



# Network automation with Google Sheets?

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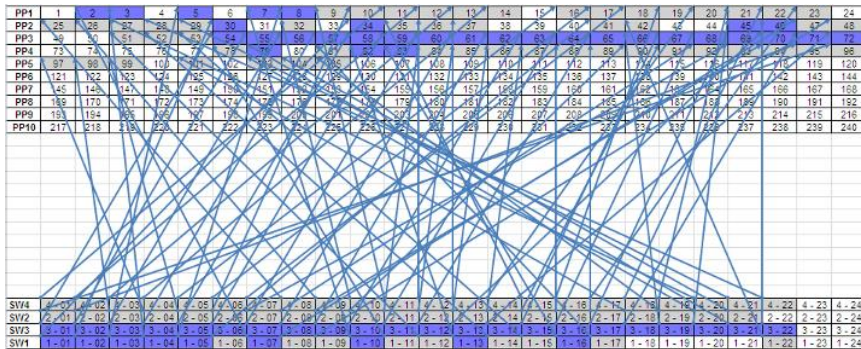
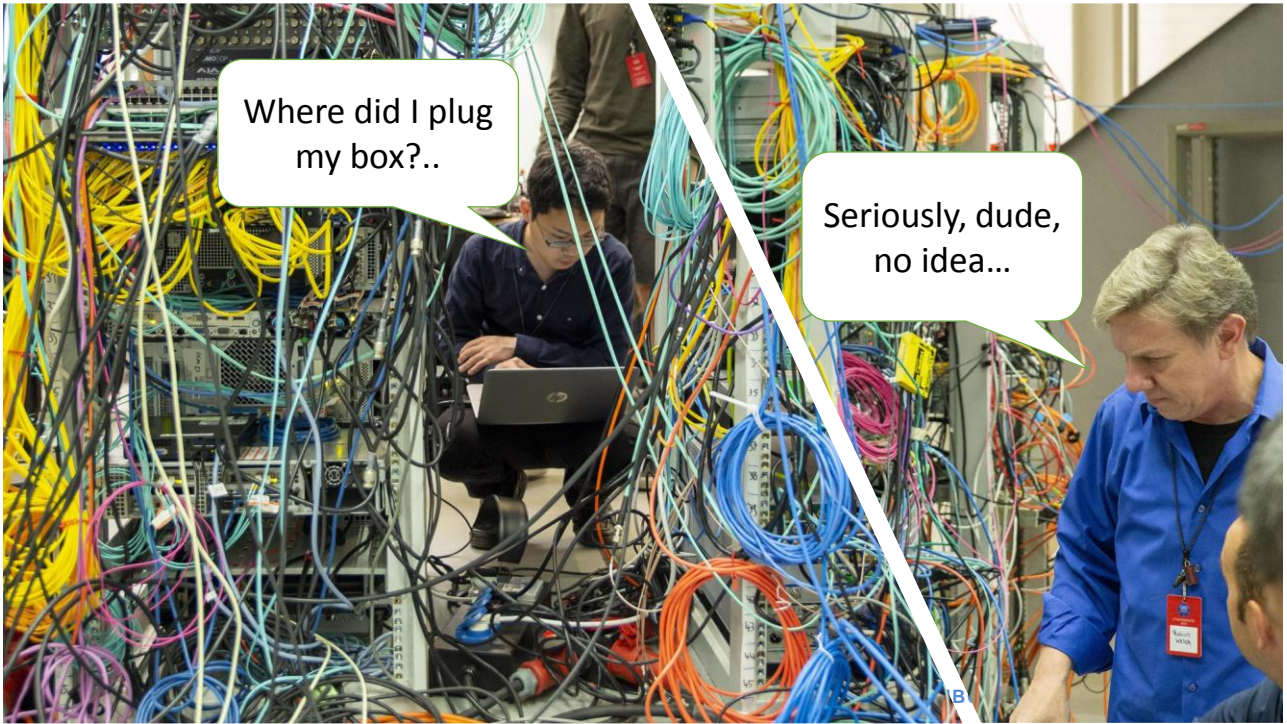
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417	DirectUM GEM MENTONE 42	connected	routed	a-full	a-3G	100BASE-T
418	Riedel RSP-2318	connected	10	a-full	a-3G	100BASE-T
449	Riedel RSP-200-C2	connected	10	a-full	a-3G	100BASE-T
4110	Stage Tec NEXUS RTP/RIF07	connected	311	a-full	a-3G	100BASE-T
4111	Stage Tec NEXUS RTP/RIF07	connected	312	a-full	a-3G	100BASE-T
4112	Studio Technologies Model 5512-02	connected	10	a-full	a-3G	100BASE-T
4113	Studio Technologies Model 5512-02	connected	110	a-full	a-3G	100BASE-T
4114	Studio Technologies Model 5518	notconnect	10	auto	auto	100BASE-T
4115	Studio Technologies Model 5518	notconnect	110	auto	auto	100BASE-T
4116	Ross Video EGY-M001	connected	10	a-full	a-3G	100BASE-T
4117	Ross Video EGY-M001	connected	110	a-full	a-3G	100BASE-T
4118	Ross Video Mirapet	connected	10	a-full	a-3G	100BASE-T
4119	Ross Video Mirapet	connected	110	a-full	a-3G	100BASE-T
4120	Ross Video Boch openModule	connected	10	a-full	a-3G	100BASE-T
4121	Ross Video Boch openModule	notconnect	110	auto	auto	100BASE-T
4122	Ross Video Boch Liberty	connected	10	a-full	a-3G	100BASE-T
4123	Ross Video Boch Liberty	connected	110	a-full	a-3G	100BASE-T
4124	The Telos Alliance Asta IQX AISP console	connected	10	a-full	a-3G	100BASE-T
4125	The Telos Alliance Telos Infinity IP Intercom Master Panel	connected	10	a-full	a-3G	100BASE-T
4126	The Telos Alliance Telos Infinity IP Intercom Master Panel	connected	10	a-full	a-100M	100BASE-T
