flokinet-005 - Routing between VLANs

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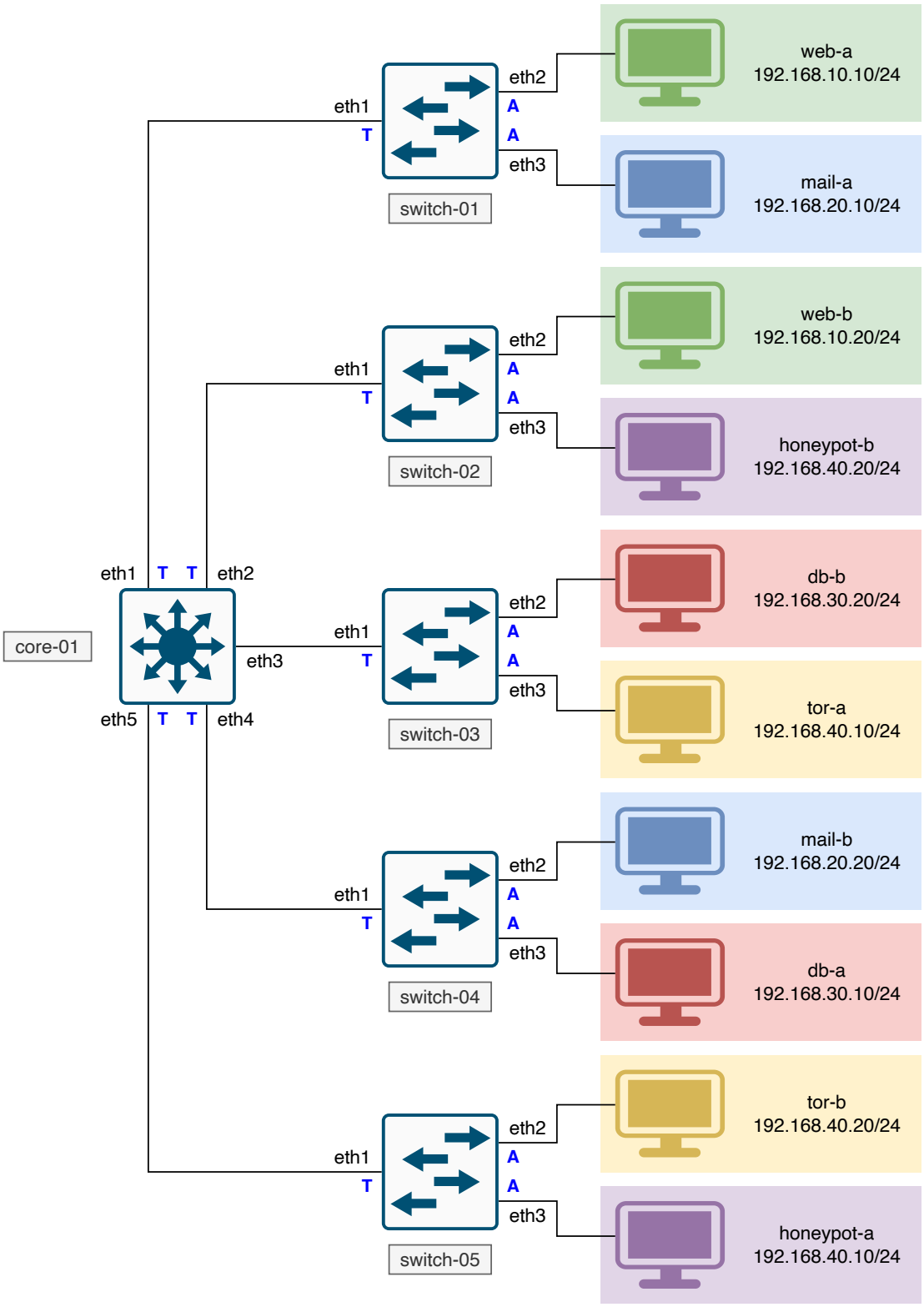
Connecting to the lab server

- Open your favourite Terminal Emulator
- SSH to the netlab server:
- ```
  $ ssh-keygen -R netlab.nanocat.net   <- delete the cached fingerprint
                                          (lab server rebuilt frequently)
  $ ssh lab@netlab.nanocat.net
  Password: (generated fresh each week)
  ```
- List the running containerlab devices:
- ```
  $ sudo containerlab inspect --all
  ```
- Connect to an **Arista** device:
- ```
  $ sudo docker exec -it clab-device-name Cli
  ```
- .. or connect to a **Linux** device:
- ```
  $ sudo docker exec -it clab-pcXX-name bash
  ```

Diagram


web-a
192.168.10.10/24
mail-a
192.168.20.10/24
web-b
192.168.10.20/24
honeypot-b
192.168.40.20/24
db-b
192.168.30.20/24
tor-a
192.168.40.10/24
mail-b
192.168.20.20/24
db-a
192.168.30.10/24
tor-b
192.168.40.20/24
honeypot-a
192.168.40.10/24
core-01
switch-01
switch-02
switch-03
switch-04
switch-05
eth1
eth2
eth3
eth4
eth5
T
A
web
192.168.10.0/24
vlan 10
mail
192.168.20.0/24
vlan 20
db
192.168.30.0/24
vlan 30
tor
192.168.40.0/24
vlan 40
honeypot
192.168.50.0/24
vlan 50

Goal

- all devices in all VLANs can ping each other.

Multi-Layer Switching (MLS)

- Old Think: Switches = Layer 2, Routers = Layer 3
- New Think: “switching” and “routing” are roles
- Switching = forwarding packets at Layer 2
  - Frames (sometimes called “Layer 2 Packets”)
  - forwarding based on destination MAC address (`show mac address-table`)
  - no IP addresses (`show ip interface brief`)
  - no participation in routing (`show ip route`)
- Routing = forwarding packets at Layer 3
  - Packets
  - forwarding based on destination IP address (`show ip route`)
    - or label when using MPLS
  - IPv4: ARP (Address Resolution Protocol) (`show ip arp`)
  - IPv6: NDP (Neighbor Discovery Protocol) (`show ipv6 neighbors`)
  - routing table (`show ip route`)

Configuration overview

- Create a Layer 3 VLAN interface to act as the gateway for your PCs
- Ensure your PCs have the correct default route set

What you are responsible for configuring

- the two PCs connected to your switch
- your switch (**switch-XX**)
- your uplink port on **core-01**
- the L3 VLAN interface as follows:
  - switch-01: vlan 10
  - switch-02: vlan 20
  - switch-03: vlan 30
  - switch-04: vlan 40
  - switch-05: vlan 50

Convert the core-01 into a Multi-Layer Switch

```
!
ip routing
!
```

Configure a Layer 3 VLAN interface

```
!
interface vlan 10
   description --- web ---
   ip address 192.168.10.1/24
!
```

Inspect core-01

```
show mac address-table
show ip arp
show ip route
ping 192.168.x.x
```

tcpdump

At a bash prompt:

```
# capture and decode all packets on ethX
$ tcpdump -i ethX

# capture and decode all ICMP packets on ethX
$ tcpdump -i ethX icmp

# capture and decode all packets to or from 192.168.100.100
$ tcpdump -i ethX host 192.168.100.100

# capture and decode FRAMES
$ tcpdump -i ethX -e ether

# capture and decode FRAMES with a filter
$ tcpdump -i ethX -e ether host 01:23:45:67:89:01
```