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# Demystifying Cisco SD-WAN(Viptela) APIs

## to operate Fabric Smoothly

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DEVNET-1380

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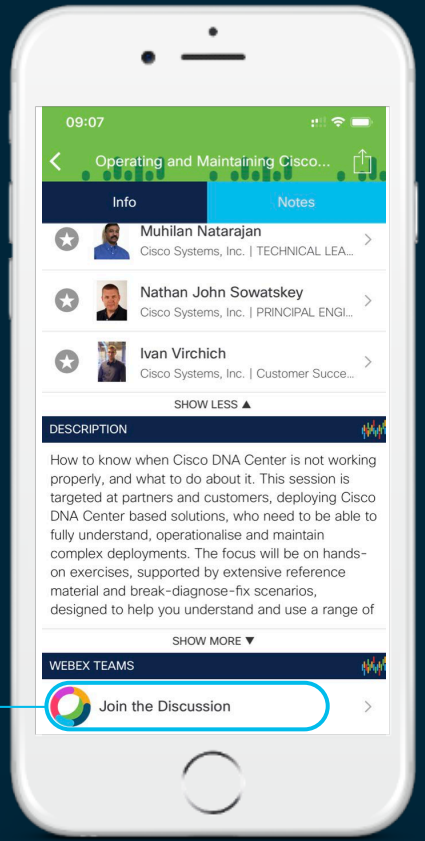


# Agenda

- WW(What & Why) of vManage APIs
- Aggregation APIs
- vManage Real Time APIs
- Demo

