Deep Dive into Ansible Network Resource Module

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WHAT WE ARE COVERING TODAY

1. ADDRESSING PROBLEMS
2. GOALS
3. FACTS ENHANCEMENTS
4. RESOURCE MODULE
5. RESOURCE MODULE BUILDER
6. DEMONSTRATION
ADDRESSING PROBLEMS
Enterprises are *NOT* automating devices from a single vendor, but from many.
Facts gathering not native for network
Lack of normalized behavior / state
Lack of normalized configuration data
Roles are too heavyweight
GOALS
NORMALIZE ARGUMENTS
PAST VS. CURRENT

# past

```python
<Argspec>
    interface:
    min_links:
    max_links:
    rate:
    port_priority:
    graceful_convergence:
    vpc_convergence:
```

# current

```python
<Argspec>
    - name:
        rate:
        port_priority:
        links:
        min:
        max:
        convergence:
        graceful:
        vpc:
```

NORMALIZE RETURN PAYLOADS
ok: [nxos101] =>
  result:
    after:
      contact: IT Support
      location: Room E, Building 6, Seattle, WA 98134
      users:
        - algorithm: md5
          group: network-admin
          localized_key: true
          password: '0x73fd9a2cc8c53ed3dd4ed8f4ff157e69'
          username: admin

    before:
      contact: IT Support
      location: Room E, Building 5, Seattle HQ
      users:
        - algorithm: md5
          group: network-admin
          localized_key: true
          password: '0x73fd9a2cc8c53ed3dd4ed8f4ff157e69'
          username: admin

    changed: true
    commands:
      - snmp-server location Room E, Building 6, Seattle, WA 98134
    failed: false
SUPPORT OPERATING ON COLLECTIONS
Subresources into a **SINGLE** Resource Module
PAST VS. CURRENT

# past

nxos_bgp:
  asn:
  vrf:
  rate:
  cluster_id:
  isolate:

nxos_bgp_neighbor:
  asn:
  vrf:
  description:
  bfd:
  neighbor:

# current

<nxos_bgp>
  - bgp_as:
    cluster_id:
    isolate:
    neighbors:
      - neighbor:
        description:
        remote_as:
CONSISTENT set of operations
FACTS ENHANCEMENTS
gather_facts: True
Share Common Data Structure
FACTS GATHERING

- hosts: arista
  module_defaults:
    eos_facts:
      gather_subset: min
      gather_network_resources:
        - interfaces
  gather_facts: True
Configuration Facts

Network Native Configuration (On box) → Convert to structured data

Example facts parameter

```
gather_network_resources:
  interfaces:
  - enabled: true
    name: Ethernet1
    mtu: 1476
  - enabled: true
    name: Loopback0
```
Facts should be usable by modules *without* transformation
- name: example of facts being pushed right back to device
  hosts: arista
  gather_facts: yes
  module_defaults:
    eos_facts:
      gather_subset: min
      gather_network_resources: l3_interfaces

# "{{ ansible_facts['network_resources']['l3_interfaces'] }}"
RESOURCE MODULES
**interfaces:**
- **enabled**: true
  - **name**: Ethernet1
  - **mtu**: 1476
- **enabled**: true
  - **name**: Loopback0
- **enabled**: true
  - **name**: Loopback1
- **enabled**: true
  - **mtu**: 1476
  - **name**: Tunnel0
- **enabled**: true
  - **name**: Ethernet1
- **enabled**: true
  - **name**: Tunnel1

**Structure Data**

**Resource Module**

**Network Native Configuration (On box)**
Resource modules have corresponding facts

<table>
<thead>
<tr>
<th>resource module</th>
<th>gather_network_resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>*os_interfaces</td>
<td>interfaces</td>
</tr>
<tr>
<td>(e.g. ios_interfaces for Cisco IOS-XE)</td>
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<tr>
<td>*os_l2_interfaces</td>
<td>l2_interfaces</td>
</tr>
<tr>
<td>*os_l3_interfaces</td>
<td>l3_interfaces</td>
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<tr>
<td>*os_lacp</td>
<td>lACP</td>
</tr>
<tr>
<td>*os_vlans</td>
<td>vlans</td>
</tr>
</tbody>
</table>
Resource modules have corresponding facts

