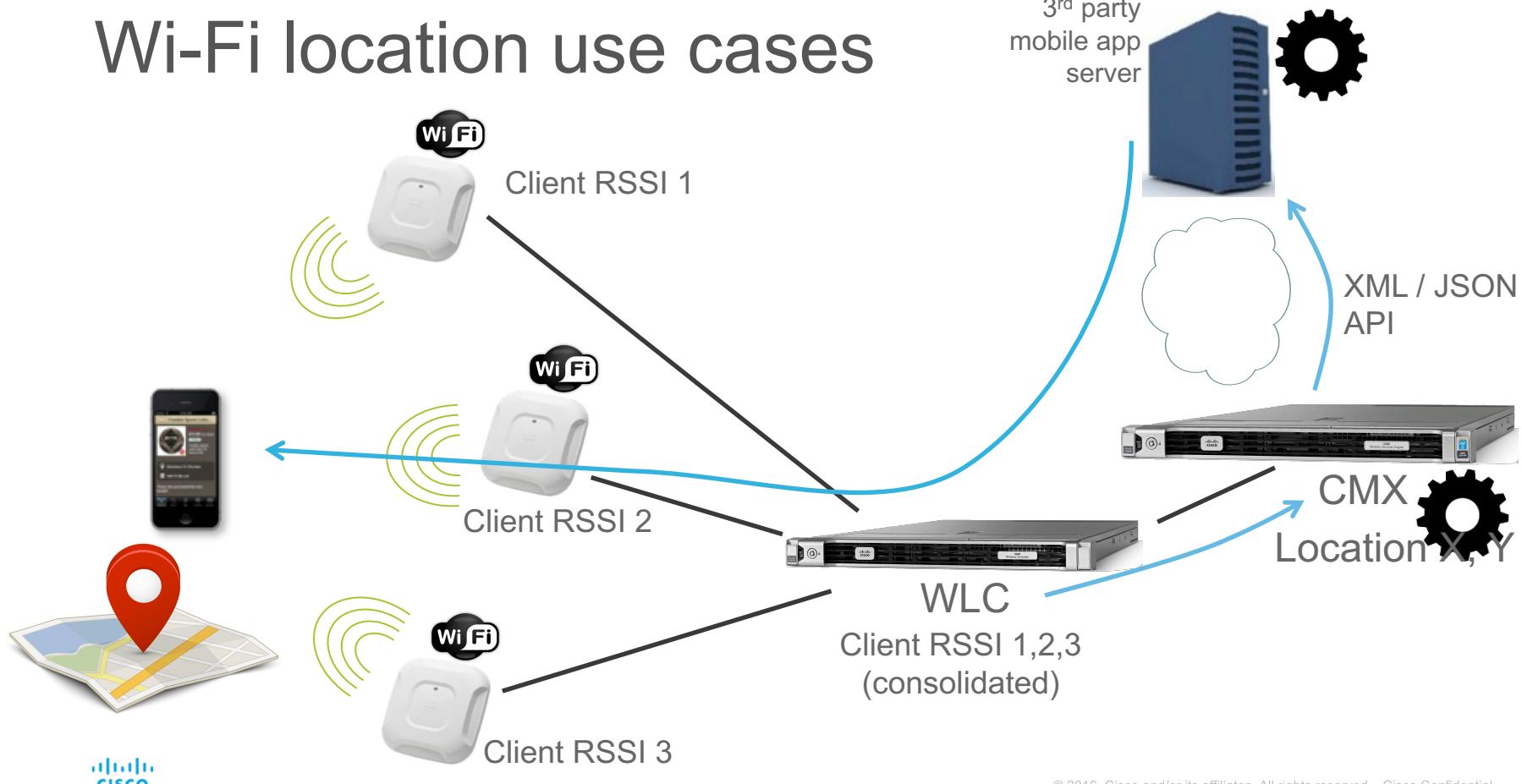
- Increase brand recognition and gain insights through Facebook Wi-Fi.
- User connects to Wi-Fi, opens browser, and checks in.
- Venue gains exposure through news feeds, notifying friends.



