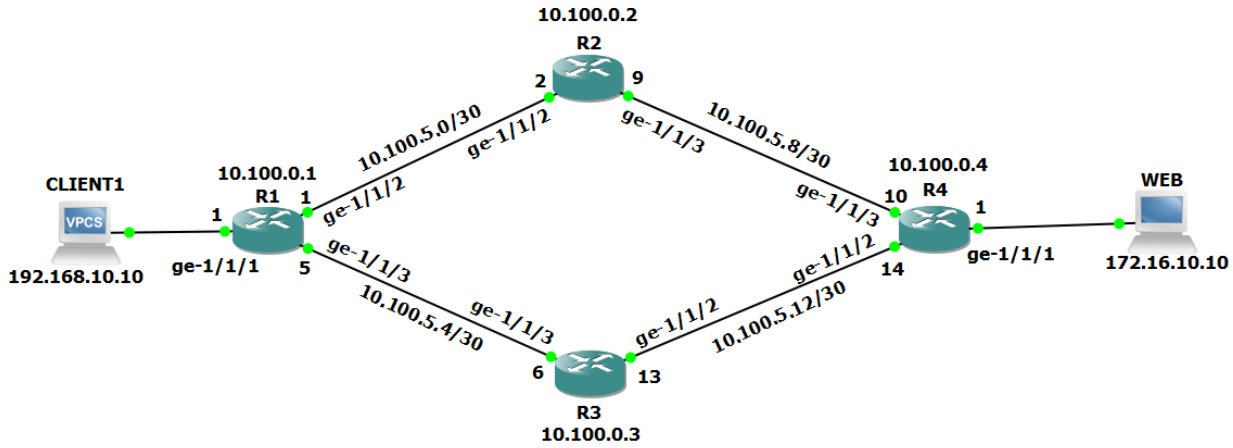
MPLS L3VPN Troubleshooting Steps

There is MPLS configured on all Juniper MX series routers. LDP signaling protocol and OSPF configured as IGP.
Client1 (**192.168.10.10**) cannot open website on Web Server (**172.16.10.10**).
Our purpose show troubleshooting steps to resolve this problem.
Network topology below:



Firstly we will use **ping** and **traceroute** commands.

```
C:\Users\CLENT1>ping 172.16.10.10

Pinging 172.16.10.10 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.16.10.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Users\CLENT1>tracert 172.16.10.10

Tracing route to 10.45.1.3 over a maximum of 30 hops
  1     1 ms     1 ms     2 ms  172.16.10.10
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
……..
30     *        *        *     Request timed out.

Trace complete.
```

Note: **ping** and **traceroute** commands output shows us problem exist on MPLS Cloud.

Because of the complexity of the MPLS network, we can obtain much better results from our investigations if we progress through the layers and verify the functioning of each layer on the routers.

We start from physical layer and check that routers are connected, interfaces are up and configured correctly. To check the physical layer, we use ***show interfaces***, ***show interfaces terse***, ***show configuration interfaces ge-x/x/x*** commands.

```
root@R1> show interfaces ge-1/1/2 terse
Interface               Admin Link Proto    Local                 Remote
ge-1/1/2                up    up
ge-1/1/2.0              up    up   inet     10.100.5.1/30
                                  mpls
                                  multiservice
```

```
root@R1> show interfaces ge-1/1/2
Physical interface: ge-1/1/2, Enabled, Physical link is Up
  Interface index: 158, SNMP ifIndex: 517
  Description: to_R2
  Link-level type: Ethernet, MTU: 9192, MRU: 9200, Speed: 1000mbps, BPDU
Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation:
Enabled, Remote fault: Online
  Pad to minimum frame size: Disabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x0
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Current address: 77:b5:9c:33:32:39, Hardware address: 77:b5:9c:33:32:39
  Last flapped   : 2016-07-19 18:21:25 AZST
  Input rate     : 600 bps (1 pps)
  Output rate    : 360 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Interface transmit statistics: Disabled

  Logical interface ge-1/1/2.0 (Index 333) (SNMP ifIndex 565)
    Flags: Up SNMP-Traps 0x0 Encapsulation: ENET2
    Input packets : 19699295
    Output packets: 14863721
    Protocol inet, MTU: 9178
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.100.5.0/30, Local: 10.100.5.1, Broadcast: 10.100.5.3
    Protocol mpls, MTU: 9166, Maximum labels: 3
    Protocol multiservice, MTU: Unlimited
```

