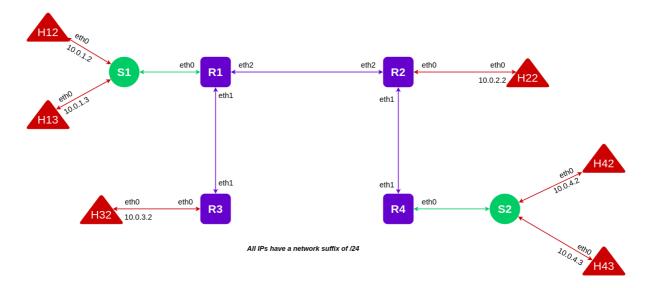


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Repository: github.com/Shathin/nc864-sdn

Target Network



The above diagram shows the target network,

Following are the different subnets and hosts in those networks -

- $10.0.1.0/24 \rightarrow R1 eth0$, H12, H13 and S1.
- $10.0.2.0/24 \rightarrow R2 eth0$ and H22
- $10.0.3.0/24 \rightarrow R3 eth0$ and H32
- $10.0.4.0/24 \rightarrow R4 eth0$, H42, H43 and S2.

Since there is no concept of routers in SDN and all data plane devices are simple forwarding devices, even the devices that were routers in the previous assignment i.e., R1, R2, R3 and R4 are now L2 switches and hence no IPs are assigned to their interfaces.

The Script

The assignment3_topo.py python script creates the above target network using the Python Mininet API.

The <u>DefaultController</u> (<u>OVS Test Controller</u>) was used in place of ODL (as required by the problem statement) as ODL was causing problems by showing various unexpected behaviours. The <u>DefaultController</u> does perform all the required actions like automatically installing flow rules when necessary.

The script can be run as follows -

```
sudo python3 assignment3_topo.py
```

Results

Default Flow Rules

A set of default flow rules is initially installed in each switch by the Controller. This default flow rules tells the switches to contact the controller if it receives a packet that doesn't have a matching flow rule. This flow helps the installation of new flow rules when necessary.

```
mininet> dpctl dump-flows
*** r1
cookie=0x0, duration=16.525s, table=0, n_packets=131, n_bytes=15358, priority=0 actions=CONTROLLER:128
*** r2
cookie=0x0, duration=16.527s, table=0, n_packets=131, n_bytes=15358, priority=0 actions=CONTROLLER:128
*** r3
cookie=0x0, duration=16.532s, table=0, n_packets=131, n_bytes=15358, priority=0 actions=CONTROLLER:128
*** r4
cookie=0x0, duration=16.538s, table=0, n_packets=132, n_bytes=15503, priority=0 actions=CONTROLLER:128
*** s1
cookie=0x0, duration=16.541s, table=0, n_packets=135, n_bytes=15786, priority=0 actions=CONTROLLER:128
*** s4
cookie=0x0, duration=16.541s, table=0, n_packets=135, n_bytes=15786, priority=0 actions=CONTROLLER:128
*** s4
cookie=0x0, duration=16.546s, table=0, n_packets=133, n_bytes=15593, priority=0 actions=CONTROLLER:128
```

Default flow rules of each switch in the network.

Testing connectivity between the hosts

The connectivity between the hosts can be tested by ping one host from another. The process can be simplified by executing the pingall command in the mininet CLI which executes the ping command on each host automatically.

```
mininet> pingall

*** Ping: testing ping reachability

h12 -> h13 h22 h32 h42 h43

h13 -> h12 h22 h32 h42 h43

h22 -> h12 h13 h32 h42 h43

h32 -> h12 h13 h22 h42 h43

h42 -> h12 h13 h22 h32 h43

h43 -> h12 h13 h22 h32 h42

*** Results: 0% dropped (30/30 received)
```

All hosts are able to ping each other.

Automatically Installed Flow Rules

When the pingall command is executed, each switch communicates with the controller to get instructions about where to send the ICMP packets. As stated before, this is possible due to the default flow rules installed in each switch that tell the switch whom to connect with in case there is no matching flow rule of an in-bound packet.

Since a lot of rules have been added after the pingall command, it is not possible to show them all clearly in a screenshot and hence they've been pasted as regular text below.

Scroll to the last bottom of this document for the discussion about the flow rules