Guest Visibility



Wi-Fi location use cases



Wi-Fi only location

- Pros
 - Supported on all endpoints with Wi-Fi enabled
 - Supported by the Wi-Fi infrastructure already deployed for uplink data
 - Location calculations done at CMX level, no need for extra functions
 - Even without a mobile app we can collect analytics data
 - AP's density smaller than BLE's density
- Cons
 - Less precise than BLE

Ordering CMX

Licenses

	Regular SKUs	Cisco ONE for Wireless
CMX Base Lic (Location and Connect)	L-MSE-PAK-N ➔ L-LS-1AP-N	Included in C1 Foundation
CMX Advanced (Analytics)	L-MSE-PAK-N ➔ L-AD-LS-1AP-N	Included in C1 Advanced
SW Support	SWSS attached to licenses	SWSS attached to C1

Appliance

Appliance Options	AIR-MSE-3365-K9 or OVA (free download)
-------------------	--



CMX Cloud

Ordering CMX Cloud

Licenses

CMX Cloud Connect	AIR-CMX-CLOUD → AIR-CMX-SVC-CX
CMX Cloud Connect with Presence Analytics	AIR-CMX-CLOUD → AIR-CMX-SVC-CPAX

Regular SKUs

No Appliance ☺

CMX Cloud 1Y license (Connect and Presence Analytics) offered with Mobility Express

OPTION SELECTION AIR-AP1832I-E-K9C Global Price List US Availability (USD)

Configuration Summary			View Full Summary			
Category	Qty	Unit List Price (USD)	SKU	Qty	Lead Time	Unit List Price (USD)
Software						
SW1830-MECPWP-K9	1	0.00	AIR-CMX-CLD-CPA-1Y	1	71 days	0.00
AP Mounting Bracket						
AIR-AP-BRACKET-1	1	0.00				
Ceiling Grid Clips						
AIR-AP-T-RAIL-R	1	0.00				
CMX Cloud Promotion						
AIR-CMX-CLD-CPA-1Y	1	0.00				
Subtotal		695.00				
Estimated Lead Time		71 days				

Clear Selection | Show Incompatible SKUs

Reset Configuration

Promo details:

<https://support.cmx.cisco.com/hc/en-us/articles/228904027-Cisco-Mobility-Express-CMX-Cloud-Promotion-License-Activation-Guidelines>

Blog article:

<http://gblogs.cisco.com/fr-reseaux/2016/12/15/bonne-annee-2017-avec-le-wi-fi-cisco-mobility-express-vous-offre-cmx-cloud-pendant-1-an>



DevNet: Getting Started with CMX

DevNet CMX: Intro

Learn How to Code with CMX API

Pick a learning lab below or go for the complete [learning module](#) now!



[Introduction to CMX 10 Mobility Services](#)

Learn about CMX 10 REST APIs to provide indoor location based services.

[Learn now ▶](#)



[CMX 10 Mobility Services REST API](#)

Learn about CMX 10 REST APIs to provide indoor location based services.

[Learn now ▶](#)



[CMX Deep Dive using the Notifications resource](#)

Learn about CMX 10 Northbound Notifications subscriptions.

[Learn now ▶](#)

DevNet CMX: Get ready within an hour

Introduction to CMX 10 Mobility Services

Learn about CMX 10 REST APIs to provide indoor location based services.

⌚ CMX REST Postman

⌚ 15 min

[Login to Start Lab](#)

CMX 10 Mobility Services REST API

Learn about CMX 10 REST APIs to provide indoor location based services.

⌚ CMX REST Postman

⌚ 15 min

[Login to Start Lab](#)

CMX Deep Dive using the Notifications resource

Learn about CMX 10 Northbound Notifications subscriptions.

⌚ CMX REST Postman

⌚ 15 min

[Login to Start Lab](#)

Mission: Query the CMX API using Python scripts

Explore the CMX/MSE REST API using Python.