4127	The Telos Alliance Mxnd Signal -A006	connected	10	a-full	a-100M	100BASE-T
4128	The Telos Alliance ALS/EBU Module	connected	10	a-full	a-100M	100BASE-T
4129	The Telos Alliance Mic -A006	connected	10	a-full	a-100M	100BASE-T
4130	The Telos Alliance Analog -A006	connected	10	a-full	a-100M	100BASE-T
4131	Mura Beck	notconnect	10	auto	auto	100BASE-T
4132	Mura Beck	notconnect	10	auto	auto	100BASE-T
4133	Mura Beck	notconnect	10	auto	auto	100BASE-T
4134	IG Host	connected	10	a-full	a-100M	100BASE-T
4135	IG Host	connected	10	a-full	a-100M	100BASE-T
4136	IG Host	notconnect	10	auto	auto	100BASE-T
4137	IG Host	notconnect	10	auto	auto	100BASE-T
4138	IG Host	notconnect	10	auto	auto	100BASE-T
4139	IG Host	notconnect	10	auto	auto	100BASE-T
4140	IG Host	notconnect	10	auto	auto	100BASE-T
4141	IG Host	notconnect	10	auto	auto	100BASE-T
4142	IG Host	notconnect	10	auto	auto	100BASE-T
4143	IG Host	notconnect	10	auto	auto	100BASE-T
4144	IG Host	notconnect	10	auto	auto	100BASE-T
4145	IG Host	notconnect	10	auto	auto	100BASE-T
4146	IG Host	notconnect	10	auto	auto	100BASE-T
4147	IG Host	notconnect	10	auto	auto	100BASE-T
4148	ARISTA DEBG - @blch	notconnect	10	auto	auto	100BASE-T
4149	PacketStorm CRS (3)10GE Port B	connected	routed	full	10G	10GBASE-SR1
4150	100G Host	notconnect	10	full	10G	Not Present
4151	100G Host	notconnect	10	full	10G	Not Present
4152	100G Host	notconnect	10	full	10G	Not Present
4153	100G to Arista Spine - eth2/2 ARISTA-SPINE-1	connected	routed	full	10G	10GBASE-SR1
4154	100G to Arista Spine - eth3/3 ARISTA-SPINE-1	connected	routed	full	10G	10GBASE-SR1
4155	100G Host	connected	routed	a-full	a-3G	10/100/1000