▼ Flow rules in Switch R1

```
cookie=0x0, duration=26.144s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,a
1, arp_spa=10.0.2.2, arp_tpa=10.0.1.2, arp_op=2 actions=output:"r1-eth0"
cookie=0x0, duration=26.132s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.3.2, arp_tpa=10.0.1.2, arp_op=2 actions=output: "r1-eth0"
cookie=0x0, duration=26.123s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=2 actions=output:"r1-eth0"
cookie=0x0, duration=26.116s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=2 actions=output: "r1-eth0"
cookie=0x0, duration=26.106s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:
02,arp_spa=10.0.2.2,arp_tpa=10.0.1.3,arp_op=2 actions=output:"r1-eth0"
cookie=0x0, duration=26.100s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
02, arp_spa=10.0.3.2, arp_tpa=10.0.1.3, arp_op=2 actions=output:"r1-eth0"
cookie=0x0, duration=26.094s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:00:
02, arp_spa=10.0.4.2, arp_tpa=10.0.1.3, arp_op=2 actions=output:"r1-eth0"
cookie=0x0, duration=26.087s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
02,arp_spa=10.0.4.3,arp_tpa=10.0.1.3,arp_op=2 actions=output:"r1-eth0"
cookie=0x0, duration=26.072s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
03,arp_spa=10.0.3.2,arp_tpa=10.0.2.2,arp_op=2 actions=output:"r1-eth2"
cookie=0x0, duration=26.042s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r1-eth1"
cookie=0x0, duration=26.035s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:00:
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r1-eth1"
cookie=0x0, duration=21.067s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
01,arp_spa=10.0.3.2,arp_tpa=10.0.1.2,arp_op=1 actions=output:"r1-eth0"
cookie=0x0, duration=21.066s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02, arp_spa=10.0.3.2, arp_tpa=10.0.1.3, arp_op=1 actions=output:"r1-eth0"
cookie=0x0, duration=21.066s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
01,arp_spa=10.0.2.2,arp_tpa=10.0.1.2,arp_op=1 actions=output:"r1-eth0"
02, arp_spa=10.0.2.2, arp_tpa=10.0.1.3, arp_op=1 actions=output: "r1-eth0"
cookie=0x0, duration=21.053s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
```

```
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=1 actions=output:"r1-eth0"
 cookie=0x0, duration=21.052s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=1 actions=output:"r1-eth0"
  cookie=0x0, duration=21.052s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.4.2,arp_tpa=10.0.1.3,arp_op=1 actions=output:"r1-eth0"
 cookie=0x0, duration=21.052s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:
02,arp_spa=10.0.4.3,arp_tpa=10.0.1.3,arp_op=1 actions=output:"r1-eth0"
  cookie=0x0, duration=21.052s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:00:
04, arp_spa=10.0.1.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r1-eth1"
 cookie=0x0, duration=21.052s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.1.3, arp_tpa=10.0.3.2, arp_op=2 actions=output: "r1-eth1"
  cookie=0x0, duration=21.051s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00.0d,dl_dst=00:00:00:00:00:00:
03,arp_spa=10.0.1.3,arp_tpa=10.0.2.2,arp_op=2 actions=output:"r1-eth2"
 cookie=0x0, duration=21.051s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.1.2, arp_tpa=10.0.2.2, arp_op=2 actions=output: "r1-eth2"
 cookie=0x0, duration=21.040s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:00:
05, arp_spa=10.0.1.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "r1-eth2"
 cookie=0x0, duration=21.040s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:
06,arp_spa=10.0.1.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"r1-eth2"
 cookie=0x0, duration=21.040s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
05, arp_spa=10.0.1.3, arp_tpa=10.0.4.2, arp_op=2 actions=output:"r1-eth2"
  cookie=0x0, duration=21.040s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
06,arp_spa=10.0.1.3,arp_tpa=10.0.4.3,arp_op=2 actions=output:"r1-eth2"
  cookie=0x0, duration=20.813s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
03, arp_spa=10.0.3.2, arp_tpa=10.0.2.2, arp_op=1 actions=output:"r1-eth2"
  cookie=0x0, duration=20.805s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=1 actions=output:"r1-eth1"
 cookie=0x0, duration=20.804s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.2.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r1-eth1"
 cookie=0x0, duration=20.796s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04, arp\_spa=10.0.4.3, arp\_tpa=10.0.3.2, arp\_op=1 \ actions=output: "r1-eth1"
 cookie=0x0, duration=20.795s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
05, arp_spa=10.0.3.2, arp_tpa=10.0.4.2, arp_op=2 actions=output:"r1-eth2"
  cookie=0x0, duration=20.784s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
06, arp_spa=10.0.3.2, arp_tpa=10.0.4.3, arp_op=2 actions=output:"r1-eth2"
  cookie=0x0, duration=26.141s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:03, nw\_src=10.0.1.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output:"r1-ethors and icmp\_type=10.0.2.2, nw\_tos=10.0.2.2, nw\_tos=10.0.2, nw\_tos=10.0.2
2"
 cookie=0x0, duration=26.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:01, nw\_src=10.0.2.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
Θ"
 cookie=0x0, duration=26.130s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00
0:04, nw\_src=10.0.1.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_total_r1-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-et
```

```
1"
     cookie=0x0, duration=26.128s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00
0:01, nw\_src=10.0.3.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-eth_continuous continuous continu
Θ"
   cookie=0x0, duration=26.122s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:05, nw\_src=10.0.1.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output:"r1-ethors.pdf
   cookie=0x0, duration=26.120s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
0:01, nw\_src=10.0.4.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
0"
   cookie=0x0, duration=26.115s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in port="r1-eth0",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:01,dl dst=00:00:00:00:0
0:06, nw_src=10.0.1.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r1-eth
   cookie=0x0, duration=26.112s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:01, nw\_src=10.0.4.3, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
   cookie=0x0, duration=26.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00.dl_dst=00:00:00:00:00
0:03, nw_src=10.0.1.3, nw_dst=10.0.2.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r1-eth
    cookie=0x0, duration=26.104s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
Θ"
   cookie=0x0, duration=26.099s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d_dst=00:00:00:00:00
0:04, nw_src=10.0.1.3, nw_dst=10.0.3.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r1-eth
   cookie=0x0, duration=26.098s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:00
cookie=0x0, duration=26.093s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:05, nw\_src=10.0.1.3, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_total_r1-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-et
    cookie=0x0, duration=26.091s, table=0, n packets=0, n bytes=0, idle timeout=60, priority=1,
0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
    cookie=0x0, duration=26.086s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output:"r1-ethorselement of the context of the context
     cookie=0x0, duration=26.084s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:0
0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
Θ"
     0:01, nw\_src=10.0.2.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_restriction of the content of the cont
Θ"
    cookie=0x0, duration=26.079s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 2"
    cookie=0x0, duration=26.076s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
```

