S-38.3192

# **Exercise Session:**

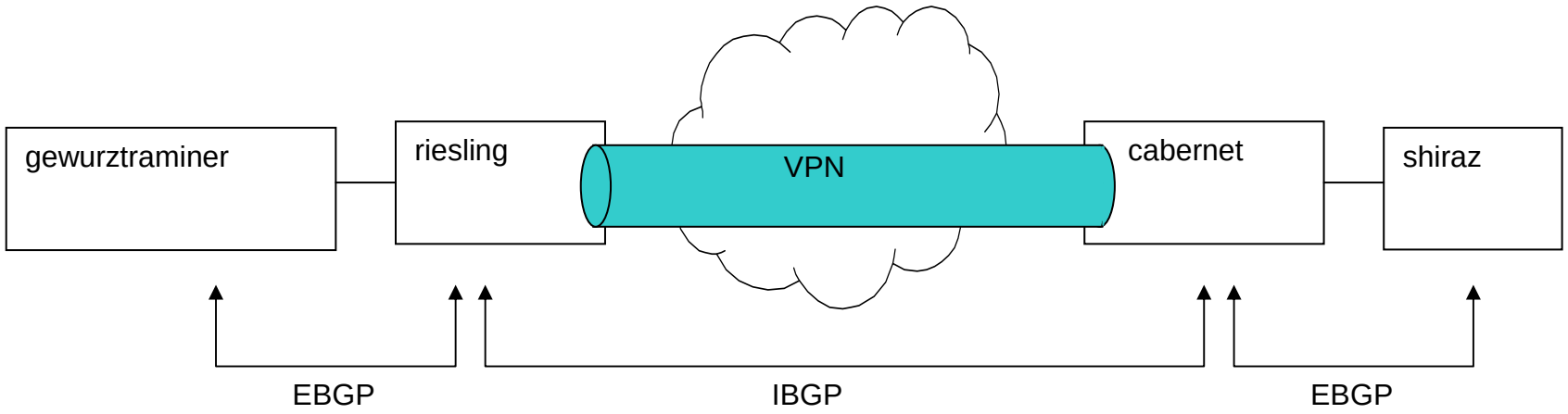
MPLS/BGP L3 VPN

15.2.2008

# Motivation

```
system {
    host-name cabernet;
    backup-router 10.11.0.254;
    time-zone Europe/Helsinki;
    root-authentication {
        encrypted-password "$1$S1IzjTvT$iNFojsaEdT1GyokBKsiDY1";
## SECRET-DATA
    }
    services {
        ftp;
        ssh {
            root-login deny;
        }
        telnet;
    }
    ntp {
        inactive: server 10.255.0.50 version 4;
        inactive: server 10.255.0.51 version 4;
        server 10.255.16.41 version 2;
    }
}
logical-routers {
    merlot {
        interfaces {
            lt-1/2/0 {
                unit 1 {
                    encapsulation ethernet;
                    peer-unit 0;
                    family inet {
                        mtu 1700;
                        address 10.111.0.25/30;
                    }
                    family iso;
                    family mpls;
                }
                unit 2 {
                    encapsulation ethernet;
                    peer-unit 3;
                    family inet {
                        mtu 1700;
                        address 10.111.0.13/30;
                    }
                    family iso;
                    family mpls;
                }
            }
            ge-1/3/0 {
                unit 2 {
                    vlan-id 2;
                    family inet {
                        mtu 1700;
                        address 10.111.0.10/30;
                    }
                    family iso;
                    family mpls;
                }
            }
            lo0 {
                unit 4 {
                    family inet {
                        address 10.100.100.4/32 {
                            primary;
                        }
                    }
                    family iso {
                        address 49.0001.0102.4124.8004.00;
                    }
                }
            }
        }
        protocols {
            rsvp {
                interface lt-1/2/0.1 {
                    aggregate;
                    link-protection;
                }
                interface lt-1/2/0.2 {
                    aggregate;
                    link-protection;
                }
                interface ge-1/3/0.2 {
                    aggregate;
                    link-protection;
                }
            }
            mpls {
                label-switched-path mer-to-cab {
                    from 10.100.100.4;
                    to 10.100.100.6;
                    ldp-tunneling;
                    link-protection;
                }
                label-switched-path mer-to-sau {
                    from 10.100.100.4;
                    to 10.100.100.2;
                    ldp-tunneling;
                    link-protection;
                }
                label-switched-path mer-to-pin {
                    from 10.100.100.4;
                    to 10.100.100.3;
                    ldp-tunneling;
                    link-protection;
                }
                interface lt-1/2/0.2;
                interface ge-1/3/0.2;
                interface lt-1/2/0.1;
            }
            isis {
                reference-bandwidth 100g;
                spf-delay 150;
                no-ipv6-routing;
                level 1 disable;
                level 2 wide-metrics-only;
                interface lt-1/2/0.1 {
                    point-to-point;
                }
                interface lt-1/2/0.2 {
                    point-to-point;
                }
                interface ge-1/3/0.2 {
                    point-to-point;
                }
                interface lo0.4;
            }
            ldp {
                interface lo0.4;
                session 10.100.100.1 {
                    authentication-key "$9$tURx0BE7NbaZjrevL7N2g"; ##
SECRET-DATA
                }
                session 10.100.100.2 {
                    authentication-key "$9$MH7Lxdji.FnCYgoGji5T"; ##
SECRET-DATA
                }
                session 10.100.100.3 {
                    authentication-key "$9$uBR5Bic-dsZUHevWx-d4o"; ##
SECRET-DATA
                }
                session 10.100.100.5 {
                    authentication-key "$9$NSVwgPfzApBZUjqPf6/"; ##
SECRET-DATA
                }
                session 10.100.100.6 {
                    authentication-key "$9$A/Z/uORx7VoJDylK8x7Y2"; ##
SECRET-DATA
                }
            }
        }
        routing-options {
            router-id 10.100.100.4;
        }
    }
    pinot_noir {
        interfaces {
            lt-1/2/0 {
                unit 3 {
                    encapsulation ethernet;
                    peer-unit 2;
                    family inet {
                        mtu 1700;
                        address 10.111.0.14/30;
                    }
                    family iso;
                    family mpls;
                }
