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Agenda

• Intro to VXLAN BGP EVPN
• Intro to Ansible
• Lab Topology
• Lab tasks
  1. Configure VXLAN BGP EVPN using CLI
  2. Configure VXLAN BGP EVPN using Ansible + NXOS modules
  3. Configure VXLAN BGP EVPN using Ansible + Jinja2 template
# Team Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faisal Chaudhry</td>
<td></td>
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<tr>
<td>Umair Arshad</td>
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<tr>
<td>Lei Tian</td>
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</tbody>
</table>
Survey/Spark

- Visual assets available for your use
- Wide range of photos
- Multiple types of icons
- bx.cisco.com
Intro to VXLAN BGP EVPN
Intro to VXLAN BGP EVPN

Open, Scalable Fabric

• Refresh for VXLAN
  • Layer 2 overlay technology on Layer 3 underlay
  • VXLAN segment is identified by 24-bit segment ID
  • No control plane Flood and Lean

• VXLAN BGP EVPN
  • Use MP-BGP with EVPN AF to distribute L2/L3 reachability information
  • Distributed Anycast Gateway
  • Symmetric IRB
  • VPC Anycast VTEP
  • ARP suppression
  • Multi-Tenancy
VXLAN BGP EVPN

Terminology

- **VTEP**: Hardware or software element at the edge for VXLAN encapsulation
- **VNI**: a logical network instance for layer 2 broadcast domain
- **VNID**: 24 bit segment ID
- **Anycast Gateway**: distributed default gateway function across all leaf nodes
- **VXLAN L2 Gateway**: gateway translate VLAN to VXLAN and VXLAN to VLAN in same BD
- **VXLAN L3 Gateway**: gateway translate VXLAN to VXLAN or VXLAN to VLAN in different BD
VXLAN BGP EVPN

Host reachability BGP update

1. Host 172.24.140.10 comes online

Leaf-1 IP ARP Table
Address   Age   MAC Address  Interface  Flags
172.21.140.10  00:03:48  0050.56a0.7630  Vlan140

Leaf-1 mac table
VLAN   MAC Address  Type  age  Secure NTFY Ports
-------------------  --------  -----  --------  ------------------
140      0050.56a0.7630  dynamic  00:04:00  F  F  Eth1/3
VXLAN BGP EVPN

Host reachability BGP update

1. Host 172.24.140.10 comes online

2. VTEP leaf-1 install MAC and MAC-IP into L2RIB

show l2route evpn mac evi 140
Topology Mac Address Prod Flags Seq No Next-Hops
140 0050.56a0.7630 Local L, 0 Eth1/3

show l2route evpn mac-ip evi 140
Topology Mac Address Prod Flags Seq No Next-Hops
140 0050.56a0.7630 HMM -- 0 172.21.140.10 Local
VXLAN BGP EVPN

Host reachability BGP update

1. Host 172.24.140.10 comes online

2. VTEP leaf-1 install MAC and MAC-IP into L2RIB

3. VTEP leaf-1 installs host mac-ip to L2VPN EVPN
VXLAN BGP EVPN
Host reachability BGP update

1. Host 172.24.140.10 comes online

2. VTEP leaf-1 install MAC and MAC-IP into L2RIB

3. VTEP leaf-1 installs host mac-ip to L2VPN EVPN

4. VTEP leaf-1 advertises L2/L3 VNI routes to its EVPN neighbors

```
sh bgp l2 evpn nei 192.168.0.6 advertised-routes
Network         Next Hop        Metric LocPrf Weight Path
Route Distinguisher: 192.168.0.8:32907 (L2VNI 50140)
*>l[2]:[0]:[0]:[48]:[0050.56a0.7630]:[32]:[172.21.140.10]/272
  192.168.0.18        100      32768 i
```

HWaddr 00:50:56:A0:76:30
inet addr:172.21.140.10
VXLAN BGP EVPN

Host reachability BGP update

1. Host 172.24.140.10 comes online

2. VTEP leaf-1 install MAC and MAC-IP into L2RIB

3. VTEP leaf-1 installs host mac-ip to L2VPN EVPN

4. VTEP leaf-1 advertises L2/L3 VNI routes to its EVPN neighbors

5. VTEP Spine nodes advertise L2/L3 VNI route to all other leaf nodes

sh bgp l2vpn evpn 172.21.140.10

BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 192.168.0.8:32907
BGP routing table entry for [2]:[0]:[0]:[48]:[0050.56a0.7630]:[32]:[172.21.140.10]/272, version 10
Paths: (1 available, best #1)
Flags: (0x000202) on xmit-list, is not in l2rib/evpn, is not in HW

