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# CONFIGURING DIFFERENT APIS IN ARUBA 8.X

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AIRHEADS COMMUNITY

# Agenda

- Why API's
- STRUCTURED DATA - SCHEMA & DATA
- Introduction to Configuration APIs in 8.0
- Types and uses:
    a) Configuration APIs (REST API)
    b) Context APIs (NBAPIs)
- Configuration API Usage
- Navigating the UI
- API calls via CLI
- Other Config API Usage

# Why API ?

- For 6.x versions, automation was not easy as CLI use to change over the time.
- WEBUI was not easily automatable.
- WebUI also used CLIs to communicate to the backend, which was hard coded and not easily extensible.
- Show commands of the configuration used to be displayed from different apps in their own proprietary formats
- These apps maintained the config presented to them in their own proprietary structures and the show command output was not consistent across apps.
- So, if outputs changed over the course of time, the scripts also had to change, as these outputs weren't generated in a structured format.
- Therefore, using GET and SET in a structured format for all configuration was the main requirement of implementing the JSON model.

# STRUCTURED DATA - SCHEMA & DATA

- The main reasons for providing JSON interface is that all the config now can be GET and SET using structured data APIs
- Structured data means that all the data is organized in a structure format (there can be many structures) but all elements belonging to one data type follow the same data model.
- This is achieved by separating schema from data.
- Schema is a data model representation (in JSON format), which tells the user as to how to interpret the data. It lists complete detail on each and every parameter or token that a particular config element can take – like it's type (integer, character, string, IP address, IPv6 address, MAC address etc), min and max values, default value (when the user doesn't give any value) etc.
- Data is the representation of the config state of the controller in JSON format. It arranges the data in the same order as the schema and can be interpreted as schema tells it to be interpreted.

# CONFIGURATION API'S – REST API

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# What is REST and Why its popular?

## What is REST ?

- REpresentational State Transfer
- Can modify or view resources on the server without performing any server-side operations
- Client requests a resource from the server and the server sends back the response
- REST is stateless
- Uniform interface
- Cacheable
- Secure

## Why REST is popular?

- Address Scale
- Stateless
- Application development is not tied with server-side development and vice versa
- Uses HTTP/HTTPS

# STRUCTURED DATA - SCHEMA & DATA

- Response of REST calls will have a status code
- **Success Status code**
  - 200 – OK – Everything is working
  - 201 – OK – New resource has been created
  - 204 – OK – The resource was successfully deleted
  - 304 – Not Modified – The client can use cached data
- **Error status code**:
  - 400 – Bad Request – The request was invalid or cannot be served.
  - 401 – Unauthorized – The request requires an user authentication
  - 403 – Forbidden – The server understood the request, but is refusing it or the access is not allowed.
  - 404 – Not found – There is no resource behind the URI.
  - 422 – Unprocessable Entity – Should be used if the server cannot process the entity
  - 500 – Internal Server Error