 $0:02, nw_src=10.0.2.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output: "r1-eth_type=10.0.2.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=10.0.2.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=10.0.2.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=10.0.2.2, nw_tos=0, icmp_type=10.0.2, nw_tos=0.$

```
0"
     cookie=0x0, duration=26.075s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:00.dl_dst=00:00:00:00:00
0:03, nw\_src=10.0.1.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-eth_continuous continuous continu
2"
   cookie=0x0, duration=26.071s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
1"
   cookie=0x0, duration=26.069s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:03, nw\_src=10.0.3.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
2"
   cookie=0x0, duration=26.055s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in port="r1-eth1",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:04,dl dst=00:00:00:00:0
0:01, nw_src=10.0.3.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r1-eth
   cookie=0x0, duration=26.054s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
0:04, nw\_src=10.0.1.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
   cookie=0x0, duration=26.051s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:0
0:02, nw_src=10.0.3.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r1-eth
   cookie=0x0, duration=26.050s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
1"
   cookie=0x0, duration=26.047s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:03, nw_src=10.0.3.2, nw_dst=10.0.2.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r1-eth
   cookie=0x0, duration=26.046s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
cookie=0x0, duration=26.041s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_total_r1-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-et
   cookie=0x0, duration=26.039s, table=0, n packets=0, n bytes=0, idle timeout=60, priority=1,
0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
    cookie=0x0, duration=26.035s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.3.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_continuous continuous continu
     cookie=0x0, duration=26.033s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:0
0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r1-ethors of the context of th
1"
     cookie=0x0, duration=26.029s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:01, nw\_src=10.0.4.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_restriction of the content of the cont
0"
    cookie=0x0, duration=26.028s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 2"
    cookie=0x0, duration=26.024s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r1-eth_content_r1-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_r2-eth_content_
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0" cookie=0x0, duration=26.024s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:00.dl_dst=00:00:00:00:00 $0:05, nw_src=10.0.1.3, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "r1-eth_continuous continuous continu$ 2" cookie=0x0, duration=26.015s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:04, nw_src=10.0.4.2, nw_dst=10.0.3.2, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output:"r1-ethors.pdf$ 1" cookie=0x0, duration=26.014s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:05, nw_src=10.0.3.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "r1-eth_type=0, icmp_type=0, icmp_type=0$ 2" cookie=0x0, duration=26.008s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in port="r1-eth2",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:06,dl dst=00:00:00:00:0 0:01, nw_src=10.0.4.3, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r1-eth cookie=0x0, duration=26.007s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0 $0:06, nw_src=10.0.1.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "r1-eth_type=0, icmp_type=0, icmp_type=0$ cookie=0x0, duration=26.003s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:0 0:02, $nw_src=10.0.4.3$, $nw_dst=10.0.1.3$, $nw_tos=0$, $icmp_type=8$, $icmp_code=0$ actions=output:"r1-eth cookie=0x0, duration=26.002s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0 2" cookie=0x0, duration=25.995s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, 0:04, nw_src=10.0.4.3, nw_dst=10.0.3.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r1-eth cookie=0x0, duration=25.994s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:00 cookie=0x0, duration=852.321s, table=0, n_packets=358, n_bytes=37830, priority=0 actions=C0 NTROLLER: 128

▼ Flow rules in Switch R2

cookie=0x0, duration=26.168s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,a 1,arp_spa=10.0.2.2,arp_tpa=10.0.1.2,arp_op=2 actions=output:"r2-eth2" cookie=0x0, duration=26.143s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00: 01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=2 actions=output: "r2-eth2" cookie=0x0, duration=26.136s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:00: 01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=2 actions=output:"r2-eth2" cookie=0x0, duration=26.126s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:00: 02, arp_spa=10.0.2.2, arp_tpa=10.0.1.3, arp_op=2 actions=output: "r2-eth2" cookie=0x0, duration=26.114s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00: 02, arp_spa=10.0.4.2, arp_tpa=10.0.1.3, arp_op=2 actions=output: "r2-eth2" cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00: 02, arp_spa=10.0.4.3, arp_tpa=10.0.1.3, arp_op=2 actions=output: "r2-eth2" cookie=0x0, duration=26.091s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,

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arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
03, arp_spa=10.0.3.2, arp_tpa=10.0.2.2, arp_op=2 actions=output:"r2-eth0"
cookie=0x0, duration=26.085s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.2, arp_tpa=10.0.2.2, arp_op=2 actions=output:"r2-eth0"
cookie=0x0, duration=26.079s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
03,arp_spa=10.0.4.3,arp_tpa=10.0.2.2,arp_op=2 actions=output:"r2-eth0"
cookie=0x0, duration=26.062s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=2 actions=output: "r2-eth2"
cookie=0x0, duration=26.055s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
04,arp_spa=10.0.4.3,arp_tpa=10.0.3.2,arp_op=2 actions=output:"r2-eth2"
cookie=0x0, duration=21.089s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.2.2, arp_tpa=10.0.1.2, arp_op=1 actions=output: "r2-eth2"
cookie=0x0, duration=21.089s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:00:
02,arp_spa=10.0.2.2,arp_tpa=10.0.1.3,arp_op=1 actions=output:"r2-eth2"
cookie=0x0, duration=21.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=1 actions=output: "r2-eth2"
cookie=0x0, duration=21.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=1 actions=output: "r2-eth2"
cookie=0x0, duration=21.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
02, arp_spa=10.0.4.3, arp_tpa=10.0.1.3, arp_op=1 actions=output:"r2-eth2"
cookie=0x0, duration=21.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
02, arp_spa=10.0.4.2, arp_tpa=10.0.1.3, arp_op=1 actions=output:"r2-eth2"
cookie=0x0, duration=21.064s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
03,arp_spa=10.0.1.3,arp_tpa=10.0.2.2,arp_op=2 actions=output:"r2-eth0"
cookie=0x0, duration=21.064s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:00:
03, arp_spa=10.0.1.2, arp_tpa=10.0.2.2, arp_op=2 actions=output:"r2-eth0"
cookie=0x0, duration=21.059s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:00:
05,arp_spa=10.0.1.2,arp_tpa=10.0.4.2,arp_op=2 actions=output:"r2-eth1"
cookie=0x0, duration=21.059s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:00:
06, arp_spa=10.0.1.2, arp_tpa=10.0.4.3, arp_op=2 actions=output:"r2-eth1"
cookie=0x0, duration=21.059s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:00:
05,arp_spa=10.0.1.3,arp_tpa=10.0.4.2,arp_op=2 actions=output:"r2-eth1"
cookie=0x0, duration=21.059s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
06, arp_spa=10.0.1.3, arp_tpa=10.0.4.3, arp_op=2 actions=output:"r2-eth1"
cookie=0x0, duration=20.829s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
03, arp_spa=10.0.3.2, arp_tpa=10.0.2.2, arp_op=1 actions=output:"r2-eth0"
cookie=0x0, duration=20.829s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.2, arp_tpa=10.0.2.2, arp_op=1 actions=output:"r2-eth0"
cookie=0x0, duration=20.828s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.3, arp_tpa=10.0.2.2, arp_op=1 actions=output:"r2-eth0"
04,arp_spa=10.0.4.2,arp_tpa=10.0.3.2,arp_op=1 actions=output:"r2-eth2"
cookie=0x0, duration=20.827s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
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04, arp_spa=10.0.2.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r2-eth2"
     cookie=0x0, duration=20.826s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:
05, arp_spa=10.0.2.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "r2-eth1"
     cookie=0x0, duration=20.826s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:00:
06,arp_spa=10.0.2.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"r2-eth1"
      cookie=0x0, duration=20.819s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=1 actions=output: "r2-eth2"
      cookie=0x0, duration=20.812s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:04,dl_dst=00:00:00:00:00:
05, arp_spa=10.0.3.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "r2-eth1"
    cookie=0x0, duration=20.802s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
06, arp_spa=10.0.3.2, arp_tpa=10.0.4.3, arp_op=2 actions=output: "r2-eth1"
     cookie=0x0, duration=26.160s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
0:03, nw\_src=10.0.1.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_r2-eth_total_
     cookie=0x0, duration=26.158s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:01, nw_src=10.0.2.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "r2-eth
      cookie=0x0, duration=26.142s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:01,dl_dst=00:00:00:00:0
0:05, nw\_src=10.0.1.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-ethous continuous cont
1"
    cookie=0x0, duration=26.140s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
0:01, nw\_src=10.0.4.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
2"
    cookie=0x0, duration=26.134s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00
0:06, nw_src=10.0.1.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r2-eth
    cookie=0x0, duration=26.132s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:0
0:01, nw\_src=10.0.4.3, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
2"
    cookie=0x0, duration=26.125s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00
0:03, nw\_src=10.0.1.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
Θ"
    cookie=0x0, duration=26.124s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:02, nw\_src=10.0.2.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r2-ethorselement of the context of the context
    cookie=0x0, duration=26.113s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:05, nw\_src=10.0.1.3, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_state of the context of
1"
    cookie=0x0, duration=26.112s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r2-ethough and icmp\_type=0, icmp\_code=0 \ actions=output:"r2-ethough and icmp\_type=0, icmp\_t
2"
    cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_state of the context of
1"
    cookie=0x0, duration=26.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_content_r2-eth_content_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2
2"
```

```
cookie=0x0, duration=26.102s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in port="r2-eth0",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:03,dl dst=00:00:00:00:0
 0:01, nw_src=10.0.2.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r2-eth
 2"
      cookie=0x0, duration=26.100s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:03, nw\_src=10.0.1.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
     cookie=0x0, duration=26.098s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.2.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
       cookie=0x0, duration=26.096s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d_dst=00:00:00:00:00
 0:03, nw_src=10.0.1.3, nw_dst=10.0.2.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output:"r2-eth
     cookie=0x0, duration=26.092s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:04, nw\_src=10.0.2.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-e
      cookie=0x0, duration=26.090s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:0
 0:03, nw_src=10.0.3.2, nw_dst=10.0.2.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "r2-eth
       cookie=0x0, duration=26.085s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:05, nw\_src=10.0.2.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-ethous continuous cont
1"
     cookie=0x0, duration=26.084s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
 0:03, nw\_src=10.0.4.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
Θ"
     cookie=0x0, duration=26.080s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:06, nw_src=10.0.2.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r2-eth
     cookie=0x0, duration=26.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:0
 0:03, nw\_src=10.0.4.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-ethous continuous cont
0"
     cookie=0x0, duration=26.068s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:00
 0:03, nw\_src=10.0.3.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
     cookie=0x0, duration=26.068s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:04, nw\_src=10.0.2.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r2-ethorselement of the context of the context
     cookie=0x0, duration=26.062s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_state of the context of
1"
     cookie=0x0, duration=26.060s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
 2"
     cookie=0x0, duration=26.055s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:06, nw\_src=10.0.3.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_state of the context of
     cookie=0x0, duration=26.053s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_content_r2-eth_content_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2
 2"
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```
cookie=0x0, duration=26.049s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
 0:01, nw_src=10.0.4.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r2-eth
 2"
      cookie=0x0, duration=26.048s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:05, nw\_src=10.0.1.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
     cookie=0x0, duration=26.045s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_code=0 \ actions=0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_src=10.0.4.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_src=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_src=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_src=10.0.4, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw\_tos=0, icmp\_code=0 \ actions=0:02, nw\_tos=0, icmp\_type=10:02, nw\_tos=0, icmp\_type=10:02, nw\_tos=0, icmp\_code=0 \ actions=0:02, nw\_tos=0, icmp\_code=0 \ actions=0:02, nw\_tos=0, icmp\_code=0 \ actions=0:02, nw\_tos=0:02, nw\_tos
       cookie=0x0, duration=26.043s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d_dst=00:00:00:00:00
 0:05, nw_src=10.0.1.3, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output:"r2-eth
     cookie=0x0, duration=26.039s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d.dst=00:00:00:00:00
 0:03, nw\_src=10.0.4.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-eth_r2-e
      cookie=0x0, duration=26.039s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:05, nw_src=10.0.2.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "r2-eth
       cookie=0x0, duration=26.035s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
 0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-ethous continuous cont
 2"
     cookie=0x0, duration=26.034s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
1"
     cookie=0x0, duration=26.028s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:06,dl_dst=00:00:00:00:00:00
 0:01, nw_src=10.0.4.3, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r2-eth
     cookie=0x0, duration=26.026s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r2-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:01,dl_dst=00:00:00:00:0
 0:06, nw\_src=10.0.1.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
1"
    cookie=0x0, duration=26.024s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_code=0 \ actions=0:02, nw_src=10.0.4.3, nw_dst=10.0.1.3, nw_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw_src=10.0.4.3, nw_dst=10.0.1.3, nw_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw_src=10.0.4.3, nw_dst=10.0.1.3, nw_tos=0, icmp\_type=8, icmp\_code=0 \ actions=0:02, nw_src=10.0.4.3, nw_dst=10.0.4.3, nw_dst=10.0.4.3,
2"
     cookie=0x0, duration=26.022s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r2-ethorse and icmp\_code=0 actions=output:"r2-ethorse actions=output:"r2-etho
     cookie=0x0, duration=26.019s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:0
 0:03, nw\_src=10.0.4.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_state of the content of
     cookie=0x0, duration=26.018s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:06, nw\_src=10.0.2.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_continuous continuous continu
1"
     cookie=0x0, duration=26.015s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r2-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00
 0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r2-eth_state of the context of
     cookie=0x0, duration=26.014s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:06, nw\_src=10.0.3.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r2-eth_code=0 \ actions=output: "r2-
 1"
```