            }
            ge-1/3/0 {
                unit 1 {
                    vlan-id 1;
                    family inet {
                        mtu 1700;
                        address 10.111.0.6/30;
                    }
                    family iso;
                    family mpls;
                }
            }
            lo0 {
                unit 3 {
                    family inet {
                        address 10.100.100.3/32 {
                            primary;
                        }
                    }
                    family iso {
                        address 49.0001.0102.4124.8003.00;
                    }
                }
            }
        }
        protocols {
            rsvp {
                interface ge-1/3/0.1 {
                    aggregate;
                    link-protection;
                }
                interface lt-1/2/0.3 {
                    aggregate;
                    link-protection;
                }
            }
            mpls {
                label-switched-path pin-to-mer {
                    from 10.100.100.3;
                    to 10.100.100.4;
                    ldp-tunneling;
                    link-protection;
                }
                label-switched-path pin-to-cha {
                    from 10.100.100.3;
                    to 10.100.100.1;
                    ldp-tunneling;
                    link-protection;
                }
                interface ge-1/3/0.1;
                interface lt-1/2/0.3;
            }
            isis {
                reference-bandwidth 100g;
                spf-delay 150;
                no-ipv6-routing;
                level 1 disable;
                level 2 wide-metrics-only;
                interface lt-1/2/0.3 {
                    point-to-point;
                }
                interface ge-1/3/0.1 {
                    point-to-point;
                }
                interface lo0.3;
            }
            ldp {
                interface lo0.3;
                session 10.100.100.1 {
                    authentication-key "$9$9/Xstu1LX-goGcylMLXws"; ##
SECRET-DATA
                }
                session 10.100.100.2 {
                    authentication-key "$9$Q7Pq36AleWdb2O1RSlex7"; ##
SECRET-DATA
                }
                session 10.100.100.4 {
                    authentication-key "$9$AN1iuORx7VoJDylK8x7Y2"; ##
SECRET-DATA
                }
                session 10.100.100.5 {
                    authentication-key "$9$OGtTIEyVb2UjqvWLNVbaJ"; ##
SECRET-DATA
                }
                session 10.100.100.6 {
                    authentication-key "$9$2SoJDn6AIEyqmfzn60O"; ##
SECRET-DATA
                }
            }
        }
        routing-options {
            router-id 10.100.100.3;
        }
    }
    shiraz {
        interfaces {
            fe-0/0/1 {
                unit 0 {
                    family inet {
                        address 10.111.0.38/30;
                    }
                }
            }
            lo0 {
                unit 8 {
                    family inet {
                        address 10.100.100.8/32 {
                            primary;
                        }
                    }
                }
            }
        }
        protocols {
            bgp {
                export export;
                group vpn-red {
                    type external;
                    peer-as 65000;
                    neighbor 10.111.0.37 {
                        family inet {
                            unicast;
                        }
                    }
                }
            }
        }
        policy-options {
            policy-statement export {
                term 1 {
                    from protocol direct;
                    then accept;
                }
                term 2 {
                    then reject;
                }
            }
        }
        routing-options {
            router-id 10.100.100.8;
            autonomous-system 65002;
        }
    }
}
interfaces {
    fe-0/0/0 {
        unit 0 {
            family inet {
                address 10.111.0.37/30;
            }
```

# Network Configuration



# To-do list

- Create VRFs
  - Assign the VRFs to PE-CE interfaces
- Change MPLS TE parameters
- Set up BGP sessions
  - Set up neighborhoods
  - Configure Address family parameters
- Test the network
  - Use a ping flow from CE to CE (LB0<->LB0)

# Today’s topic: MPLS/BGP L3 VPN

- Do the exercise. You find it at course’s website.
- Send the exercise as an email attachment to ttheikk2@netlab.tkk.fi. File type must be PDF.
- Remember the feedback questions
- Next exercise session will be on Fri 22.2. at 12 -14 o’clock in Maari-A, BGP/VPN Help Session

# For the Next Exercise Session

- Topic will be Network failures
- Familiarize yourself with the topic
- Next (new topic) exercise session will be on Fri 29.2.2008 at 12 -14 o’clock in Maari-A