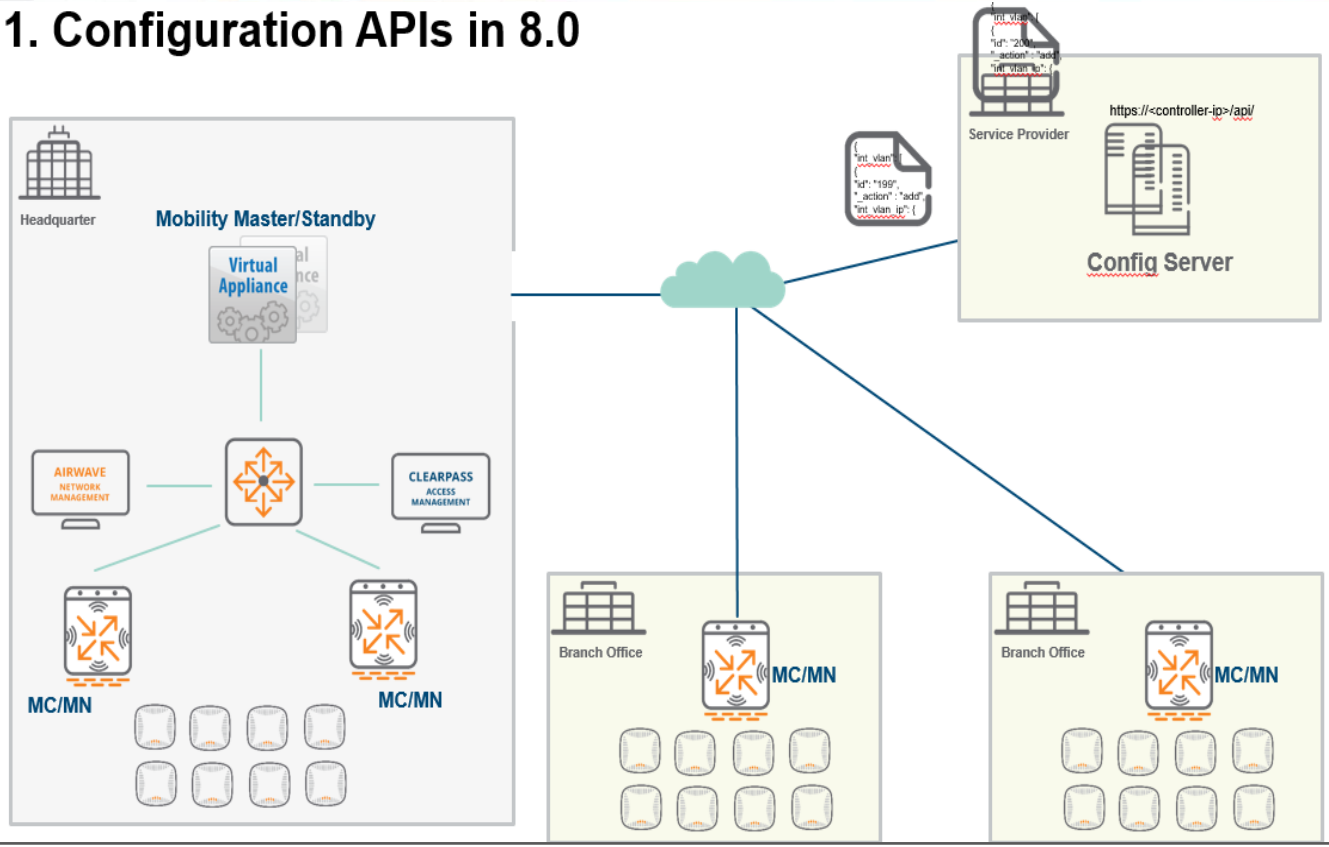
# Introduction to Configuration APIs in 8.0

JSON model provides the ability to make GET and SET calls using structured APIs

| | | |
|---|---|---|
| 1 | • CLI | ••AOS 6.x |
| 2 | • GUI | ••AOS 6.x |
| 3 | • API | ••AOS 8.x |

# 1. Configuration APIs in 8.0

1. Configuration APIs in 8.0



# Configuration API Calls – GET Via GUI

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- CONTAINERS
  - -- AP Provisioning
  - -- Authentication
  - -- Controller
  - -- Crypto
  - -- External Services
  - -- Hierarchy
  - -- Interfaces
  - -- L2/L3 Protocols
  - -- Load Balancing & Redun
  - -- Pools
  - -- Roles & Policies
  - -- Services
  - -- Statistics
  - -- WAN
  - -- WLAN
  - -- Unknown
- Show Commands

# Configuration API Calls – GET Via GUI

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| | | |
|---|---|---|
| POST | /object/perftest_srvr_ap_stop | Create/Update/Delete perftest_srvr_ap_stop |
| GET | /object/ids_wms_system_prof | Get ids_wms_system_prof configuration |
| POST | /object/ids_wms_system_prof | Create/Update/Delete ids_wms_system_prof |
| GET | /object/anqp_domain_name_prof | Get anqp_domain_name_prof configuration |
| POST | /object/anqp_domain_name_prof | Create/Update/Delete anqp_domain_name_prof |
| GET | /object/wired_port | Get wired_port configuration |
| POST | /object/wired_port | Create/Update/Delete wired_port |
| GET | /object/anqp_nai_realm_prof | Get anqp_nai_realm_prof configuration |
| POST | /object/anqp_nai_realm_prof | Create/Update/Delete anqp_nai_realm_prof |
| POST | /object/process_reset_wms | Create/Update/Delete process_reset_wms |
| GET | /object/ht_ssid_prof | Get ht_ssid_prof configuration |
| POST | /object/ht_ssid_prof | Create/Update/Delete ht_ssid_prof |
| GET | /object/ip_mob_cfg_pkt_trace | Get ip_mob_cfg_pkt_trace configuration |
| POST | /object/ip_mob_cfg_pkt_trace | Create/Update/Delete ip_mob_cfg_pkt_trace |
| GET | /object/ap_sys_prof | Get ap_sys_prof configuration |
| POST | /object/ap_sys_prof | Create/Update/Delete ap_sys_prof |
| POST | /object/airmatch_test_db | Create/Update/Delete airmatch_test_db |
| GET | /object/foreign_agent_general_prof_re | Get foreign_agent_general_prof_re configuration |