▼ Flow rules in Switch R3

```
cookie=0x0, duration=26.192s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.3.2, arp_tpa=10.0.1.2, arp_op=2 actions=output: "r3-eth1"
 cookie=0x0, duration=26.161s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
02, arp_spa=10.0.3.2, arp_tpa=10.0.1.3, arp_op=2 actions=output:"r3-eth1"
 cookie=0x0, duration=26.132s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.3.2, arp_tpa=10.0.2.2, arp_op=2 actions=output:"r3-eth1"
 cookie=0x0, duration=26.101s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r3-eth0"
 cookie=0x0, duration=26.095s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r3-eth0"
 cookie=0x0, duration=21.129s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
01, arp_spa=10.0.3.2, arp_tpa=10.0.1.2, arp_op=1 actions=output:"r3-eth1"
 cookie=0x0, duration=21.129s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.3.2,arp_tpa=10.0.1.3,arp_op=1 actions=output:"r3-eth1"
 cookie=0x0, duration=21.104s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04,arp_spa=10.0.1.3,arp_tpa=10.0.3.2,arp_op=2 actions=output:"r3-eth0"
 cookie=0x0, duration=21.104s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04,arp_spa=10.0.1.2,arp_tpa=10.0.3.2,arp_op=2 actions=output:"r3-eth0"
 cookie=0x0, duration=20.875s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
03, arp_spa=10.0.3.2, arp_tpa=10.0.2.2, arp_op=1 actions=output:"r3-eth1"
 cookie=0x0, duration=20.862s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:00:
04,arp_spa=10.0.4.2,arp_tpa=10.0.3.2,arp_op=1 actions=output:"r3-eth0"
 cookie=0x0, duration=20.857s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
05,arp_spa=10.0.3.2,arp_tpa=10.0.4.2,arp_op=2 actions=output:"r3-eth1"
 cookie=0x0, duration=20.857s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.2.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r3-eth0"
 cookie=0x0, duration=20.852s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=1 actions=output: "r3-eth0"
 cookie=0x0, duration=20.848s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
06, arp_spa=10.0.3.2, arp_tpa=10.0.4.3, arp_op=2 actions=output: "r3-eth1"
 cookie=0x0, duration=26.190s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:01,dl_dst=00:00:00:00:0
0:04, nw\_src=10.0.1.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r3-ethors of the context of th
0"
 cookie=0x0, duration=26.189s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00
1"
 cookie=0x0, duration=26.159s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:00.dl_dst=00:00:00:00:00
0:04, nw_src=10.0.1.3, nw_dst=10.0.3.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r3-eth
```

```
0"
       cookie=0x0, duration=26.159s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.3.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r3-ethors of the context of th
 1"
     cookie=0x0, duration=26.131s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:04, nw\_src=10.0.2.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output:"r3-ethology of the contraction o
     cookie=0x0, duration=26.130s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:03, nw\_src=10.0.3.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r3-ethology of the context of 
1"
     cookie=0x0, duration=26.115s, table=0, n packets=0, n bytes=0, idle timeout=60, priority=1,
 icmp,in port="r3-eth0",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:04,dl dst=00:00:00:00:0
 0:01, nw_src=10.0.3.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r3-eth
     cookie=0x0, duration=26.114s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
 0:04, nw\_src=10.0.1.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r3-ethology of the context of 
     cookie=0x0, duration=26.112s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:0
 0:02, nw_src=10.0.3.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r3-eth
      cookie=0x0, duration=26.110s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
 0:04, nw\_src=10.0.1.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r3-ethorselement of the context of the context
 Θ"
     cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00
 0:03, nw_src=10.0.3.2, nw_dst=10.0.2.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r3-eth
     cookie=0x0, duration=26.106s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:04, nw\_src=10.0.2.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r3-ethorselement of the context of the context
       cookie=0x0, duration=26.101s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r3-eth_tos=0.000, icmp\_type=10.000, icmp\_type=10.0000, icmp\_type=10.0000, icmp\_type=10.0000, icmp\_type=10.0000, icmp\_type=10.0000, icmp\_type=10.0000, 
1"
      cookie=0x0, duration=26.099s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
 0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r3-ethology of the context of 
      cookie=0x0, duration=26.094s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:06, nw\_src=10.0.3.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r3-ethors of the context of th
       cookie=0x0, duration=26.091s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:0
 0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r3-ethology of the context of 
 Θ"
       cookie=0x0, duration=26.074s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
 0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r3-eth_state of the context of
 Θ"
      cookie=0x0, duration=26.073s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r3-ethology and icmp\_type=0, icmp\_code=0 \ actions=output:"r3-ethology and icmp\_type=0, icmp
 1"
      cookie=0x0, duration=26.054s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="r3-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:06,dl_dst=00:00:00:00:00:00
  0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r3-eth_tos=0.0.4.3, nw\_tos=0.10, nw\_tos
```

```
0"
    cookie=0x0, duration=26.053s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r3-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:04,dl_dst=00:00:00:00:0
0:06,nw_src=10.0.3.2,nw_dst=10.0.4.3,nw_tos=0,icmp_type=0,icmp_code=0 actions=output:"r3-eth
1"
    cookie=0x0, duration=852.378s, table=0, n_packets=316, n_bytes=34722, priority=0 actions=C0
NTROLLER:128
```

