**Nick Tipton - ITS Undergrad**

ITS 4750: Internet Engineering – Final Project Friday December 2nd

**Executive Brief**

## ADDITIONAL POINTS (60): VLANS (15), VPNS (25), OSPF IPv4 INTERNALLY ROUTED (20)

1. Full IP documentation (not just an IP Grid)

| IPV4 Private Network Address | IPV6 Network Address | IPV4 Public Network Address | IPV4 WAN Network Address | IPV6 WAN Network Address |
|---|---|---|---|---|
| 172.18.128.0/17 | 2610:a8:483f:5100::/64 | 100.70.81.0/24 | 132.235.160.192/26 | 2610:a8:4831:312::51/64 |

| Location | Network Address IPv4 | Useable IPv4 Range | Network Address IPv6 | | | |
|---|---|---|---|---|---|---|
| Internet | 132.235.160.192/26 | 132.235.160.193 - 132.235.160.254 | 2610:a8:4831:312::51/64 | ethernet | IPv4 Address | IPv6 Address |
| *Cloud* | | | | br192-PublicNet | 132.235.160.254 | 2610:a8:4831:312::1 |
| *PFE* | | | | e0 | 132.235.160.223 | 2610:a8:4831:312::51 |

| | 100.70.81.0/24 | 100.70.81.1 - 100.70.81.254 | 2610:a8:483f:5110::/64 |
|---|---|---|---|
| DMZ | *eth1 - PFE* | 100.70.81.254 | 2610:a8:483f:5110::1 |
| | *WebServer* | 100.70.81.1 | 2610:a8:483f:5110::3 |
| | *DNS* | 100.70.81.2 | 2610:a8:483f:5110::4 |
| | *Bastion* | 100.70.81.5 | 2610:a8:483f:5110::5 |
| | *eth0 - PFI* | 100.70.81.253 | 2610:a8:483f:5110::2 |

| Location | Network Address IPv4 | Useable IPv4 Range | Network Address IPv6 | | | |
|---|---|---|---|---|---|---|
| **US1** | **172.18.240.0/20** | **172.18.240.1 - 172.18.255.254** | **2610:a8:483f:5105::/64** | **ethernet : VPN** | **IPv4 Address** | **IPv6 Address** |
| *US1 to US2* | 172.18.160.0/20:192.168.0.224/27 | 172.18.160.1 - 172.18.175.254 | 2610:a8:483f:5100::/64 | eth1 : 192.168.0.254 | 172.18.175.254 | 2610:a8:483f:5100::1 |
| *US1 to China* | 172.18.128.0/21:192.168.0.160/27 | 172.18.128.1 - 172.18.135.254 | 2610:a8:483f:5104::/64 | eth2 : 192.168.0.190 | 172.18.135.254 | 2610:a8:483f:5104::1 |
| **US1 Subdivisions** | **Network Address IPv4** | **Useable IPv4 Range** | **Network Address IPv6** | **ethernet** | **IPv4 Gateway** | **IPv6 Gateway** |
| *VLAN 100 - Sales* | 172.18.241.0/24 | 172.18.241.1 - 172.18.241.254 | 2610:a8:483f:5105::/64 | eth3 | 172.18.241.254 | 2610:a8:483f:5105::1 |
| *VLAN 200 - Technical* | 172.18.244.0/23 | 172.18.244.1 - 172.18.245.254 | | eth3 | 172.18.245.254 | |
| *VLAN 300 - Support* | 172.18.242.0/23 | 172.18.242.1 - 172.18.243.254 | | eth3 | 172.18.243.254 | |
| *VLAN 400 - Local Management* | 172.18.246.0/23 | 172.18.246.1 - 172.18.247.254 | | eth3 | 172.18.247.254 | |
| *VLAN 500 - Wireless* | 172.18.248.0/21 | 172.18.248.1 - 172.18.255.254 | | eth3 | 172.18.255.254 | |
| *US1* | 172.18.240.0/25 | 172.18.240.1 - 172.18.240.126 | 2610:a8:483f:5112::/64 | eth0 | 172.18.240.125 | 2610:a8:483f:5112::2 |
| *PFI* | | | | eth1 | 172.18.240.126 | 2610:a8:483f:5112::1 |
| *PFI* | 172.18.240.128/25 | 172.18.240.129 - 172.18.240.254 | 2610:a8:483f:5111::/64 | eth2 | 172.18.240.254 | 2610:a8:483f:5111::1 |
| *IT ADMIN* | | | | eth0 | 172.18.240.129 | 2610:a8:483f:5111::2 |