# Configuration API Calls – GET Via GUI

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GET /object/ht_ssid_prof — Get ht_ssid_prof configuration

Implementation Notes

Gets configuration for ht_ssid_prof

Response Class (Status 200)

Model | Model Schema

```
[
  {
    "profile-name": "string",
    "ssid_ht_enable": {},
    "ssid_40mhz_enable": {},
    "ssid_vht_enable": {},
    "ssid_80mhz_enable": {},
    "ba_amsdu": {},
    "sw_retry": {},
    "legacy_allowed": {},
```

Response Content Type application/json

Parameters

| Parameter | Value | Description | Parameter Type | Data Type |
|---|---|---|---|---|
| config_path | /md | **Hierarchy path** | query | string |
| sort | | Object name for field to sort on. Preceeding '-' indicates descending order | query | string |
| count | | Object name for field for which only count will be returned rather than data | query | string |
| offset | | 1-based offset to start from (Paginate). It should be multiple of limit (below) + 1 | query | integer |
| limit | | Number of records to fetch (Paginate) | query | integer |
| total | | Last total number of records returned (Paginate) | query | integer |
| filter | | JSON filter expression specifying the items to return | query | string |
| UIDARUBA | d0e5e419-ea8a-423e-9c5d-1144b4b6cb30 | **SESSION id from authentication cookie** | query | string |

# Configuration API Calls – GET Via GUI

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| | | | | |
|---|---|---|---|---|
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| offset | | 1-based offset to start from (Paginate). It should be multiple of limit (below) + 1 | query | integer |
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| filter | | JSON filter expression specifying the items to return | query | string |
| UIDARUBA | d0e5e419-ea8a-423e-9c5d-1144b4b6cb30 | **SESSION id from authentication cookie** | query | string |

Response Messages

| HTTP Status Code | Reason | Response Model | Headers |
|---|---|---|---|
| 401 | Unauthorized | | |
| 403 | Forbidden | | |
| 415 | Unsupported Type | | |

Try it out! Hide Response

```
curl -X GET --header "Accept: application/json" "https://10.17.164.11/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&UIDARUBA=d0e5e419-
```

```
curl -X GET --header "Accept: application/json" "https://10.17.164.11/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&UIDAR
```

Request URL

```
https://10.17.164.11/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&UIDARUBA=d0e5e419-ea8a-423e-9c5d-1144b4b6cb30
```

Response Body

```
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
```

# Configuration API Calls – GET Via GUI

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- Show Commands

Try it out! Hide Response

```
curl -X GET --header "Accept: application/json" "https://10.17.164.11:4343/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&UIDARUBA=a3b7
```

```
curl -X GET --header "Accept: application/json" "https://10.17.164.11:4343/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&
```

Request URL

```
https://10.17.164.11:4343/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&UIDARUBA=a3b7b4f8-069d-43a4-a1d4-3a6e3dd36a3e
```

Response Body


```
{
  "_data": {
    "ht_ssid_prof": [
      {
        "profile-name": "default",
        "_flags": {
          "inherited": true,
          "default": true
        },
        "ssid_ht_enable": {
          "_present": true,
          "_flags": {
            "default": true,
            "inherited": true
          }
        },
        "ssid_40mhz_enable": {
          "_present": true,
          "_flags": {
            "default": true,
```


Response Code

```
200
```

Response Headers


```
{
  "date": "Wed, 15 Feb 2017 20:39:05 GMT",
  "server": "Apache",
  "x-frame-options": "SAMEORIGIN",
  "content-type": "application/json",
  "expires": "0, 0",
  "connection": "Keep-Alive",
  "keep-alive": "timeout=15, max=96",
  "content-length": "4683",
  "x-ua-compatible": "IE=edge;IE=11;IE=10;IE=9"
}
```

# Configuration API Calls – cURL commands via CLI

**GET:**

Now let's check the same GET Option for an object (HT_SSID_PROF) using CLI
Before executing GET/SET commands, we need to login to the controller:

**LOGIN:**

```
[arubasupport@ANSHUL_CPPM_SRV ~]$curl --insecure -c "aruba-cookie" -d
"username=admin&password=aruba123" https://10.17.164.11:4343/v1/api/login
{"_global_result": {"status":"0", "status_str": "You've logged in successfully.", "UIDARUBA":"2bf89edb-
5208-48d9-b916-bb2fa759c26a"}}
```