Path-id 1 advertised to peers:
192.168.0.9    192.168.0.10    192.168.0.11

HWaddr 00:50:56:A0:76:30
inet addr:172.21.140.10
VXLAN BGP EVPN

Distributed Anycast Gateway

- All leaf nodes have same IP and MAC address for extended subnet
- No additional FHRP protocol
- Optimize East/West and North/South routing
**VXLAN BGP EVPN**

Symmetric IRB

- VLAN/L2VNI only required on leaf nodes where end host resides
- New L3VNI for each VRF to handle VXLAN L3 routing
- Routed traffic is forwarded symmetrically using L3VNI
Intro to Ansible
Intro to Ansible

Open Automation Platform

- Ansible is an easy to use, configuration management and IT automation tool
- Ansible is agentless; only requires SSH and Python on target nodes
- Ansible can also be extended to use Plug-ins and API
Intro to Ansible

Terminology

• **Host**: remote machines that Ansible manages

• **Group**: several hosts that can be configured together and share common variables

• **Inventory**: file describes hosts and groups in Ansible.

• **Variable**: names of value (int, str, dic, list) referenced in playbook or template

• **YAML**: data format for Playbook or Variables in Ansible

• **Playbook**: the script to orchestrate, automate, deploy system in Ansible. One playbook can include multiple plays.

• **Roles**: group of tasks, templates to implement specific behavior

• **Jinja2**: a Python based tempting language
Intro to Ansible

Inventory file
- Inventory file includes all switches in this lab
- All switches can be organized in Spine and Leaf groups
- Inventory file can also include some variables

```
[all:vars] defines global variables apply to all groups

[all:vars]
ansible_connection = local
user=admin
pwd=C1sco12345
gather_fact=no

[spine]
198.18.134.140 router_id=192.168.0.6 loopback1=192.168.0.100

[leaf]
198.18.134.142 router_id=192.168.0.8 loopback1=192.168.0.18
```

use ‘[
]’ define group
host specific variable can also be defined in inventory file
Intro to Ansible

Playbook

---

- hosts: leaf,jinja2_leaf
  vars:
    nxos_provider:
      username: "{{ user }}"
      password: "{{ pwd }}"
      transport: nxapi
      host: "{{ inventory_hostname }}"
  tasks:
    - name: configure VLAN for server port
      when: ("142" in inventory_hostname) or ("144" in inventory_hostname)
      nxos_switchport:
        interface: eth1/3
        mode: access
        access_vlan: 140
        provider: "{{ nxos_provider }}"

Playbook starts with ‘---’

Included hosts for this playbook

Space and indent are very important in playbook

Use "{{var}}" to reference variable in a play
Intro to Ansible

Roles
- role helps organizing playbook
- role makes playbook more modular
- each function or application can be a role, in our lab, spine and leaf can be two different roles
- roles are inside ‘roles’ folder
- role uses directory structure and expect certain directory names

```
[root@rhel7-tools LTRDCN-1572]# tree
.
  ├── ansible.cfg
  ├── hosts
  ├── roles
  │   └── leaf
  │       ├── handlers
  │       │   └── main.yml
  │       └── main.yml
  │           └── README.md
  │                   └── main.yml
  │                       └── vars
  │                               └── main.yml
  └── verify_underlay.yml
```
Lab Topology
Lab Topology Overview
Lab Exercises
Lab Exercises

- Exercise 1: Build Ansible node on Redhat server
- Exercise 2: Simple Ansible Playbook
- Exercise 3: Day 1 provisioning VXLAN Fabric using Ansible + Jinja2 template
- Exercise 4: Day 1 provisioning VXLAN Fabric using Ansible + NXOS modules
- Exercise 5: Day 2 operation using Ansible
- Appendix A: Day 0 automation using POAP
Lab Resource

- [https://cisco.box.com/v/LTRDCN1572](https://cisco.box.com/v/LTRDCN1572)
- ATOM [https://atom.io/](https://atom.io/)
Lab Tips
Be aware

- All pods have identical setup.
- You will have internet access from your pod, but you don’t have access other pod.
- It is highly recommended to use ATOM as text editor to write your Ansible script.
- If you prefer to use VI or other text editor, pay attention to space and indent.
- This lab has minimal CLI involved.
Related Sessions

- BRKDCT-2949  
  Building DataCenter networks with VXLAN BGP-EVPN Part I

- BRKDCT-3378  
  Building DataCenter networks with VXLAN BGP-EVPN Part II

- LTRDCT-2781  
  Building and operating VXLAN BGP EVPN Fabrics with Data Center Network Manager

- LTRDCT-3161  
  Deploying VXLAN/EVPN in DC with SDN Controller(DCNM)
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