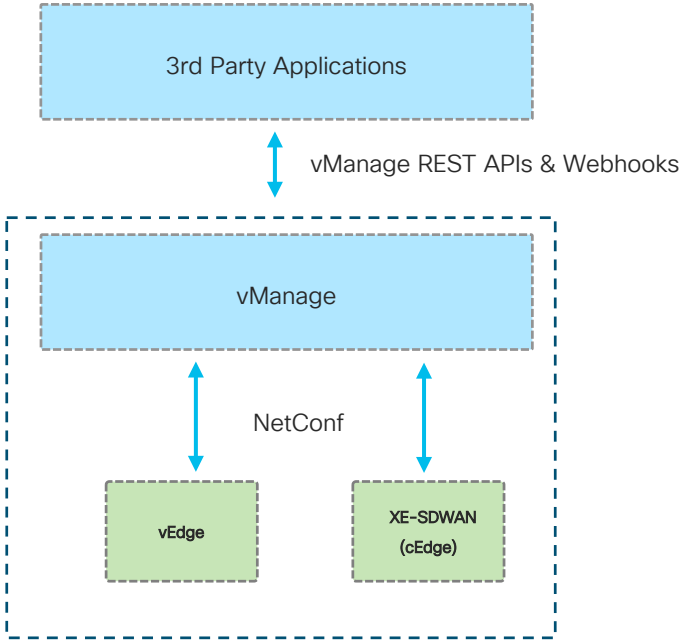
# WW(What & Why) of vManage APIs

# vManage REST APIs

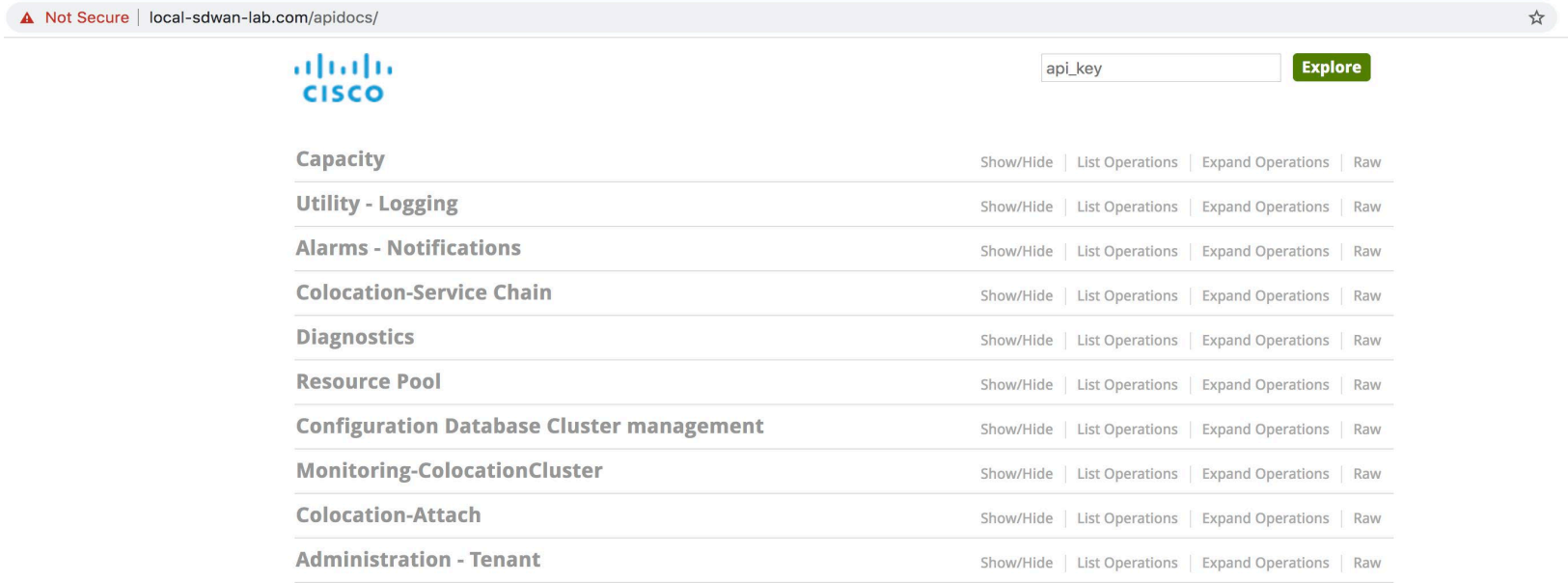
- vManage uses REST architecture which is stateless, client-server, cacheable communications protocol.

- vManage exposes REST APIs and webhooks to integrate with 3rd party systems

- vManage uses NetConf for configuring and managing edge devices

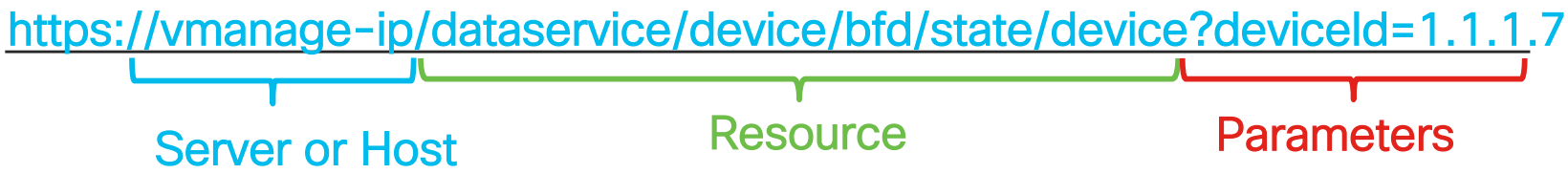


# vManage – Using REST APIs




- API Documentation built-in – https://<vmanage-ip:port>/apidocs
- Test API calls can be tried out from swagger UI

# URI Structure




http:// or https://

- Protocol over which data is sent between client and server

Server or Host

- Resolves to the IP and port to which to connect

Resource

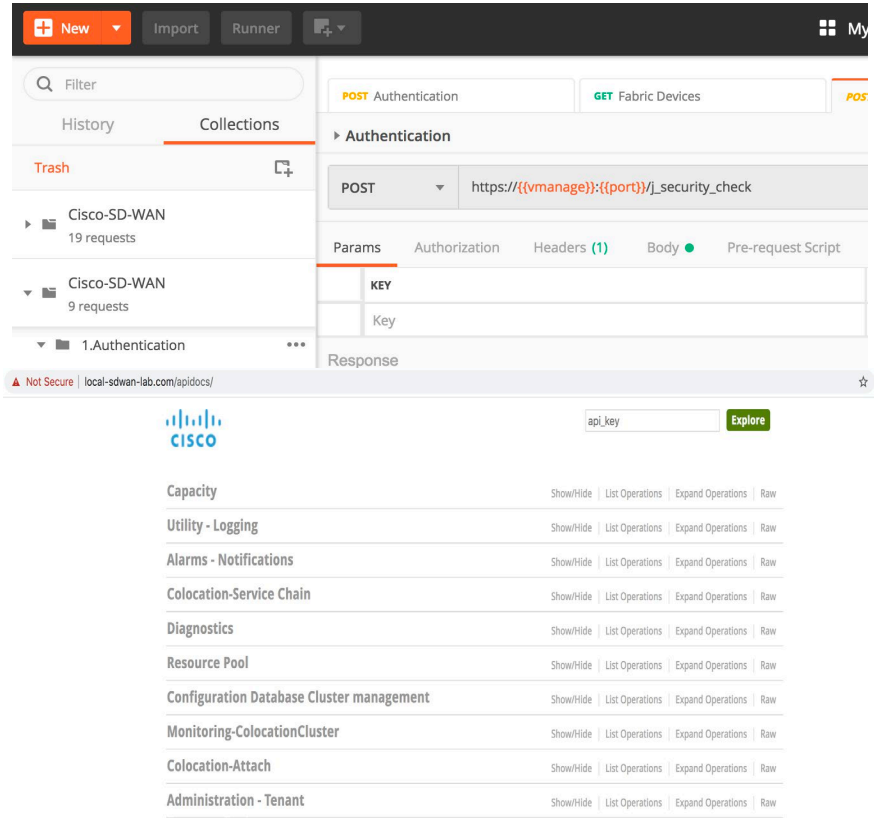
- The location of the data or object of interest