▼ Flow rules in Switch R4

```
cookie=0x0, duration=26.191s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.183s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.161s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.4.2,arp_tpa=10.0.1.3,arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.154s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.4.3,arp_tpa=10.0.1.3,arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.132s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
03,arp_spa=10.0.4.2,arp_tpa=10.0.2.2,arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.127s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.3, arp_tpa=10.0.2.2, arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.110s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:00:
04,arp_spa=10.0.4.2,arp_tpa=10.0.3.2,arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=26.102s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=2 actions=output:"r4-eth1"
cookie=0x0, duration=21.129s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01,arp_spa=10.0.4.2,arp_tpa=10.0.1.2,arp_op=1 actions=output:"r4-eth1"
cookie=0x0, duration=21.129s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=1 actions=output: "r4-eth1"
cookie=0x0, duration=21.129s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:00:
02, arp_spa=10.0.4.3, arp_tpa=10.0.1.3, arp_op=1 actions=output: "r4-eth1"
02,arp_spa=10.0.4.2,arp_tpa=10.0.1.3,arp_op=1 actions=output:"r4-eth1"
cookie=0x0, duration=21.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
05, arp_spa=10.0.1.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "r4-eth0"
cookie=0x0, duration=21.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:
06, arp_spa=10.0.1.2, arp_tpa=10.0.4.3, arp_op=2 actions=output:"r4-eth0"
cookie=0x0, duration=21.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:
05, arp_spa=10.0.1.3, arp_tpa=10.0.4.2, arp_op=2 actions=output:"r4-eth0"
cookie=0x0, duration=21.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:
06,arp_spa=10.0.1.3,arp_tpa=10.0.4.3,arp_op=2 actions=output:"r4-eth0"
cookie=0x0, duration=20.879s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
03,arp_spa=10.0.4.2,arp_tpa=10.0.2.2,arp_op=1 actions=output:"r4-eth1"
```

```
cookie=0x0, duration=20.879s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.3, arp_tpa=10.0.2.2, arp_op=1 actions=output: "r4-eth1"
     cookie=0x0, duration=20.879s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=1 actions=output: "r4-eth1"
     cookie=0x0, duration=20.871s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=1 actions=output: "r4-eth1"
     cookie=0x0, duration=20.871s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00:
 05, arp_spa=10.0.2.2, arp_tpa=10.0.4.2, arp_op=2 actions=output:"r4-eth0"
    cookie=0x0, duration=20.870s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:
06, arp_spa=10.0.2.2, arp_tpa=10.0.4.3, arp_op=2 actions=output: "r4-eth0"
   cookie=0x0, duration=20.856s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:
05,arp_spa=10.0.3.2,arp_tpa=10.0.4.2,arp_op=2 actions=output:"r4-eth0"
   cookie=0x0, duration=20.846s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
06,arp_spa=10.0.3.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"r4-eth0"
     cookie=0x0, duration=26.188s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
0:05, nw_src=10.0.1.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r4-eth
   cookie=0x0, duration=26.188s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
1"
   cookie=0x0, duration=26.181s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.1.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_type=10.0.4.3, icmp\_type=10.0.4.3, icmp\_typ
   cookie=0x0, duration=26.180s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:00
0:01, nw\_src=10.0.4.3, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"r4-eth_content_relations and relations are relations and relations are relations. The relations are relations are relations are relations are relations and relations are relations are relations. The relations are relations are relations are relations are relations and relations are relations are relations. The relations are relations are relations are relations are relations and relations are relations are relations. The relations are relations are relations are relations are relations are relations and relations are relations are relations. The relations are relations are relations are relations are relations are relations are relative and relations are relations are relations. The relations are relations are relative are relations are relative a
     cookie=0x0, duration=26.159s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:05, nw\_src=10.0.1.3, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_tos=0.000, icmp\_type=10.000, icmp\_type=10.0000, icmp\_type=10.00
   cookie=0x0, duration=26.159s, table=0, n packets=0, n bytes=0, idle timeout=60, priority=1,
0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-ethors are not considered as the constant of the constant o
   cookie=0x0, duration=26.153s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output:"r4-ethorse and icmp\_type=8, icmp\_type=8, icmp\_code=0 \ actions=output:"r4-ethorse and icmp\_type=8, ic
     cookie=0x0, duration=26.151s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:0
0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-eth_type=0, icmp\_type=0, icmp\_type=0
1"
     cookie=0x0, duration=26.131s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:05, nw\_src=10.0.2.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_restriction of the content of the cont
0"
   cookie=0x0, duration=26.130s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:03, nw\_src=10.0.4.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-ethors of the context of th
1"
   cookie=0x0, duration=26.126s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:06, nw\_src=10.0.2.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_type=10.0.2.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=10.0.2.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=10.0.4.3, nw\_tos=0, icmp\_type=10.0.4, nw\_tos=0, icmp\_type=10.0.4
```

```
0"
      cookie=0x0, duration=26.125s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:06,dl_dst=00:00:00:00:00
0:03, nw\_src=10.0.4.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-eth_continuous continuous continu
1"
    cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-ethors of the context of th
1"
    cookie=0x0, duration=26.100s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in port="r4-eth1",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:04,dl dst=00:00:00:00:0
0:06, nw_src=10.0.3.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r4-eth
    cookie=0x0, duration=26.099s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-eth_state of the context of
    cookie=0x0, duration=26.096s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:0
0:01, nw_src=10.0.4.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output:"r4-eth
     cookie=0x0, duration=26.093s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:01,dl_dst=00:00:00:00:0
0"
    cookie=0x0, duration=26.091s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d.dst=00:00:00:00:00
0:02, nw_src=10.0.4.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r4-eth
    cookie=0x0, duration=26.089s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00
cookie=0x0, duration=26.085s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:03, nw\_src=10.0.4.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-eth_r4-e
1"
     cookie=0x0, duration=26.085s, table=0, n packets=0, n bytes=0, idle timeout=60, priority=1,
icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:05, nw\_src=10.0.2.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-ethors and icmp\_type=0, icmp\_type=0,
     cookie=0x0, duration=26.082s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_continuous continuous continu
      cookie=0x0, duration=26.080s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:0
0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-ethors are not considered by the constant of the constant o
Θ"
      cookie=0x0, duration=26.075s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00
0:01, nw\_src=10.0.4.3, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_restriction of the content of the cont
1"
     cookie=0x0, duration=26.072s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:06, nw\_src=10.0.1.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "r4-eth_total_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range_range
Θ"
     cookie=0x0, duration=26.070s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="r4-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "r4-eth_type=10.0.4.3, nw\_tos=0, icmp\_type=10.0.4.3, nw\_tos=0, icmp\_type=10.0.4, nw\_tos=0, icmp
```