**LOGOUT:**

```
[arubasupport@ANSHUL_CPPM_SRV ~]$ curl --insecure -c "aruba-cookie"
https://10.17.164.11:4343/v1/api/logout
{"_global_result": {"status":"0", "status_str": "You've been logged out successfully.", "UIDARUBA":"(null)"}}
```

- **The --insecure (or -k) option can be used with the curl command if the certificate of the Mobility Master cannot be validated.**

# Configuration API Calls – cURL commands via CLI

- **Snippet from Slide#13:**

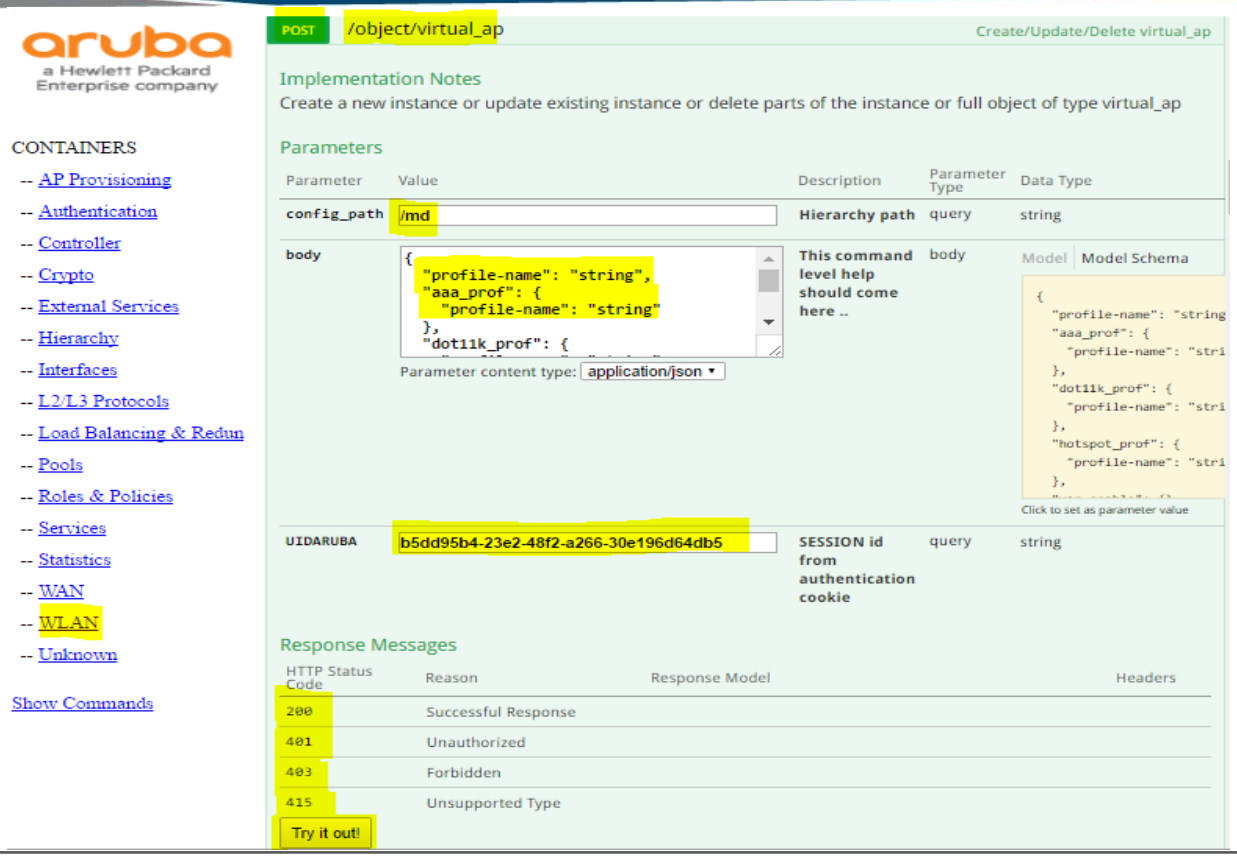

**curl -k -b "aruba-cookie" -X GET --header "Accept: application/json" https://10.17.164.11/v1/configuration/object/ht_ssid_prof?config_path=%2Fmd&UIDARUBA=d0e5e419-ea8a-423e-9c5d-1144b4b6cb30**


```
{
  "_data": {
 "ht_ssid_prof": [
{
 "profile-name": "default",
       "_flags": {
 "inherited": true,
"default": true
  },
 "ssid_ht_enable": {
"_pr;   "_flags":
```


**<OUTPUT SNIPPED>**

# Configuration API Calls –SET Via GUI

# Configuration API Calls –SET Via GUI



# Configuration API Calls –SET Via GUI

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  - -- WLAN
  - -- Unknown
- Show Commands