| Location | Network Address IPv4 | Useable IPv4 Range | Network Address IPv6 | | | |
|---|---|---|---|---|---|---|
| **US2** | **172.18.224.0/20** | **172.18.224.1 - 172.18.239.254** | **2610:a8:483f:5106::/64** | **ethernet : VPN** | **IPv4 Address** | **IPv6 Address** |
| *US2 to US1* | 172.18.160.0/20:192.168.0.224/27 | 172.18.160.1 - 172.18.175.254 | 2610:a8:483f:5100::/64 | eth0 : 192.168.0.225 | 172.18.160.1 | 2610:a8:483f:5100::2 |
| *US2 to European* | 172.18.152.0/21:192.168.0.192/27 | 172.18.152.1 - 172.18.159.254 | 2610:a8:483f:5101::/64 | eth1 : 192.168.0.222 | 172.18.159.254 | 2610:a8:483f:5101::1 |
| **US2 Subdivisions** | **Network Address IPv4** | **Useable IPv4 Range** | **Network Address IPv6** | **ethernet** | **IPv4 Gateway** | **IPv6 Gateway** |
| *VLAN 100 - Sales* | 172.18.224.0/23 | 172.18.224.1 - 172.18.225.254 | ***2610:a8:483f:5106::/64*** | eth3 | 172.18.225.254 | ***2610:a8:483f:5106::1*** |
| *VLAN 200 - Technical* | 172.18.226.0/23 | 172.18.226.1 - 172.18.227.254 | | eth3 | 172.18.227.254 | |
| *VLAN 300 - Support* | 172.18.228.0/23 | 172.18.228.1 - 172.18.229.254 | | eth3 | 172.18.229.254 | |
| *VLAN 400 - Global Management* | 172.18.230.0/23 | 172.18.230.1 - 172.18.231.254 | | eth3 | 172.18.231.254 | |
| ***R&D Wifi Mesh*** | ***172.18.232.0/21*** | ***172.18.232.1 - 172.18.239.254*** | | ***eth6*** | ***172.18.239.254*** | |