1" cookie=0x0, duration=26.068s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d_dst=00:00:00:00:00 $0:06, nw_src=10.0.1.3, nw_dst=10.0.4.3, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "r4-eth_continuous continuous continu$ Θ" cookie=0x0, duration=26.065s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:03, nw_src=10.0.4.3, nw_dst=10.0.2.2, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output: "r4-eth_rankspace" actions=0.0.4.3, nw_dst=10.0.2.2, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=0.0.4.3, nw_dst=10.0.4.3, nw_dst=10.$ cookie=0x0, duration=26.064s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="r4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00 $0:06, nw_src=10.0.2.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "r4-ethors and icmp_type=0, icmp_type=0,$ 0" cookie=0x0, duration=26.061s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in port="r4-eth0",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:06,dl dst=00:00:00:00:0 0:04, nw_src=10.0.4.3, nw_dst=10.0.3.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "r4-eth cookie=0x0, duration=26.060s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:06, nw_src=10.0.3.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "r4-ethors are not considered by the constant of the constant o$ cookie=0x0, duration=852.387s, table=0, n_packets=335, n_bytes=36100, priority=0 actions=C0 NTROLLER: 128

▼ Flow rules in Switch S1

cookie=0x0, duration=26.242s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,i $01, nw_src=10.0.1.3, nw_dst=10.0.1.2, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "s1-eth1"$ cookie=0x0, duration=26.218s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:03, nw_src=10.0.1.2, nw_dst=10.0.2.2, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output: "s1-eth_state of the context of$ 3" cookie=0x0, duration=26.213s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:01, nw_src=10.0.2.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "s1-eth_state of the context of$ 1" cookie=0x0, duration=26.207s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0 $0:04, nw_src=10.0.1.2, nw_dst=10.0.3.2, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output: "s1-eth_start of the context of$ cookie=0x0, duration=26.204s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:01, nw_src=10.0.3.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "s1-ethors of the context of th$ 1" cookie=0x0, duration=26.198s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0 $0:05, nw_src=10.0.1.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output: "s1-eth_start of the context of$ cookie=0x0, duration=26.196s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:01, nw_src=10.0.4.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=0, icmp_code=0 \ actions=output: "s1-eth_state of the context of$ cookie=0x0, duration=26.191s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, $0:06, nw_src=10.0.1.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 \ actions=output: "s1-eth_content_states of the content_states of the content$ cookie=0x0, duration=26.188s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:06,dl_dst=00:00:00:00:00 0:01, $nw_src=10.0.4.3$, $nw_dst=10.0.1.2$, $nw_tos=0$, $icmp_type=0$, $icmp_code=0$ actions=output:"s1-eth 1"

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cookie=0x0, duration=26.185s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
 0:01, nw_src=10.0.1.3, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s1-eth
 1"
      cookie=0x0, duration=26.185s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
 0:02, nw\_src=10.0.1.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_state of the context of
     cookie=0x0, duration=26.181s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00
 0:03, nw\_src=10.0.1.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_started by the started 
       cookie=0x0, duration=26.180s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:02, nw_src=10.0.2.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s1-eth
     cookie=0x0, duration=26.176s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d.dst=00:00:00:00:00
 0:04, nw\_src=10.0.1.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_state of the context of
      cookie=0x0, duration=26.174s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:0
 0:02, nw_src=10.0.3.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s1-eth
       cookie=0x0, duration=26.169s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
 0:05, nw\_src=10.0.1.3, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_start of the start 
3"
     cookie=0x0, duration=26.167s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
 0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_start of the start 
2"
     cookie=0x0, duration=26.162s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00.dl_dst=00:00:00:00:00
 0:06, nw_src=10.0.1.3, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s1-eth
 3"
     cookie=0x0, duration=26.159s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
  icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:0
 0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_start of the context of
2"
    cookie=0x0, duration=26.156s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
 0:01, nw\_src=10.0.2.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_start of the start 
1"
     cookie=0x0, duration=26.156s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:03, nw\_src=10.0.1.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output:"s1-ethorse and icmp\_code=0 actions=output:"s1-ethorse actions=output:"s1-etho
     cookie=0x0, duration=26.152s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:02, nw\_src=10.0.2.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_start of the context of
2"
      cookie=0x0, duration=26.152s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:03, nw\_src=10.0.1.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_state of the context of
 3"
     cookie=0x0, duration=26.131s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 0:01, nw\_src=10.0.3.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_state of the context of
     cookie=0x0, duration=26.131s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00
 0:04, nw\_src=10.0.1.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_code=0 \ actions=output: "s1-
 3"
```