\*Taken from the JT-NM Tested March 2019



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## Idea

- A centralized, but dynamic and collaborative repository for often changed switch parameters.
- A centralized, but dynamic and collaborative view of troubleshooting data from the switch, the “show” commands.
- A real time update or periodic polling of both.
- Has to support Arista switches



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## Possible solutions

- CLI?
- Ansible?
- Python?
  - CLI (Telnet/SSH)?
  - JSON?
  - Native API?



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## Python

- telnetlib
- paramiko
- netmiko
- native programmatic API library (pyeapi)

# EBU

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## telnetlib

```
1 import getpass
2 import sys
3 import telnetlib
4
5 ip_address = "192.168.122.71"
6 user = 'admin'
7 password = 'admin'
8
9 tn = telnetlib.Telnet(ip_address)
10
11 tn.read_until("Username: ")
12 tn.write(user + "\n")
13 tn.read_until("Password: ")
14 tn.write(password + "\n")
15
16 tn.write("enable\n")
17 tn.write("super_secure_enable_pass\n")
18 tn.write("show version\n")
19
20 print(tn.read_all())
21
```

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## paramiko

```

1 import paramiko
2 import time
3
4 ip_address = "192.168.122.72"
5 username = "admin"
6 password = "admin"
7
8 ssh_client = paramiko.SSHClient()
9 ssh_client.set_missing_host_key_policy(paramiko.AutoAddPolicy())
10 ssh_client.connect(hostname=ip_address, username=username, password=password)
11
12 remote_connection = ssh_client.invoke_shell()
13
14 remote_connection.send("enable\n")
15 remote_connection.send("super_secure_enable_pass\n")
16 remote_connection.send("show version\n")
17
18 time.sleep(1)
19 output = remote_connection.recv(65535)
20 print(output)
21
22 ssh_client.close
23

```

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## netmiko

```

1 from netmiko import ConnectHandler
2
3 S1 = {
4     'device_type': 'arista_eos',
5     'ip': '192.168.122.72',
6     'username': 'admin',
7     'password': 'admin',
8 }
9
10
11 net_connect = ConnectHandler(**S1)
12 output = net_connect.send_command('show version')
13 print(output)
14

```

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# pyeapi

```

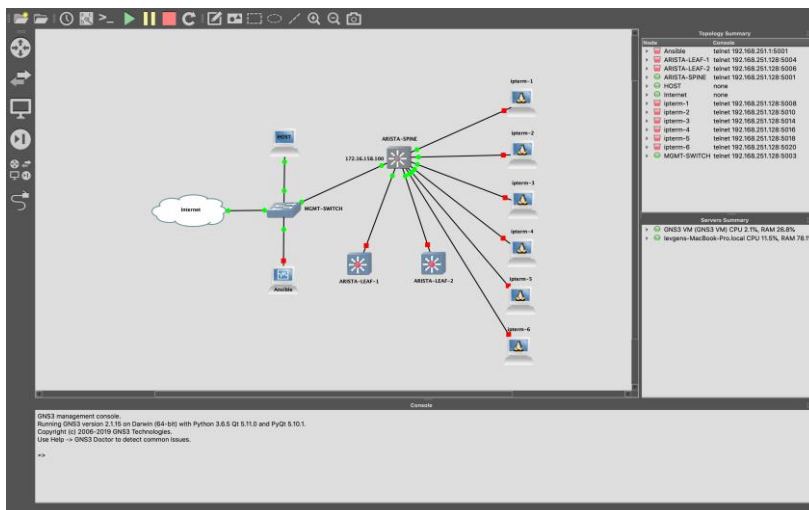
1  import pyeapi
2  connect = pyeapi.client.connect(
3      transport='https',
4      host='192.168.22.72',
5      username='admin',
6      password='admin')
7  connectedSwitch = pyeapi.client.Node(connect)
8
9  connectedSwitch.enable('show version')
10

```



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ARISTA Command API Explorer Overview Command Documentation

Simple Request Script Editor

**Simple eAPI request editor**

This page lets you craft a single eAPI request, and explore the returned JSON. Note that this form creates real eAPI requests, so any configuration you perform will apply to this switch. Don't know where to start? Read the API overview or try one of these examples: [Check version](#), [Create an ACL](#), [Show virtual router](#), or [View running-config](#)

API Endpoint:  Version:

Commands:

```
1 show version
2
```

Format:  Timestamps:  ID:

**Request Viewer**

```
1- [
2  "jsonrpc": "2.0",
3  "method": "runCmds",
4  "params": {
5    "format": "json",
6    "timestamps": false,
7    "cmds": [
8      "show version"
9    ],
10   "version": 1
11 },
12   "id": "EapiExplorer-1"
13 ]
```

**Response Viewer**

```
1- [
2  "jsonrpc": "2.0",
3  "result": [
4    {
5      "modelName": "eOS",
6      "internalVersion": "4.15.3F-2812776.4153F",
7      "systemMacAddress": "00:0c:29:08:7d:08",
8      "serialNumber": "",
9      "partNumber": "1897531",
10     "bootupTimestamp": "1461275519.58",
11     "heapFree": "348496",
12     "version": "4.15.3F",
13     "architecture": "i386",
14     "internalBuildId": "34549125-b84f-41f0-b8bb-ce9d089614de",
15     "hardwareRevision": ""
16   }
17 ],
18   "id": "EapiExplorer-1"
19 ]
```



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Switches

Vlan ID	Vlan Name
1	default
3	TEN
4	TWENTY
5	THIRTY
6	FOURTY
7	FIFTY
8	SIXTY
9	SEVENTY
10	Management
11	Zoo
12	POD_1
13	POD_2
14	POD_3
15	POD_4
16	POD_5

Switches

Port	Vlan	Description
1	1	Device 1
2	20	Device 2
3	200	Device 3
4	20	Device 4
5	100	Device 5
7	20	Device 6
8	10	Device 7
9	220	Device 8
10	20	Device 9
11	30	Device 10
12	20	Device 11
13	240	Device 12



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```
def setInterfaceDescriptions():
    # Reads interfaces description from the spreadsheet and writes to the switch
    logger.info('=====')
    logger.info(' - Updating interfaces descriptions...')
    for port in vlanPorts.get_all_records():
        portsDescription.set_description('Ethernet {}'.format(
            port['Port']), value=port['Description'])
    logger.info(' - Interfaces descriptions updated')

def createVlans():
    # Reads vlan list and names from the spreadsheet and writes to the switch
    logger.info('=====')
    logger.info(' - Updating vlan table...')
    vlans = connectedSwitch.api('vlans')
    vlans.autorefresh = True
    for vlan in vlanList.get_all_records():
        vlans.create(vlan['Vlan ID'])
        vlans.set_name(vlan['Vlan ID'], name=vlan['Vlan Name'])
    logger.info(' - Vlan table updated')

def setInterfaceVlans():
    # Reads interfaces vlans list from the spreadsheet and writes to the switch
    logger.info('=====')
    logger.info(' - Updating interface vlans...')
    currentVlans = portsVlans.getall()
    for port in vlanPorts.get_all_records():
        try:
            if str(port['Vlan']) != str(currentVlans['Ethernet {}'.format(port['Port'])]['access_vlan']):
                logger.warning(
                    ' - Modifying port {} - new access Vlan {}'.format(port['Port'], port['Vlan']))
                portsVlans.set_access_vlan('Ethernet {}'.format(
                    port['Port']), value=port['Vlan'])
            else:
                pass
        except KeyError:
            pass
    logger.info(' - Interface vlans updated')
```

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```
def getInterfacesState():
    # Reads interfaces statuses and mac address table from the switch and writes to the spreadsheet
    logger.info('=====')
    logger.info(' - Updating interface status table...')
    getInterfaces = connectedSwitch.enable('show interfaces status')
    interfacesStatus = getInterfaces[0]['result']['interfaceStatuses']
    macAdTable = connectedSwitch.enable('show mac address-table')
    unicastMacAdTable = macAdTable[0]['result']['unicastTable']['tableEntries']

    header = ['autoNegotiateActive', 'autoNegotiateActive', 'bandwidth',
        'description', 'duplex', 'interfaceType', 'lineProtocolStatus', 'linkStatus', 'macAddress', 'entryType']
    # Define the cell range
    cellRange = interfacesStatusTable.range('A2:L256')

    # Sort by interface name
    interfaceList = []
    for interface in interfacesStatus.keys():
        interfaceList.append(interface)
    interfaceList.sort()

    # Flatten the list of dicts into a list of values in order
    flattened_test_data = []
    # =====
    for i in interfaceList:
        for entry in unicastMacAdTable:
            for value in entry.values():
                if value == i:
                    interfacesStatus[i].update(
                        {'macAddress': entry['macAddress']})
                    interfacesStatus[i].update(
                        {'entryType': entry['entryType']})
    # =====

    for i in interfaceList:
        flattened_test_data.append(i)
        try:
            flattened_test_data.append(
                interfacesStatus[i]['vlanInformation']['vlanId'])
        except KeyError:
            flattened_test_data.append('N/A')
        for j in header:
            try:
                flattened_test_data.append(interfacesStatus[i][j])
            except KeyError:
                flattened_test_data.append('N/A')
    # Send flattened list to the cell range to be re-rendered as a table
    for i, cell in enumerate(cellRange):
        try:
            cell.value = flattened_test_data[i]
        except IndexError:
            pass

    interfacesStatusTable.update_cells(cellRange)
    logger.info(' - Interfaces status table updated')
```