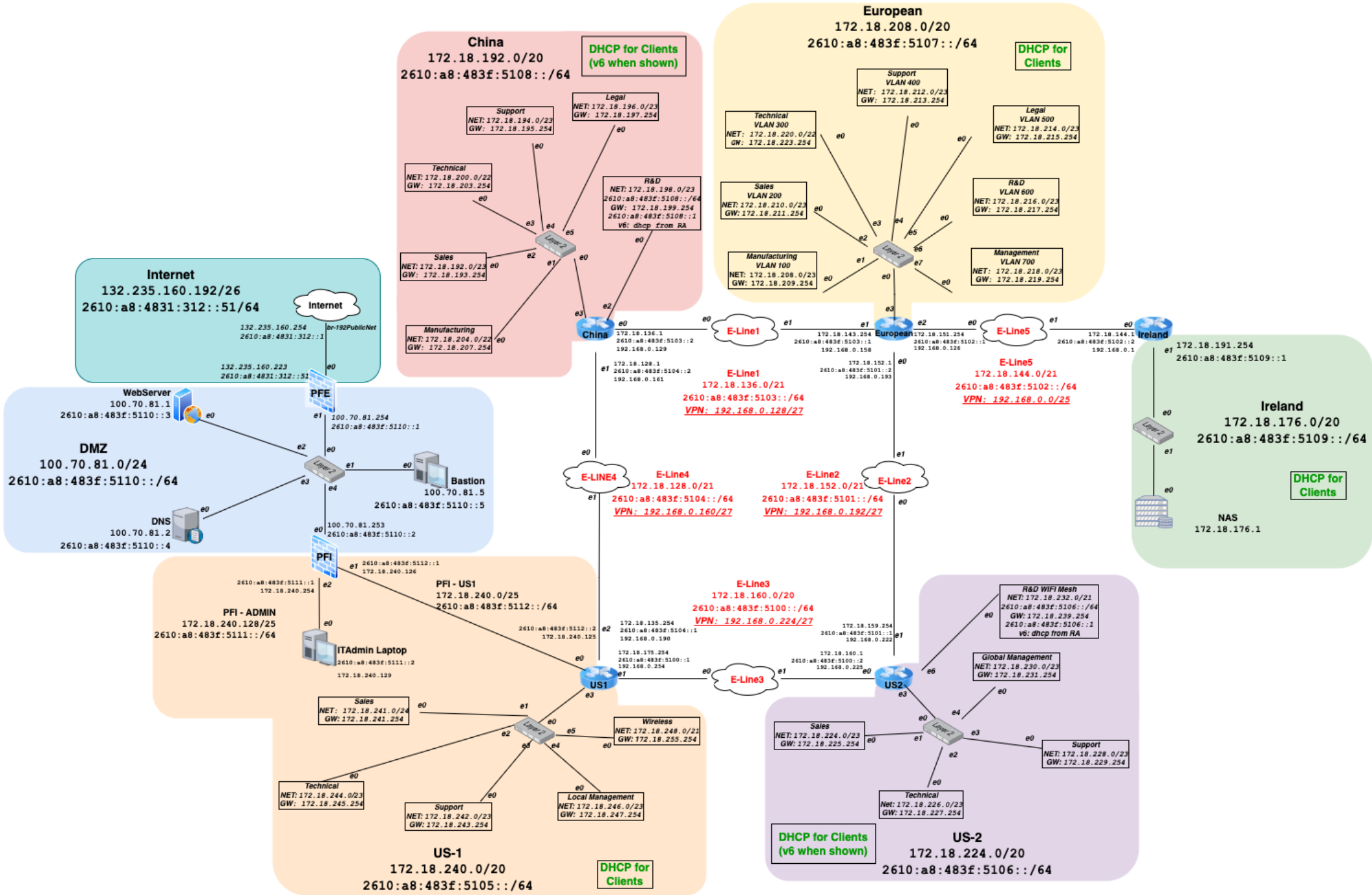
| Location | Network Address IPv4 | Useable IPv4 Range | Network Address IPv6 | | | |
|---|---|---|---|---|---|---|
| **European** | **172.18.208.0/20** | **172.18.208.1 - 172.18.223.254** | **2610:a8:483f:5107::/64** | **ethernet : VPN** | **IPv4 Address** | **IPv6 Address** |
| *European to US2* | 172.18.152.0/21:192.168.0.192/27 | 172.18.152.1 - 172.18.159.254 | 2610:a8:483f:5101::/64 | eth0 : 192.168.0.193 | 172.18.152.1 | 2610:a8:483f:5101::2 |
| *European to Ireland* | 172.18.144.0/21:192.168.0.0/25 | 172.18.144.1 - 172.18.151.254 | 2610:a8:483f:5102::/64 | eth2 : 192.168.0.126 | 172.18.151.254 | 2610:a8:483f:5102::1 |
| *European to China* | 172.18.136.0/21:192.168.0.128/27 | 172.18.136.1 - 172.18.143.254 | 2610:a8:483f:5103::/64 | eth1 : 192.168.0.158 | 172.18.143.254 | 2610:a8:483f:5103::1 |
| **European Subdivisions** | **Network Address IPv4** | **Useable IPv4 Range** | **Network Address IPv6** | **ethernet** | **IPv4 Gateway** | **IPv6 Gateway** |
| *VLAN 100 - Manufacturing* | 172.18.208.0/23 | 172.18.208.1 - 172.18.209.254 | 2610:a8:483f:5107::/64 | eth3 | 172.18.209.254 | 2610:a8:483f:5107::1 |
| *VLAN 200 - Sales* | 172.18.210.0/23 | 172.18.210.1 - 172.18.211.254 | | eth3 | 172.18.211.254 | |
| *VLAN 300 - Technical* | 172.18.220.0/22 | 172.18.220.1 - 172.18.223.254 | | eth3 | 172.18.223.254 | |
| *VLAN 400 - Support* | 172.18.212.0/23 | 172.18.212.1 - 172.18.213.254 | | eth3 | 172.18.213.254 | |
| *VLAN 500 - Legal* | 172.18.214.0/23 | 172.18.214.1 - 172.18.215.254 | | eth3 | 172.18.215.254 | |
| *VLAN 600 - R&D* | 172.18.216.0/23 | 172.18.216.1 - 172.18.217.254 | | eth3 | 172.18.217.254 | |
| *VLAN 700 - Management* | 172.18.218.0/23 | 172.18.218.1 - 172.18.219.254 | | eth3 | 172.18.219.254 | |