```
cookie=0x0, duration=26.127s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:04,dl_dst=00:00:00:00:0
0:02, nw_src=10.0.3.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s1-eth
2"
   cookie=0x0, duration=26.126s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00.dl_dst=00:00:00:00:00
0:04, nw\_src=10.0.1.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_type=0, icmp\_code=0 \ actions=output: "s1-eth_type=0, icmp\_code=0, icmp
  cookie=0x0, duration=26.104s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
0:01, nw\_src=10.0.4.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_started by the started 
   cookie=0x0, duration=26.104s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00
0:05, nw_src=10.0.1.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output:"s1-eth
  cookie=0x0, duration=26.099s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:0
0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_content_states of the content_states of the content
   cookie=0x0, duration=26.099s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
0:05, nw_src=10.0.1.3, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s1-eth
   cookie=0x0, duration=26.083s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:0
0:01, nw\_src=10.0.4.3, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s1-eth_start of the start 
1"
  cookie=0x0, duration=26.082s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00
0:06, nw\_src=10.0.1.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_continuous continuous continu
3"
  cookie=0x0, duration=26.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:02, nw_src=10.0.4.3, nw_dst=10.0.1.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s1-eth
2"
  cookie=0x0, duration=26.078s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s1-eth_state of the context of
3"
  cookie=0x0, duration=26.219s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.2.2, arp_tpa=10.0.1.2, arp_op=2 actions=output: "s1-eth1"
  cookie=0x0, duration=26.207s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
01, arp_spa=10.0.3.2, arp_tpa=10.0.1.2, arp_op=2 actions=output:"s1-eth1"
   cookie=0x0, duration=26.199s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=2 actions=output: "s1-eth1"
   cookie=0x0, duration=26.191s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=2 actions=output: "s1-eth1"
   cookie=0x0, duration=26.181s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.2.2,arp_tpa=10.0.1.3,arp_op=2 actions=output:"s1-eth2"
  cookie=0x0, duration=26.176s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
02,arp_spa=10.0.3.2,arp_tpa=10.0.1.3,arp_op=2 actions=output:"s1-eth2"
   cookie=0x0, duration=26.169s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.4.2,arp_tpa=10.0.1.3,arp_op=2 actions=output:"s1-eth2"
   cookie=0x0, duration=26.163s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:00:
 02,arp_spa=10.0.4.3,arp_tpa=10.0.1.3,arp_op=2 actions=output:"s1-eth2"
```

cookie=0x0, duration=21.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00: 01, arp_spa=10.0.3.2, arp_tpa=10.0.1.2, arp_op=1 actions=output: "s1-eth1" cookie=0x0, duration=21.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00: 02, arp_spa=10.0.3.2, arp_tpa=10.0.1.3, arp_op=1 actions=output: "s1-eth2" cookie=0x0, duration=21.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00: 02, arp_spa=10.0.2.2, arp_tpa=10.0.1.3, arp_op=1 actions=output: "s1-eth2" cookie=0x0, duration=21.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d,dl_dst=00:00:00:00:00: 01, arp_spa=10.0.2.2, arp_tpa=10.0.1.2, arp_op=1 actions=output: "s1-eth1" cookie=0x0, duration=21.132s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00: 04, arp_spa=10.0.1.2, arp_tpa=10.0.3.2, arp_op=2 actions=output:"s1-eth3" cookie=0x0, duration=21.132s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00: 04, arp_spa=10.0.1.3, arp_tpa=10.0.3.2, arp_op=2 actions=output: "s1-eth3" cookie=0x0, duration=21.131s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, 03, arp_spa=10.0.1.3, arp_tpa=10.0.2.2, arp_op=2 actions=output: "s1-eth3" cookie=0x0, duration=21.131s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00: 03, arp_spa=10.0.1.2, arp_tpa=10.0.2.2, arp_op=2 actions=output: "s1-eth3" cookie=0x0, duration=21.121s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00: 01,arp_spa=10.0.4.2,arp_tpa=10.0.1.2,arp_op=1 actions=output:"s1-eth1" cookie=0x0, duration=21.121s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, 01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=1 actions=output: "s1-eth1" cookie=0x0, duration=21.121s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00: 02, arp_spa=10.0.4.2, arp_tpa=10.0.1.3, arp_op=1 actions=output: "s1-eth2" cookie=0x0, duration=21.120s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00: 02, arp_spa=10.0.4.3, arp_tpa=10.0.1.3, arp_op=1 actions=output: "s1-eth2" cookie=0x0, duration=21.118s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00: 05, arp_spa=10.0.1.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "s1-eth3" cookie=0x0, duration=21.117s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, arp,in_port="s1-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00: 06,arp_spa=10.0.1.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"s1-eth3" cookie=0x0, duration=21.117s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, 05,arp_spa=10.0.1.3,arp_tpa=10.0.4.2,arp_op=2 actions=output:"s1-eth3" cookie=0x0, duration=21.117s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1, 06, arp_spa=10.0.1.3, arp_tpa=10.0.4.3, arp_op=2 actions=output: "s1-eth3" cookie=0x0, duration=852.395s, table=0, n_packets=339, n_bytes=36500, priority=0 actions=C0 NTROLLER: 128

▼ Flow rules in Switch S4

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02,arp_spa=10.0.4.2,arp_tpa=10.0.1.3,arp_op=2 actions=output:"s4-eth3"
cookie=0x0, duration=26.185s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
02, arp_spa=10.0.4.3, arp_tpa=10.0.1.3, arp_op=2 actions=output: "s4-eth3"
cookie=0x0, duration=26.163s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
03,arp_spa=10.0.4.2,arp_tpa=10.0.2.2,arp_op=2 actions=output:"s4-eth3"
cookie=0x0, duration=26.157s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.3, arp_tpa=10.0.2.2, arp_op=2 actions=output: "s4-eth3"
cookie=0x0, duration=26.140s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=2 actions=output: "s4-eth3"
cookie=0x0, duration=26.133s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=2 actions=output: "s4-eth3"
cookie=0x0, duration=21.168s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.2, arp_tpa=10.0.1.2, arp_op=1 actions=output: "s4-eth3"
cookie=0x0, duration=21.167s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
01, arp_spa=10.0.4.3, arp_tpa=10.0.1.2, arp_op=1 actions=output: "s4-eth3"
cookie=0x0, duration=21.167s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
02, arp_spa=10.0.4.2, arp_tpa=10.0.1.3, arp_op=1 actions=output: "s4-eth3"
cookie=0x0, duration=21.167s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
02,arp_spa=10.0.4.3,arp_tpa=10.0.1.3,arp_op=1 actions=output:"s4-eth3"
cookie=0x0, duration=21.134s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:
05, arp_spa=10.0.1.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "s4-eth1"
cookie=0x0, duration=21.134s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:
06,arp_spa=10.0.1.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"s4-eth2"
cookie=0x0, duration=21.134s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:
05, arp_spa=10.0.1.3, arp_tpa=10.0.4.2, arp_op=2 actions=output: "s4-eth1"
cookie=0x0, duration=21.134s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:00:
06, arp_spa=10.0.1.3, arp_tpa=10.0.4.3, arp_op=2 actions=output:"s4-eth2"
cookie=0x0, duration=20.913s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
03, arp_spa=10.0.4.2, arp_tpa=10.0.2.2, arp_op=1 actions=output: "s4-eth3"
cookie=0x0, duration=20.912s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00:
03,arp_spa=10.0.4.3,arp_tpa=10.0.2.2,arp_op=1 actions=output:"s4-eth3"
cookie=0x0, duration=20.912s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00:
04, arp_spa=10.0.4.2, arp_tpa=10.0.3.2, arp_op=1 actions=output: "s4-eth3"
cookie=0x0, duration=20.907s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
04, arp_spa=10.0.4.3, arp_tpa=10.0.3.2, arp_op=1 actions=output: "s4-eth3"
cookie=0x0, duration=20.895s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
05,arp_spa=10.0.2.2,arp_tpa=10.0.4.2,arp_op=2 actions=output:"s4-eth1"
cookie=0x0, duration=20.895s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:03,dl_dst=00:00:00:00:00:00:
06,arp_spa=10.0.2.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"s4-eth2"
cookie=0x0, duration=20.881s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
05, arp_spa=10.0.3.2, arp_tpa=10.0.4.2, arp_op=2 actions=output: "s4-eth1"
cookie=0x0, duration=20.873s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
arp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:00:
06,arp_spa=10.0.3.2,arp_tpa=10.0.4.3,arp_op=2 actions=output:"s4-eth2"
```

```
cookie=0x0, duration=26.218s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in port="s4-eth3",vlan tci=0x0000/0x1fff,dl src=00:00:00:00:00:01,dl dst=00:00:00:00:0
0:05, nw_src=10.0.1.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s4-eth
1"
    cookie=0x0, duration=26.218s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
0:01, nw\_src=10.0.4.2, nw\_dst=10.0.1.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
    cookie=0x0, duration=26.210s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
0:06, nw\_src=10.0.1.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the started 
      cookie=0x0, duration=26.210s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:06,dl_dst=00:00:00:00:00
0:01, nw_src=10.0.4.3, nw_dst=10.0.1.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s4-eth
    cookie=0x0, duration=26.189s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d_dst=00:00:00:00:00
0:05, nw\_src=10.0.1.3, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
     cookie=0x0, duration=26.189s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
0:02, nw_src=10.0.4.2, nw_dst=10.0.1.3, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s4-eth
      cookie=0x0, duration=26.182s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:0
0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the started 
2"
    cookie=0x0, duration=26.182s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
3"
    cookie=0x0, duration=26.160s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:05, nw_src=10.0.2.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s4-eth
    cookie=0x0, duration=26.160s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
0:03, nw\_src=10.0.4.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
3"
    cookie=0x0, duration=26.155s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:06, nw_src=10.0.2.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s4-eth
2"
    cookie=0x0, duration=26.155s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:03, nw\_src=10.0.4.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth local contents of the c
    cookie=0x0, duration=26.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth loop of the context of 
1"
     cookie=0x0, duration=26.137s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
3"
    cookie=0x0, duration=26.130s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.3.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
    cookie=0x0, duration=26.129s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:04, nw\_src=10.0.4.3, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_state of the context of
3"
```

```
cookie=0x0, duration=26.126s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
0:01, nw_src=10.0.4.2, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s4-eth
3"
    cookie=0x0, duration=26.123s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
0:05, nw\_src=10.0.1.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth limits of the context o
    cookie=0x0, duration=26.121s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
0:02, nw\_src=10.0.4.2, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the started 
      cookie=0x0, duration=26.118s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:00:0d_dst=00:00:00:00:00
0:05, nw_src=10.0.1.3, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s4-eth
    cookie=0x0, duration=26.116s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
0:03, nw\_src=10.0.4.2, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the started 
     cookie=0x0, duration=26.114s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:05, nw_src=10.0.2.2, nw_dst=10.0.4.2, nw_tos=0, icmp_type=0, icmp_code=0 actions=output: "s4-eth
      cookie=0x0, duration=26.112s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:05,dl_dst=00:00:00:00:0
0:04, nw\_src=10.0.4.2, nw\_dst=10.0.3.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the started 
3"
    cookie=0x0, duration=26.109s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:05, nw\_src=10.0.3.2, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
1"
    cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth1",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:05,dl_dst=00:00:00:00:00
0:06, nw_src=10.0.4.2, nw_dst=10.0.4.3, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s4-eth
    cookie=0x0, duration=26.107s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
 icmp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:06,dl_dst=00:00:00:00:00
0:05, nw\_src=10.0.4.3, nw\_dst=10.0.4.2, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the started 
1"
   cookie=0x0, duration=26.105s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth2",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:06,dl_dst=00:00:00:00:00
0:01, nw_src=10.0.4.3, nw_dst=10.0.1.2, nw_tos=0, icmp_type=8, icmp_code=0 actions=output: "s4-eth
3"
    cookie=0x0, duration=26.102s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.1.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth local content of the co
    cookie=0x0, duration=26.100s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:02, nw\_src=10.0.4.3, nw\_dst=10.0.1.3, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth loop of the context of 
    cookie=0x0, duration=26.097s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:06, nw\_src=10.0.1.3, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
2"
    cookie=0x0, duration=26.095s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
0:03, nw\_src=10.0.4.3, nw\_dst=10.0.2.2, nw\_tos=0, icmp\_type=8, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
    cookie=0x0, duration=26.094s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="s4-eth3",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00
0:06, nw\_src=10.0.2.2, nw\_dst=10.0.4.3, nw\_tos=0, icmp\_type=0, icmp\_code=0 \ actions=output: "s4-eth_started by the context of the context 
2"
```