Try it out! Hide Response

```
curl -X POST --header "Content-Type: application/json" --header "Accept: application/json" -d "{
  \"profile-name\": \"string\",
  \"aaa_prof\": {
    \"profile-name\": \"string\"
  },
  \"dot11k_prof\": {
    \"profile-name\": \"string\"
  },
  \"hotspot_prof\": {
    \"profile-name\": \"string\"
  },
  \"vap_enable\": {},
  \"vlan\": {
    \"vlan\": \"string\"
  },
  \"forward_mode\": {
    \"forward_mode\": \"tunnel\"
  },
  \"ssid_prof\": {
    \"profile-name\": \"string\"
  },
  \"vap_rf_band\": {
    \"rf_band_tristate\": \"g\"
  },
  \"band_steering\": {},
  \"cellular_handoff_assist\": {},
  \"openflow_enable\": {},
  \"steering_mode\": {
    \"steering_mode\": \"balance-bands\"
  },
  \"dynamic_mcast_optimization\": {},
  \"dynamic_mcast_opt_thresh\": {
    \"dynamic-mcast-optimization-thresh\": 0
  },
  \"drop_mcast\": {},
  \"voip_proxy_arp\": {},
  \"auth_failure_blacklist_time\": {
    \"auth-failure-blacklist-time\": 0
  },
  \"blacklist_time\": {
    \"blacklist-time\": 0
  },
  \"deny_vap_inter_user_traffic\": {},
  \"deny_time_range\": {
    \"deny-time-range\": \"string\"
  },
  \"dos_prevention\": {},
  \"ha_disc_onassoc\": {},
  \"mobile_ip\": {},
  \"preserve_vlan\": {},
  \"rap_operation\": {
    \"rap_virtual_ap_operation\": \"standard\"
  },
  \"blacklist\": {},
  \"strict_compliance\": {},
  \"vlan_mobility\": {},
  \"wan_operation\": {
    \"wan_virtual_ap_operation\": \"primary\"
  },
  \"fdb_update_on_assoc\": {},
  \"per_ac_qos_prof\": {
    \"profile-name\": \"string\"
  },
  \"anyspot_prof\": {
```

# Configuration API Calls –SET Via GUI

# Configuration API Calls – cURL commands via CLI

**SET/POST:**

**Posting a Virtual AP Profile:**

```
curl -k -b "aruba-cookie" -X POST --header "Content-Type: application/json" --header "Accept: application/json" -d "{
\"profile-name\": \"curl_test\",
\"aaa_prof\": {
\"profile-name\": \"default\“
},
\"vap_enable\": {},
\"vlan\": {
 \"vlan\": \"1\“
},
\"forward_mode\": {
\"forward_mode\": \"tunnel\“
},
\"ssid_prof\": {
\"profile-name\": \"default\“
}
}" "https://10.17.164.11:4343/v1/configuration/object/virtual_ap?config_path=%2Fmd&UIDARUBA=db5f35eb-e3ed-4722-8aee-db8ec6b4ccf7"
```

# Configuration API Calls – cURL commands via CLI

**OUTPUT:**


```
{
"virtual_ap": {
   "profile-name": "curl_test",
   "aaa_prof": {
    "profile-name": "default",
  "_result": {
"status": 0,
"status_str": "“
 }
},
"vap_enable": {
    "_result": {
    "status": 0,
    "status_str": "“
}
...
…
...
…
…
 },
      "_result": {
      "status": 0,
      "status_str": “
   }
},
"_global_result": {

    "status": 0,
    "status_str": "Success",
    "_pending": false
}
```


**<skipped mid data and continued to final section>**

# Configuration API Calls – cURL commands via CLI

**Creating a new role using .TXT file:**

**We need to create a .txt file in linux and save it to the required path,**

**To create a .txt file,**

```
[arubasupport@ANSHUL_CPPM_SRV ~]$ echo "{
  \"rname\": \"string\",
  \"role__acl\": {
  \"acl_type\": \"eth\",
   \"pname\": \"string\",
  \"loc\": \"string\",
   \"prio\": 0
},
  \"role__reauth\": {
    \"seconds\": true,
    \"reauthperiod\": 0
}
}" > sample1.txt
```

**We have ECHOED the ROLE INFO in a text file called sample1.txt**

# Configuration API Calls – cURL commands via CLI

**Output:**

```
[arubasupport@ANSHUL_CPPM_SRV ~]$ cat sample1.txt
{
  "rname": "curltest",
  "role__reauth": {
  "seconds": true,
  "reauthperiod": 20
},
"role__acl": [
{
    "acl_type": "session",
    "pname": "captiveportal“
},
{
    "acl_type": "session",
    "pname": "logon-control“
}
]
```