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Switches

Файл Изменить Вид Вставка Формат Данные Инструменты Дополнения Справка Последнее изменение: python-api 9 дней назад

100% p. % .00 123 Arial 12 B I A

Interface	Vlan ID	autoNegotiateActive	autoNegotigateActive	bandwidth	description	duplex	interfaceType	lineProtocolStatus	linkStatus	MAC Address	Entry Type
Ethernet1	1	FALSE	FALSE	0	Device 1	duplexFull	EbraTestPhyPort	up	connected	N/A	N/A
Ethernet10	30	FALSE	FALSE	0	Device 10	duplexFull	EbraTestPhyPort	up	connected	N/A	N/A
Ethernet11	20	FALSE	FALSE	0	Device 11	duplexFull	EbraTestPhyPort	up	connected	N/A	N/A
Ethernet12	240	FALSE	FALSE	0	Device 12	duplexFull	EbraTestPhyPort	up	connected	76:d0:3c:48:d8:31	dynamic
Ethernet2	20	FALSE	FALSE	0	Device 2	duplexFull	EbraTestPhyPort	up	connected	N/A	N/A
Ethernet3	200	FALSE	FALSE	0	Device 3	duplexFull	EbraTestPhyPort	up	connected	96:b6:4c:f8:8c:1a	dynamic
Ethernet4	20	FALSE	FALSE	0	Device 4	duplexFull	EbraTestPhyPort	up	connected	1a:b2:af:cc:7a:c6	dynamic
Ethernet5	100	FALSE	FALSE	0	Device 5	duplexFull	EbraTestPhyPort	up	connected	N/A	N/A
Ethernet6	20	FALSE	FALSE	0	Device 6	duplexFull	EbraTestPhyPort	up	connected	9e:94:82:cc:ed:ac	dynamic
Ethernet7	10	FALSE	FALSE	0	Device 7	duplexFull	EbraTestPhyPort	up	connected	ba:ac:81:78:3e:1a	dynamic
Ethernet8	220	FALSE	FALSE	0	Device 8	duplexFull	EbraTestPhyPort	up	connected	N/A	N/A
Ethernet9	20	FALSE	FALSE	0	Device 9	duplexFull	EbraTestPhyPort	up	connected	7e:05:67:4c:9f:5b	dynamic
Management1	N/A	TRUE	TRUE	1000000000	MGMT	duplexFull	10/100/1000	up	connected	N/A	N/A



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```
# First - connect to the switch and check connection and eAPI
connect = pyeapi.client.connect(
    transport='https', host=config['ip'], username=config['username'], password=config['password'])
logger.info(
    ' - Trying to connect to {} using provided username and password'.format(config['ip']))
connectedSwitch = pyeapi.client.Node(connect)
hostname = connectedSwitch.enable('show hostname')
logger.info(' - Successfully connected to ' +
    hostname[0]['result']['hostname'])
version = connectedSwitch.enable('show version')
logger.info(pp.pprint(version[0]['result']))
# Second - read initial data from the switch
vlans = connectedSwitch.api('vlans')
portsVlans = connectedSwitch.api('switchports')
portsDescription = connectedSwitch.api('interfaces')

# Start executing selected tasks when continuous flag is not set

if args.vlans_list and not args.continuous:
    createVlans()

if args.interfaces_description and not args.continuous:
    setInterfaceDescriptions()

if args.interfaces_vlans and not args.continuous:
    setInterfaceVlans()

if args.interfaces_status and not args.continuous:
    getInterfacesState()