Parameters

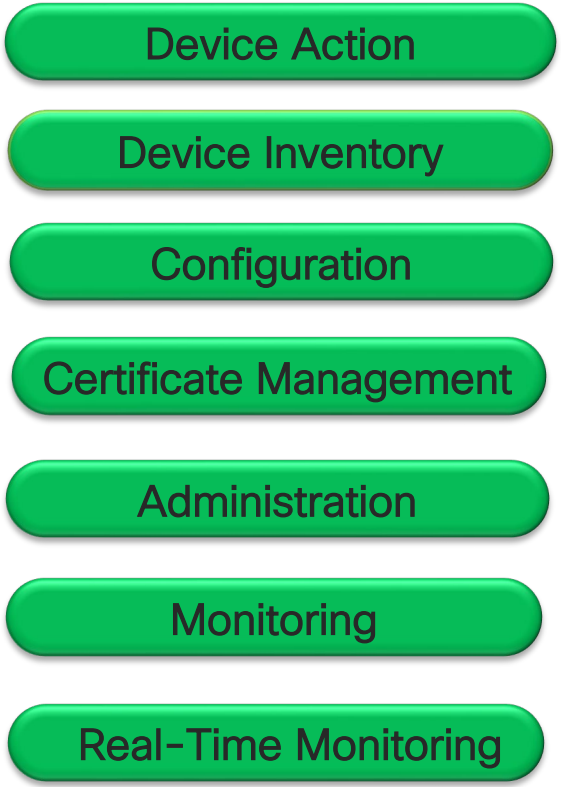
- Details to scope, filter, or clarify a request. Often optional.

# Options for Working with REST APIs

- curl
  - Linux command line application
- Postman
  - API testing application and framework
- Requests
  - Python library for scripting
- OpenAPI/Swagger
  - Dynamic API Documentation



# API categories

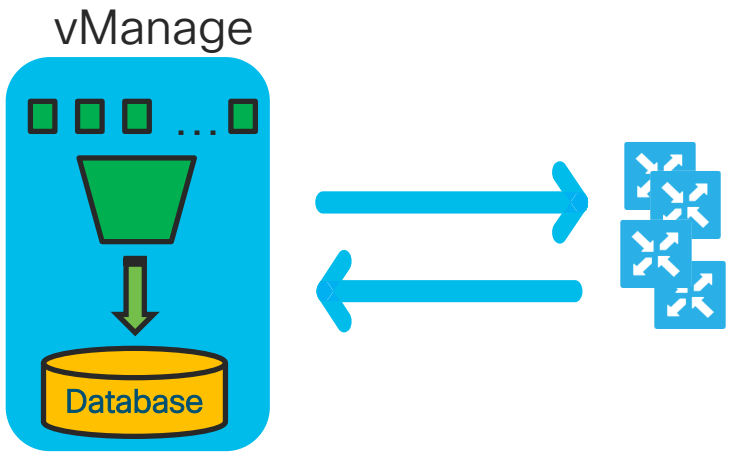



- vManage APIs are grouped into different resource collections
- APIs under each resource collection are documented at https://<vmanage-ip:port>/apidocs

# Aggregation APIs

# Aggregation APIs

- vManage collects statistics periodically from edge routers and stores stats in database
- Using Aggregation APIs we can build queries to retrieve selected statistics from the database.
- Aggregation APIs supports various operators viz. sum, count, average, min and max.