| Location | Network Address IPv4 | Useable IPv4 Range | Network Address IPv6 | | | |
|---|---|---|---|---|---|---|
| **China** | **172.18.192.0/20** | **172.18.192.1 - 172.18.207.254** | **2610:a8:483f:5108::/64** | **ethernet : VPN** | **IPv4 Address** | **IPv6 Address** |
| *China to European* | 172.18.136.0/21:192.168.0.128/27 | 172.18.136.1 - 172.18.143.254 | 2610:a8:483f:5103::/64 | eth0 : 192.168.0.129 | 172.18.136.1 | 2610:a8:483f:5103::2 |
| *China to US1* | 172.18.128.0/21:192.168.0.160/27 | 172.18.128.1 - 172.18.135.254 | 2610:a8:483f:5104::/64 | eth1 : 192.168.0.161 | 172.18.128.1 | 2610:a8:483f:5104::2 |
| **China Subdivisions** | **Network Address IPv4** | **Useable IPv4 Range** | **Network Address IPv6** | **ethernet** | **IPv4 Gateway** | **IPv6 Gateway** |
| *VLAN 100 - Manufacturing* | 172.18.204.0/22 | 172.18.204.1 - 172.18.207.254 | ***2610:a8:483f:5108::/64*** | eth3 | 172.18.207.254 | ***2610:a8:483f:5108::1*** |
| *VLAN 200 - Sales* | 172.18.192.0/23 | 172.18.192.1 - 172.18.193.254 | | eth3 | 172.18.193.254 | |
| *VLAN 300 - Technical* | 172.18.200.0/22 | 172.18.200.1 - 172.18.203.254 | | eth3 | 172.18.203.254 | |
| *VLAN 400 - Support* | 172.18.194.0/23 | 172.18.194.1 - 172.18.195.254 | | eth3 | 172.18.195.254 | |
| *VLAN 500 - Legal* | 172.18.196.0/23 | 172.18.196.1 - 172.18.197.254 | | eth3 | 172.18.197.254 | |
| ***R&D*** | ***172.18.198.0/23*** | ***172.18.198.1 - 172.18.199.254*** | | ***eth2*** | ***172.18.199.254*** | |