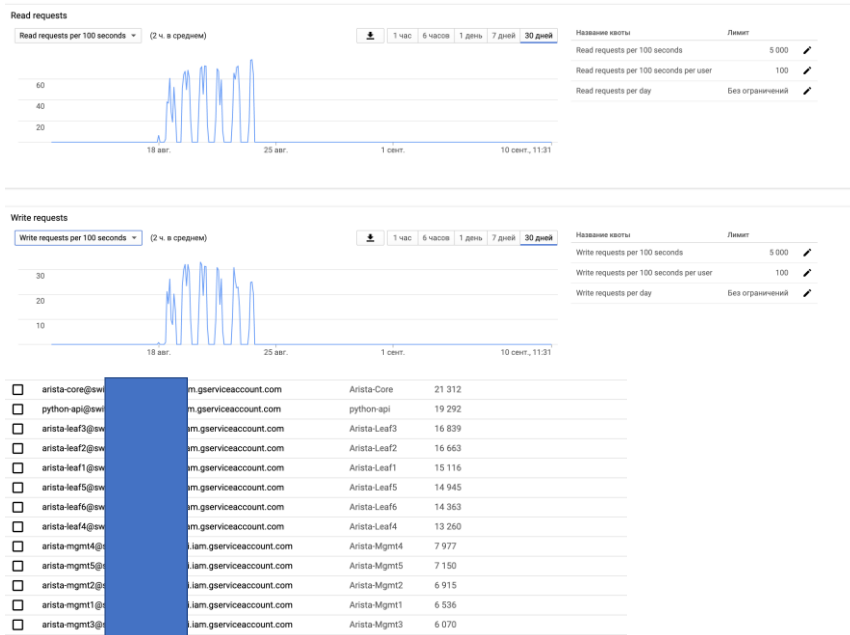
if not args.continuous:
    logger.info('=====')
    logger.info(' - All tasks finished. Exiting...')
```



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```
# Tasks repetition when continuous flag is set
# Each task can be interrupted by the Google API exhaustion error. 1 minute wait is introduced.

try:
    while args.continuous:
        logger.info('- ' + str(datetime.now().replace(microsecond=0)))
        logger.info(' - Successfully connected to ' +
                    hostname[0]['result']['hostname'])
        if args.vlans_list:
            try:
                createVlans()
            except gspread.exceptions.APIError:
                wait('api')
            gc = googleAuthorize()
        if args.interfaces_description:
            try:
                setInterfaceDescriptions()
            except gspread.exceptions.APIError:
                wait('api')
            gc = googleAuthorize()
        if args.interfaces_vlans:
            try:
                setInterfaceVlans()
            except gspread.exceptions.APIError:
                wait('api')
            gc = googleAuthorize()
        if args.interfaces_status:
            try:
                getInterfacesState()
            except gspread.exceptions.APIError:
                wait('api')
            gc = googleAuthorize()
        wait('wait')
except KeyboardInterrupt:
    logger.info('Stopped')
```



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```
usage: automation.py [-h] [-vL] [-iD] [-iS] [-iV] [-c] config api [time]

positional arguments:
  config      provide the config file
  api         provide the API json file
  time        amount of seconds to wait before repeating tasks,
              default is 10 seconds

optional arguments:
  -h, --help            show this help message and exit
  -vL, --vlans_list     read vlans from the spreadsheet and create in the
                        switch
  -iD, --interfaces_description
                        read interfaces descriptions from the spreadsheet and
                        update in the switch
  -iS, --interfaces_status
                        read interfaces status from the switch and update in
                        the spreadsheet
  -iV, --interfaces_vlans
                        read interfaces vlans from the spreadsheet and update
                        in the switch
  -c, --continious     repeat activated tasks after 10 seconds (default,
                        unless time is specified)
```

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## Useful links

- <https://github.com/ktbyers/netmiko>
- <https://github.com/paramiko/paramiko>
- <https://docs.python.org/3.7/library/telnetlib.html>
- <https://pyeapi.readthedocs.io/en/latest/index.html>
- <https://github.com/ievgen-kostiukevych/Google-Spreadsheet-Driven-Arista-eAPI-Automation-Demo>
- <https://www.gns3.com/>

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## Thank you

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