# Let's Query vManage

Use case:

- Collect DPI statistics for DIA path over last **24** hours for the edge router with system-ip **1.1.2.201**
- Aggregate the statistics based on application, application family and local-color DIA.
- Metrics value in octets.

```
{
  "query": {
    "condition": "AND",
    "rules": [
      {
        "value": [
          "24"
        ],
        "field": "entry_time",
        "type": "date",
        "operator": "last_n_hours"
      },
      {
        "value": [
          "1.1.2.201 "
        ],
        "field": "vdevice_name",
        "type": "string",
        "operator": "in"
      },
```

<== Aggregated data must match all rules specified below

<== DPI Statistics for last 24 hours are aggregated

<== System IP address of the device

```
{
        "value": [
          "dia"
        ],
        "field": "local_color",
        "type": "string",
        "operator": "in"
      }]
  },
  "aggregation": {
application
        "field":  [
                {  "property":"application",
                   "size":200,
                   "sequence":1},
                {  "property":"family",
                   "size":200,
                   "sequence":1},
                { "property":"local_color",
                  "size":25,
                   "sequence":1}
              ],
```

<== Collect DPI statistics for DIA path

<== Bucketized based on application,

family and local-color

```
  "metrics": [
    {
      "property": "octets",
      "type": "sum",
      "order": "desc"
    }
  ]
 }
}
```

<== Display total amount of data in octets.

Use case:

- Collect DIA traffic statistics per application across all the edge routers in fabric

Solution:

- Use DPI aggregation API /dataservice/statistics/dpi/fields and build query to get DIA path traffic statistics

```
(venv) MSUCHAND-M-R0EV:sdwan-dpi-statistics msuchand$ python3 sdwan-dpi-statistics.py
Fetching DPI summary statistics
```

| System IP | Application | Application Family | Packets |
|---|---|---|---|
| 1.1.2.1 | dns | network-service | 339728 |
| 1.1.2.1 | ms-office-365 | web | 497902 |
| 1.1.2.1 | gmail | webmail | 79743 |
| 1.1.2.1 | google-services | web | 408333 |
| 1.1.2.1 | skype | instant-messaging | 186474 |
| 1.1.2.1 | gtalk | instant-messaging | 85886 |
| 1.1.2.1 | box | web | 109504 |
| 1.1.2.1 | dropbox | web | 314500 |
| 1.1.2.201 | tcp | network-service | 62 |
| 1.1.2.200 | tcp | network-service | 56 |
| 1.1.1.15 | ntp | network-service | 33 |
| 1.1.1.14 | ntp | network-service | 32 |

```
(venv) MSUCHAND-M-R0EV:sdwan-dpi-statistics msuchand$
```

Email alert triggered for the data retrieved from DPI aggregation APIs.

Source code:

https://github.com/suchandanreddy/sdwan-apis/blob/master/sdwan-dpi-statistics.py

## DIA Application Statistics

**vmanage.notifications@gmail.com**

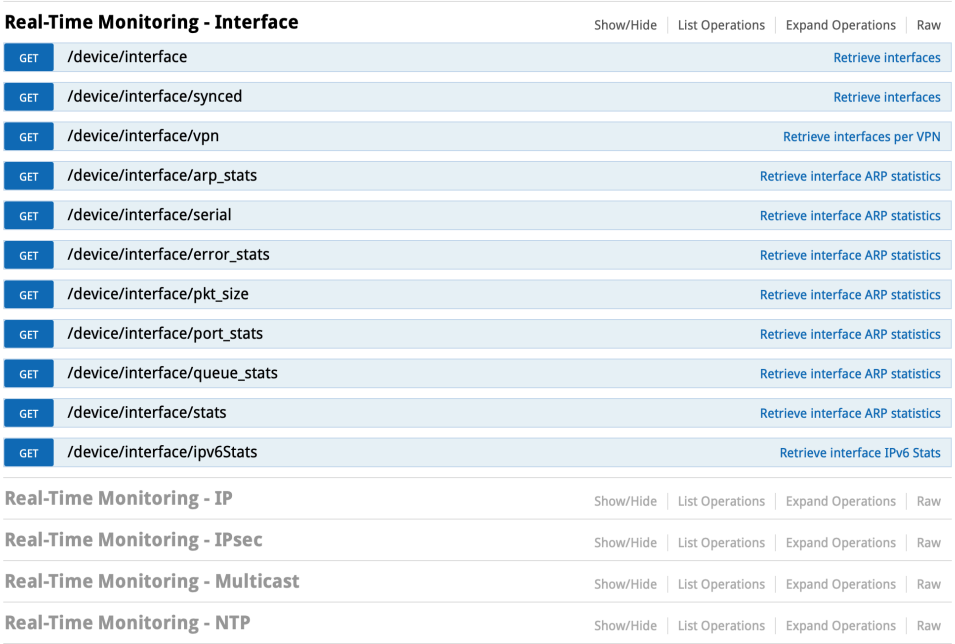
to me

| System IP | Application | Application Family | Packets |
|---|---|---|---|
| 1.1.2.1 | dns | network-service | 339720 |
| 1.1.2.1 | ms-office-365 | web | 497424 |
| 1.1.2.1 | gmail | webmail | 79753 |
| 1.1.2.1 | google-services | web | 408068 |
| 1.1.2.1 | skype | instant-messaging | 188708 |
| 1.1.2.1 | gtalk | instant-messaging | 85851 |
| 1.1.2.1 | box | web | 109640 |
| 1.1.2.1 | dropbox | web | 314387 |
| 1.1.2.201 | tcp | network-service | 60 |
| 1.1.2.200 | tcp | network-service | 56 |
| 1.1.1.15 | ntp | network-service | 33 |
| 1.1.1.14 | ntp | network-service | 31 |

# vManage Real Time APIs

# Real Time APIs

- Used to query directly the device (via the vManage)
- All GET in the form of /device/<object>
- Command output converted in Json



# Let’s Query vManage

Use cases:

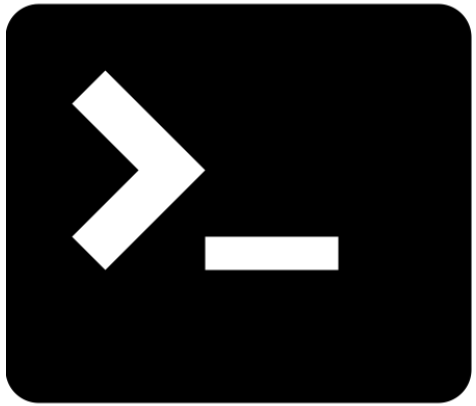
- Get the list of interfaces of a given device
- Get the routing table of a given device
- Get the list of OMP peers of a given device

# API Structure

| Entrypoint | Input values | URL |
| --- | --- | --- |
| /device/interfaces | **deviceId**<br>vpn-id<br>ifname<br>af-type | /device/interface?deviceId=10.0.1.101<br>/device/interface?deviceId=10.0.1.101&vpn-id=0 |
| /device/omp/peers | **deviceId** | /device/omp/peers?deviceId=10.0.1.101 |
| /device/ip/routetable | **deviceId**<br>vpn-id<br>address-family<br>prefix<br>protocol | /device/routetable?deviceId=10.0.1.101&prefix=0.0.0.0 |

# Introducing...

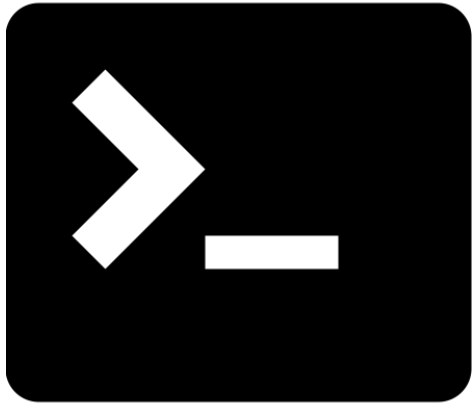
Python SDK



pip install viptela

# and...

CLI Application



vmanage --help

# Demo

# Additional Resources –
## GitHub Repos and DevNet Learning Labs

- https://github.com/CiscoDevNet/sdwan-devops
- https://github.com/CiscoDevNet/sdwan-ops
- https://github.com/CiscoDevNet/ansible-(viptela, virl, pyats, nfvis)
- http://cs.co/sdwan-apis-lab
- https://github.com/suchandanreddy/sdwan-umbrella-policy/
- https://github.com/suchandanreddy/sdwan-webhooks
- https://github.com/suchandanreddy/sdwan-integration-with-influxdb-grafana
- https://github.com/suchandanreddy/sdwan-apis
- https://developer.cisco.com/sdwan/
- https://developer.cisco.com/learning/modules/sd-wan

# SD-WAN Automation learning map at CLEUR

1 DEVWKS-2226
Automating Test Environments

3 DEVWKS-2030
CI/CD

2 DEVWKS-2028
Automating Day 1 & Day 2

4 DEVWKS-3484
Monitoring & Analytics


BRKDEV-3326
Continuous Integration and Testing for SD-WAN with Ansible

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