**Here we can see the txt file is created**

# Configuration API Calls – cURL commands via CLI

```
curl -k -b "aruba-cookie" -X POST -i
"https://10.17.164.11/v1/configuration/object/role?config_path=%2Fmd&UIDARUBA=e27d21f7-0806-4021-8ae6-e512152c8a82" -d @sample1.txt
HTTP/1.1 200 OK
Date: Mon, 13 Feb 2017 19:16:48 GMT
Server: Apache
Expires: 0
X-Frame-Options: SAMEORIGIN
X-UA-Compatible: IE=edge;IE=11;IE=10;IE=9
Expires: 0
Set-Cookie: SESSION=e27d21f7-0806-4021-8ae6-e512152c8a82; path=/;;Secure;
Content-Length: 719
Content-Type: application/json
{
   "role": {
   "rname": "curltest",
   "role__reauth": {
   "seconds": true,
   "reauthperiod": 20,
   "_result": {
   …….
"_global_result": {
   "status": 0,
   "status_str": "Success",
   "_pending": 1
}
```

# Configuration API Calls – cURL commands via CLI

**GET/POST information to lower hierarchal design:**

**Configuration node hierarchy**

**/md/Anshul-MD/local-device/00:1a:1e:02:1b:60 Device Aruba7220**

**curl -k -b "aruba-cookie" -X POST --header "Content-Type: application/json" --header "Accept: application/json" "https://10.17.164.11/v1/configuration/object/write_memory?config_path=%2Fmd%2FAnshul-MD%2Flocal-device%2F00%3A1a%3A1e%3A02%3A1b%3A60&UIDARUBA=420f39f2-b332-4c98-a0ab-341826102a23"**

**Write Memory:**

**curl -k -b "aruba-cookie" -X POST --header "Content-Type: application/json" --header "Accept: application/json" "https://10.17.164.11/v1/configuration/object/write_memory?config_path=%2Fmd&UIDARUBA=aba2f089-80cb-42f9-9cab-034e0ba4d57b"**


```
{
   "write_memory": {
   "_result": {
   "status": 0,
……..
   "status": 0,
   "status_str": "Success",
   "_pending": false
}
```

# Configuration API Calls – cURL commands via CLI

**Using "show" command APIs:**

**SHOW AP DATABASE**

```
curl -k -b aruba-cookie -X GET -i
"https://10.17.164.11:4343/v1/configuration/showcommand?command=show+ap+database&UIDARUBA=420f39f2-b332
341826102a23"
HTTP/1.1 200 OK
Date: Wed, 15 Feb 2017 19:37:58 GMT
Server: Apache
Expires: 0
X-Frame-Options: SAMEORIGIN
X-UA-Compatible: IE=edge;IE=11;IE=10;IE=9
Expires: 0
Set-Cookie: SESSION=420f39f2-b332-4c98-a0ab-341826102a23;
path=/;;Secure;
  Content-Length: 1240
Content-Type: application/json{
"AP Database": [
   {
    "AP Type": "225",
    "Flags": null,
    "Group": "New-Test-API",
    "IP Address": "10.17.170.126",
    "Name": "225-rep",
    "Standby IP": "0.0.0.0",
    "Status": "Up 8m:0s",
    "Switch IP": "10.17.170.106"
},
   {
    "AP Type": "225",
    "Flags": null,
    "Group": "New-Test",
    "IP Address": "10.17.170.125",
    "Name": "225-test-MM",
    "Standby IP": "0.0.0.0",
    "Status": "Up 19d:11h:11m:1s",
    "Switch IP": "10.17.170.106"
   }
 ],
  "_data": [
   "Flags: U = Unprovisioned; N = Duplicate name; G = No such
group; L = Unlicensed",
<OUTPUT SNIPPED>
```

# Configuration API Calls – cURL commands via CLI

## Posting Multiple Objects in One-Go

```
curl -k -b "aruba-cookie" -X POST --header "Content-Type: application/json" --header "Accept: application/json" -d "{

\"aaa_prof\": {
  \"profile-name\": \"aaa-curl\",
  \"default_user_role\": {
    \"role\": \"authenticated\“
  },
  \"dot1x_auth_profile\": {
    \"profile-name\": \"default-psk\“
  }
},
\"ssid_prof\": {
  \"profile-name\": \"ssid-curl\",
  \"ssid_enable\": {},
  \"essid\": {
    \"essid\": \"ess-curl\“
...
…
},
 \"write_memory\": {}
}" "https://10.17.164.111:4343/v1/configuration/object/?config_path=%2Fmd&UIDARUBA=bb34c35e-d3ea-444e-ab61-9b6b2e5e48f0"
```