Discussion about the flow rules

After the pingall a total of 3 types of rules are observed on each switch -

▼ The default flow rule (as discussed before)

Again, this flow rule tells the switch whom to contact when a packet arrives for which there is no corresponding flow rule.

The default flow rule from the switch $R1 \rightarrow$

```
cookie=0x0, duration=852.321s, table=0, n_packets=358, n_bytes=37830, priority=0 actions=C0 NTROLLER:128
```

▼ Flow rule that matches ARP packets

Each flow rule matching ARP packets have the following key factors -

- Protocol → arp
- Opcode of ARP → arp_op: This determines what type of ARP packet is to be matched by the flow rule.
 - \circ $arp_op=1 \Rightarrow ARP$ Request Packet
 - arp_op=2 ⇒ ARP Response Packet
- Source IP Address of ARP → arp_spa: Address of the initiator of the ARP Request.
- Target IP Address of ARP → arp_tpa: Refers to intended target of the ARP Request

Flow rule matching an ARP Request on the Switch $R1 \rightarrow$

Flow rule matching an ARP Response on the Switch $R1 \rightarrow$

▼ Flow rule that matches ICMP packets

Each flow rule matching ICMP (ping) packets have the following key factors -

- Protocol → icmp
- ICMP Type → icmp_type: Determines the type of ICMP message. In our flow rules, we see only two types of ICMP messages
 - icmp_type=0
 ⇒ Echo: ping request
 - icmp_type=8 ⇒ Echo reply: Response to the ping
- ICMP Code → icmp_code: The ICMP Code for both of the observed ICMP Types is all
 of the flow rules is icmp_code=0 which doesn't have meaning and stands for no code.

Flow rule matching the Echo ICMP packet from the host 10.0.1.2 to the host 10.0.2.2 going throught switch $R1\,$ $^{\rightarrow}$

cookie=0x0, duration=26.079s, table=0, n_packets=0, n_bytes=0, idle_timeout=60, priority=1,
icmp,in_port="r1-eth0",vlan_tci=0x0000/0x1fff,dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:0
0:03,nw_src=10.0.1.2,nw_dst=10.0.2.2,nw_tos=0,icmp_type=0,icmp_code=0 actions=output:"r1-eth
2"

Flow rule matching the Echo Reply ICMP packet from the host 10.0.1.2 to the host 10.0.2.2 going throught switch $R1\,$ $^{-}$

References

OpenFlow Protocol - Ryubook 1.0 documentation

This section describes match, instructions and actions defined in the OpenFlow protocol. There are a variety of conditions that can be specified to match, and it grows each time OpenFlow is updated. OpenFlow 1.0 had 12 types but in OpenFlow 1.3 as many as 40 types of conditions are defined.

https://osrg.github.io/ryu-book/en/html/openflow_protocol.html

Internet Control Message Protocol (ICMP) Parameters

Last Updated 2020-09-25 Available Formats XML HTML Plain text Registries included below Registration Procedure(s) IESG Approval or Standards Action Reference [RFC2780] Note The Internet Control Message Protocol (ICMP) has many messages that are identified by a "type" field.

🚳 https://www.iana.org/assignments/icmp-parameters/icmp-parameters.xhtml#icmp-parameters-types

http://www.openvswitch.org/support/dist-docs/ovs-dpctl.8.txt