Next step we investigate the IP Layer, verify that interfaces have correct IP addressing, IGP protocol configuration and neighbor adjacencies. We use ***show configuration interfaces ge-x/x/x***, ***show configuration protocols ospf*** *and* ***show ospf neighbor*** *commands.*

```
root@R1> show configuration interfaces ge-1/1/2
description to_R2;
mtu 9192;
unit 0 {
    family inet {
        address 10.100.5.1/30;
    }
    family mpls;
}
```

```
root@R1> show configuration protocols ospf
area 0.0.0.0 {
    interface ge-1/1/2.0 {
        interface-type p2p;
    }
    interface ge-1/1/3.0 {
        interface-type p2p;
    }
}
```

```
root@R1> show ospf neighbor
Address          Interface              State     ID               Pri  Dead
10.100.5.2       ge-1/1/2.0             Full      10.100.0.2       128    32
10.100.5.6      ge-1/1/3.0             Full      10.100.0.3       128    32
```

After we have investigated the IP layer functioning and the problem is still not solved, we can begin to check the Label Distribution Protocol (**LDP**) and MPLS layers to determine if the problem is in one of these.
When we investigate the LDP and MPLS layer, we are checking that dynamic LDP signaling is occurring as expected, neighbors are connected, interfaces are configured correctly for LDP and MPLS. To check the LDP layer, using the ***show ldp session***, ***show ldp neighbor***, ***show ldp interface***, ***show configuration protocols ldp***, ***show configuration protocols mpls*** *and* ***show route x.x.x.x*** *commands.*

```
root@R1> show ldp session
  Address            State        Connection     Hold time  Adv. Mode
10.100.0.2           Operational  Open             23         DU
10.100.0.3           Operational  Open             28         DU
10.100.0.4           Operational  Open             25         DU
```

```
root@R1> show ldp neighbor
Address            Interface          Label space ID         Hold time
10.100.0.2         lo0.0              10.100.0.3:0             41
10.100.0.3         lo0.0              10.100.0.3:0             37
10.100.0.4         lo0.0              10.100.0.4:0             35
10.100.5.2         ge-1/1/2.0         10.100.0.2:0             13
```

```
10.100.5.6         ge-1/1/3.0          10.100.0.3:0              10

root@R1> show ldp interface
Interface             Label space ID         Nbr count   Next hello
lo0.0                 10.100.0.1:0               3           0
ge-1/1/2.0            10.100.0.1:0               1           2
ge-1/1/3.0            10.100.0.1:0               1           3

root@R1> show configuration protocols ldp
track-igp-metric;
interface ge-1/1/2.0;
interface ge-1/1/3.0;
interface lo0.0;

root@R1> show configuration protocols mpls
interface ge-1/1/2.0;
interface ge-1/1/3.0;

root@R1> show route 172.16.10.10
```

This output shows us **R1** cannot receive **172.16.10.0** subnet via **vrf**.

Last step we must verify Border Gateway Protocol (BGP). Using ***show bgp summary***, ***show configuration protocols bgp*** *and* ***show configuration routing-instances XXX*** commands.

```
root@R1> show configuration routing-instances TEST-VRF
description TEST-L3VPN;
instance-type vrf;
interface ge-1/1/1.0;
route-distinguisher 65100:33;
vrf-target target:65100:33;
vrf-table-label;


root@R1> show bgp summary
Groups: 1 Peers: 1 Down peers: 0
Table          Tot Paths  Act Paths Suppressed    History Damp State
Pending
bgp.l3vpn.0
                   72          36       0           0        0     0
Peer                     AS      InPkt     OutPkt    OutQ   Flaps Last Up/Dwn
State|#Active/Received/Accepted/Damped...
10.100.0.2           65100     745984     752838       0       1    33w4d21h
Establ
  bgp.l3vpn.0: 1/36/36/0


root@R1> show configuration protocols bgp
group MPBGP {
    type internal;
```

```
    local-address 10.100.0.1;
    family inet-vpn {
        unicast;
    }
    neighbor 10.100.0.2;
}
```

As we see neighbor to **R4** is not configured. We need to add **set protocols bgp group MPBGP neighbor 10.100.0.4** command to solve this problem.