# CONTEXT API'S - NBAPI

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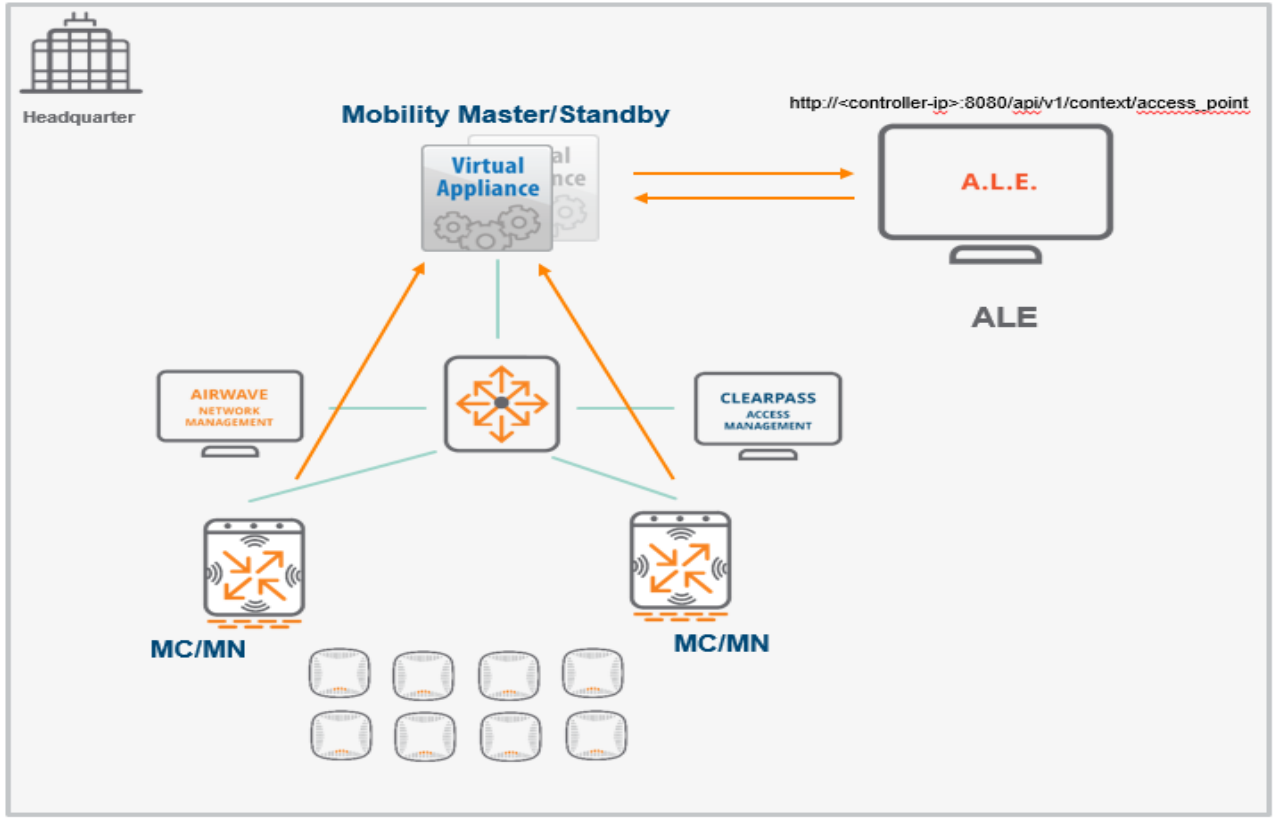
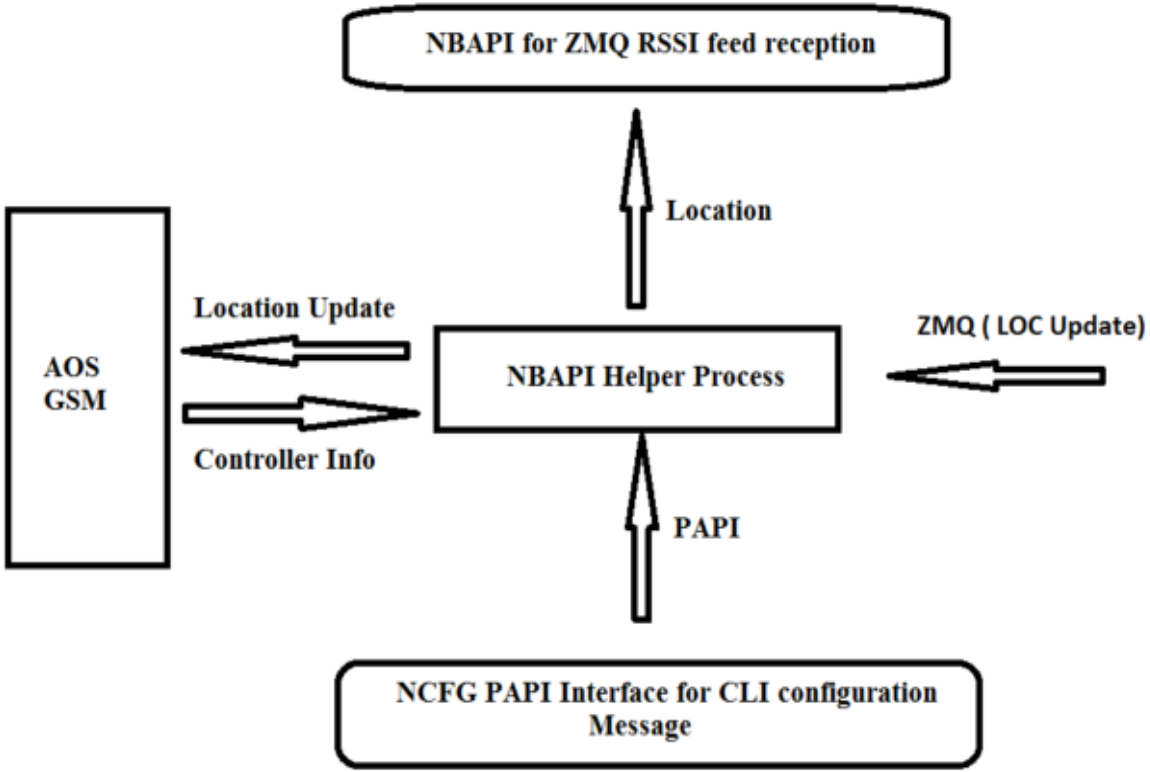
# 2. Context APIs in 8.0