| Location | Network Address IPv4 | Useable IPv4 Range | Network Address IPv6 | | | |
|---|---|---|---|---|---|---|
| **Ireland** | **172.18.176.0/20** | **172.18.176.1 - 172.18.191.254** | **2610:a8:483f:5109::/64** | **ethernet : VPN** | **IPv4 Address** | **IPv6 Address** |
| *Ireland to European* | 172.18.144.0/21:192.168.0.0/25 | 172.18.144.1 - 172.18.151.254 | 2610:a8:483f:5102::/64 | eth0 : 192.168.0.1 | 172.18.144.1 | 2610:a8:483f:5102::2 |
| **Ireland Subdivisions** | **Network Address IPv4** | **Useable IPv4 Range** | **Network Address IPv6** | **ethernet** | **IPv4 Gateway** | **IPv6 Gateway** |
| *VLAN 100 - NAS* | 172.18.176.0/20 | 172.18.176.1 - 172.18.191.254 | 2610:a8:483f:5109::/64 | eth0 | 172.18.191.254 | 2610:a8:483f:5109::1 |

| | | |
|---|---|---|
| **ITAdminLaptop** | **PFI access: http://172.18.240.254/** | **admin/class115#** |
| **Bastion** | **PFE access: http://100.70.81.254/** | **admin/class115#** |
| **All routers** | **US1:US2:EU:IR:CH** | **itsclass/class115#** |

**2.** Network Diagram from Draw.io



## 3. US1 configuration

**GUI Configs - ITAdmin**

sudo nmcli general hostname ITAdmin

DHCP in Pfsense 2 - PFI

**US1 Config**

set system host-name US-1

set interfaces ethernet eth0 address 172.18.240.125/25

set interfaces ethernet eth0 address 2610:a8:483f:5112::2/64

set interfaces ethernet eth0 description PFI

set interfaces ethernet eth1 address 172.18.175.254/20

set interfaces ethernet eth1 address 2610:a8:483f:5100::1/64

set interfaces ethernet eth1 description E-Line3

set interfaces ethernet eth2 address 172.18.135.254/21

set interfaces ethernet eth2 address 2610:a8:483f:5104::1/64

set interfaces ethernet eth2 description E-Line4

set interfaces ethernet eth3 vif 100 address 172.18.241.254/24

set interfaces ethernet eth3 vif 200 address 172.18.245.254/23

set interfaces ethernet eth3 vif 300 address 172.18.243.254/23

set interfaces ethernet eth3 vif 400 address 172.18.247.254/23

set interfaces ethernet eth3 vif 500 address 172.18.255.254/21

set protocols static route6 2610:a8:483f:5106::/64 next-hop 2610:a8:483f:5100::2

set protocols static route6 2610:a8:483f:5101::/64 next-hop 2610:a8:483f:5100::2

set protocols static route6 2610:a8:483f:5107::/64 next-hop 2610:a8:483f:5100::2

set protocols static route6 2610:a8:483f:5108::/64 next-hop 2610:a8:483f:5100::2

set protocols static route6 2610:a8:483f:5103::/64 next-hop 2610:a8:483f:5100::2

set protocols static route6 2610:a8:483f:5109::/64 next-hop 2610:a8:483f:5100::2

set protocols static route6 2610:a8:483f:5102::/64 next-hop 2610:a8:483f:5100::2

set protocols static route 0.0.0.0/0 next-hop 172.18.240.126

set protocols static route6 ::/0 next-hop 2610:a8:483f:5112::1

set system name-server 100.70.81.2

set system name-server 2610:a8:483f:5110::4

***VLAN 100***

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.241.0/24 range 0 start 172.18.241.1

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.241.0/24 range 0 stop 172.18.241.253

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.241.0/24 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.241.0/24 default-router 172.18.241.254

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.241.0/24 lease 120

***VLAN 200***

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.244.0/23 range 0 start 172.18.244.1

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.244.0/23 range 0 stop 172.18.245.253

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.244.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.244.0/23 default-router 172.18.245.254

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.244.0/23 lease 120

***VLAN 300***

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.242.0/23 range 0 start 172.18.242.1

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.242.0/23 range 0 stop 172.18.243.253

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.242.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.242.0/23 default-router 172.18.243.254

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.242.0/23 lease 120

***VLAN 400***

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.246.0/23 range 0 start 172.18.246.1

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.246.0/23 range 0 stop 172.18.247.253

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.246.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.246.0/23 default-router 172.18.247.254