⌚ CMX REST Postman

⌚ 15 min

[Login to Start Lab](#)



DevNet CMX: Sandbox

CISCO CMX 10.3.0-62

DETECT & LOCATE ANALYTICS CONNECT & ENGAGE MANAGE SYSTEM learning ▾

Map Troubleshooting

CiscoCampus CiscoLiveLatAm DevNetCampus DevNetBuilding DevNetZone Unassigned

Activity Map

5 APs, 52 Associated Clients, 0 Probing Only Clients, 7 Zones, 1 Beacons, 0 Interferers, 0 RFID Tags

Back to World Map DevNetCampus / DevNetBuilding / DevNetZone Client MAC Address, Username, IP, SS..

+

-

Activity Map showing floor plan with AP locations and client activity. The floor plan includes various rooms, desks, and equipment. Numerous green dots represent associated clients, blue diamonds represent beacons, and blue circles with numbers (e.g., 8, 7) represent zones. A legend on the right side provides icons for location, signal strength, zone, beacon, interferer, and information.

FloorID: 70
FloorRefID: 723413320329068590
x: 192.67, y: 52.54 ft

DevNet CMX: API docs

The screenshot shows the main landing page of the Cisco DevNet CMX API Docs. At the top, there's a blue header bar with the Cisco logo and navigation links for "API Docs" and "Code Samples". Below the header is a large dark grey section containing a title and descriptive text. The title is "Detect, Connect and Engage Users In-Venue". The text explains that visitors to a venue are always connected and describes how Cisco Connected Mobile Experiences (CMX) provides relevant mobile content and meaningful analytics. A blue button labeled "Explore Cisco CMX" is centered in this section. At the bottom of this dark area are two small circular icons: a white circle with a black dot and a black circle with a white dot.

Detect, Connect and Engage Users In-Venue

Whether you are in retail, hospitality, transportation, healthcare, education, or government, visitors to your venue are always on, always connected. Cisco Connected Mobile Experiences (CMX) lets you tap into this connected lifestyle and provide relevant mobile content while gaining meaningful analytics. Our professional services team can help you define and deliver the Connected Mobile Experiences to back your business initiatives.

[Explore Cisco CMX](#)



Configuration

Use the Configuration REST APIs to configure different aspects of MSE.

[View details »](#)



Location

Use the Location based REST APIs to find location specific details on visitors.

[View details »](#)



Analytics

Use the Analytics based REST APIs to find analytical data on visitors.

[View details »](#)



Connect

Use the Connect based REST APIs to find user session information.

[View details »](#)



<https://cmxlocationsandbox.cisco.com/apidocs/>

Copyright © 2018 Cisco and/or its affiliates. All rights reserved. Cisco Confidential

31

DevNet CMX: API docs

The screenshot shows the DevNet CMX API documentation for the Active Clients API. The top navigation bar includes links for Home, REST APIs, CMX, Code, learning, and a placeholder for '.....'. The main content area is titled 'Active Clients API' and describes a GET method for retrieving the active clients count at the URL `/api/location/v2/clients/count`. It includes sections for 'Call' (with a text input field containing the URL), 'Response Code' (set to 200), 'Response Headers' (a JSON object with various headers like X-TOTAL-EXECUTION-TIME, ACCESS-CONTROL-ALLOW-ORIGIN, etc.), and 'Response Body' (a JSON object with device type, query string, and count). Buttons for 'Try it!' and 'Clear results' are also present.

Active Clients API

GET This API returns active clients count /api/location/v2/clients/count

Try it! Clear results

Call

cmxlocationsandbox.cisco.com/api/location/v2/clients/count

Response Code

200

Response Headers

```
{  
    "x-total-execution-time": "0",  
    "access-control-allow-origin": "*",  
    "access-control-allow-methods": "GET, POST, DELETE, PUT",  
    "access-control-allow-headers": "Content-Type",  
    "cmx-token": "GqfNI/dHRP2o2cxwYfnw7bQght2QpEJoFN39raixJuM=",  
    "content-type": "application/json",  
    "content-length": "68"  
}
```

Response Body Select body

```
{  
    "deviceType": "Wireless_Client",  
    "deviceQueryString": null,  
    "count": 80  
}
```



<https://cmxlocationsandbox.cisco.com/apidocs/>

Copyright © 2018 Cisco and/or its affiliates. All rights reserved. Cisco Confidential

32