# NorthBound API Basics

- NB API is part of ALE solution that is being integrated with Mobility Master and the helper process aids the JVM process in the AOS Services controller.
- This process receives the protobuf encoded ZMQ ALE feed consisting of Geofence, Location and Presence updates and makes them available to NBAPI JVM process as well as publishing the feed to AOS GSM.
- To configure nbapi_helper process to receive ZMQ feed from ALE, CLI can be used. The maximum number of ALEs that can be configured is 5.
- LC are also sending AMON feed to SC on port 9001. The JVM process grabs the AMON feed coming in port 9001 and update the redis DB with all the context information.
- The Analytics and Location Engine supports two types of APIs:
  a polling-based REST API, and
  a publish/subscribe API based on Google Protobuf and ZeroMQ.

# NB API Work Flow



# NBAPI Helper Process

- **NBAPI helper process running on Services Controller is a multi-threaded process handling following tasks.**

- **Listening to ZMQ Location, Presence and Geo-fence updates from ALE VM.**
- **Writing the above messages to GSM.**
- **Getting Controller information from GSM and updates of configuration file regulating the NBAPI java process.**
- **NBAPI-helper process sends out a ZMQ feed. This feed contains context information like AP, VAP, etc**
- **By default, ZMQ feed or REST API does not contain location, geofence and presence info. These are only updated in the GSM.**
- **If location, presence and geo-fence information is required, the customer will have to subscribe to ZMQ feed from individual ALEs.**

# Configuration

- **ale-configuration**
  **ale_sta_associated**
  **anonymize**
  **ip address 10.17.164.26 username admin password Aruba@p1**
  **nbapi_publish**

- **The following command is used to configure an ALE IP address with login information. A maximum of five ALE IP addresses can be configured on the Mobility Master:**

  **(host) [mynode] (config) #ale-configuration**
  **(host) [mynode] (config-submode) # ip <IP address> username <username> password <password>**

# Configuration (Contd.)

- **The following command is used to configure anonymization on the Mobility Master REST API:**

  **(host) [mynode] (config) #ale-configuration**
  **(host) [mynode] (config-submode) #anonymize**

- **The following command is used to enable REST APIs on the Mobility Master to publish data available via ZMQ, including station, virtual AP, AP, radio, RSSI, visibility record, destination. By default, this parameter is false.**

  **(host) [mynode] (config) #ale-configuration**
  **(host) [mynode] (config-submode) #nbapi_publish**

# THANK YOU!

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