- **name**: grab arista eos info
  - **eos_facts**:
    - **gather_subset**: min
    - **gather_network_resources**: interfaces
CHANGES
SINGULAR → PLURAL
Module has a parent "config" and "state" key
PAST VS. CURRENT

# past
nxos OSPF Interface:
area:
cost:
dead interval:
hello interval:
interface:
message digest:
message digest algorithm type:
message digest encryption type:
message digest key id:
message digest password:
ospf:
passive interface:
state:

# current
nxos OSPF Interfaces:
config:
- name:
  ospf:
  - area:
    cost:
    intervals:
    hello:
    dead:
    message digest:
    enabled:
    algorithm:
    encryption:
    key:
    password:
    passive:
    process:
    state: replaced
RESOURCE MODULE: state

- **merged**: The configuration will be merged with the provided configuration
- **replaced**: The configuration of the provided resources will be replaced with the provided configuration
- **deleted**: The configuration of the provided resources will be deleted/defaulted
- **overridden**: The configuration of the provided resources will be replaced with the provided configuration, extraneous resource instances will be removed
RESOURCE MODULE: return

- **before:** Resource modules leverage the facts subsystem to collect the native network configuration and convert it to structured data. The configuration prior to module execution is always returned.

- **after:** If commands have been issued on the device, use the facts subsystem to collect the configuration post module execution.

- **commands:** Resource modules compare the user provided data to the `before` and generate a delta command set for the device.
ok: [nxos101] =>
result:
  after:
    contact: IT Support
    location: Room E, Building 6, Seattle, WA 98134
    users:
      - algorithm: md5
        group: network-admin
        localized_key: true
        password: '0x73fd9a2cc8c53ed3dd4ed8f4ff157e69'
        privacy_password: '0x73fd9a2cc8c53ed3dd4ed8f4ff157e69'
        username: admin
  before:
    contact: IT Support
    location: Room E, Building 5, Seattle HQ
    users:
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        group: network-admin
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        privacy_password: '0x73fd9a2cc8c53ed3dd4ed8f4ff157e69'
        username: admin
  changed: true
  commands:
    - snmp-server location Room E, Building 6, Seattle, WA 98134
  failed: false
- name: example of facts being pushed right back to device
  hosts: arista
  gather_facts: yes
  module_defaults:
    eos_facts:
      gather_subset: min
      gather_network_resources: l3_interfaces

tasks:
- name: ensure that the IP address information is accurate
  eos_l3_interfaces:
    config: "{{ ansible_network_resources['l3_interfaces'] }}"
    register: result

- name: ensure config did not change
  assert:
    that: not result.changed
RESOURCE MODULE: documentation

DOCUMENTATION
● The documentation for each resource module will include the following
  ○ An example of each state (merged, replaced, deleted, overridden)
  ○ Each example will include:
    ■ The effective text configuration prior to module invocation
    ■ The effective text configuration after module completion
    ■ The full return payload, (before, command, after)
  ○ Changes to both single and sets of resources
● Documentation should answer the question “If I want to _______, how do I use this module?”
NETWORK OPERATING SYSTEM SUPPORT

EOS
IOS
IOS-XR
NXOS
VYOS
JUNOS
## ANSIBLE 2.9

<table>
<thead>
<tr>
<th>Arista EOS</th>
<th>Cisco IOS XR</th>
<th>Juniper JunOS</th>
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<tbody>
<tr>
<td>● eos_interfaces</td>
<td>● iosxr_interfaces</td>
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RESOURCE MODULE BUILDER

GENERATOR_VERSION: '1.0'
ANSIBLE_METADATA:
NETWORK_OS:
RESOURCE:
DOCUMENTATION:
options:
  config:
    type: list
    elements: dict
    suboptions:
      name:
        type: str
        description:
      state:
        description:
        type: str
        choices:
        - merged

MODEL

Resource Module Builder

Resource Module
SCAFFOLDING
RMB Prerequisites

Prerequisites include:
- Ansible
- A resource module builder model
The resource module builder model is a yaml file containing the information necessary to:

- Build stub resource and facts module
- Template the argspec and docstring
- Appropriately name files, name directories, and format includes
HOW DO I DEVELOP RESOURCE MODULE

https://docs.ansible.com/ansible/devel/network/dev_guide/developing_resource_modules_network.html
DEMO
Questions?
THANK YOU