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.246.0/23 lease 120

***VLAN 500***

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.248.0/21 range 0 start 172.18.248.1

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.248.0/21 range 0 stop 172.18.255.253

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.248.0/21 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.248.0/21 default-router 172.18.255.254

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.248.0/21 lease 120

***VPN - US1 to US2***

set interfaces openvpn vtun2 local-address 192.168.0.254 subnet-mask 255.255.255.224

set interfaces openvpn vtun2 local-host 172.18.175.254

set interfaces openvpn vtun2 local-port 1195

set interfaces openvpn vtun2 mode site-to-site

set interfaces openvpn vtun2 remote-address 192.168.0.225

set interfaces openvpn vtun2 remote-host 172.18.160.1

set interfaces openvpn vtun2 remote-port 1195

set interfaces openvpn vtun2 shared-secret-key-file /config/auth/openvpn-2.key

set interfaces openvpn vtun2 protocol udp

set interfaces openvpn vtun2 persistent-tunnel

***VPN - US1 to China***

set interfaces openvpn vtun1 local-address 192.168.0.190 subnet-mask 255.255.255.224

set interfaces openvpn vtun1 local-host 172.18.135.254

set interfaces openvpn vtun1 local-port 1195

set interfaces openvpn vtun1 mode site-to-site

set interfaces openvpn vtun1 remote-address 192.168.0.161

set interfaces openvpn vtun1 remote-host 172.18.128.1

set interfaces openvpn vtun1 remote-port 1195

set interfaces openvpn vtun1 shared-secret-key-file /config/auth/openvpn-1.key

set interfaces openvpn vtun1 protocol udp

set interfaces openvpn vtun1 persistent-tunnel

***ospf default to PFI***

set protocols ospf default-information originate always

set protocols ospf default-information originate metric 10

set protocols ospf default-information originate metric-type 2

***OSPF CONFIG***

set protocols ospf area 0 network 172.18.128.0/17

set protocols ospf log-adjacency-changes

set protocols ospf redistribute connected metric-type 2

set protocols ospf redistribute connected route-map CONNECT

set policy route-map CONNECT rule 10 action permit

set policy route-map CONNECT rule 10 match interface lo

## 4. US2 configuration

**US2 Config**

set system host-name US-2

set interfaces ethernet eth0 address 172.18.160.1/20

set interfaces ethernet eth0 address 2610:a8:483f:5100::2/64

set interfaces ethernet eth0 description E-Line3

set interfaces ethernet eth1 address 172.18.159.254/21

set interfaces ethernet eth1 address 2610:a8:483f:5101::1/64

set interfaces ethernet eth1 description E-Line2

set interfaces ethernet eth3 vif 100 address 172.18.225.254/23

set interfaces ethernet eth3 vif 200 address 172.18.227.254/23

set interfaces ethernet eth3 vif 300 address 172.18.229.254/23

set interfaces ethernet eth3 vif 400 address 172.18.231.254/23

set interfaces ethernet eth6 address 172.18.239.254/21

set interfaces ethernet eth6 address 2610:a8:483f:5106::1/64

set interfaces ethernet eth6 description R&DWifiMesh

set protocols static route6 ::/0 next-hop 2610:a8:483f:5100::1

set system name-server 100.70.81.2

set system name-server 2610:a8:483f:5110::4

set service router-advert interface eth6 prefix 2610:a8:483f:5106::/64

set service router-advert interface eth6 name-server 2610:a8:483f:5110::4

set protocols static route6 2610:a8:483f:5107::/64 next-hop 2610:a8:483f:5101::2

set protocols static route6 2610:a8:483f:5108::/64 next-hop 2610:a8:483f:5101::2

set protocols static route6 2610:a8:483f:5103::/64 next-hop 2610:a8:483f:5101::2

set protocols static route6 2610:a8:483f:5109::/64 next-hop 2610:a8:483f:5101::2

set protocols static route6 2610:a8:483f:5102::/64 next-hop 2610:a8:483f:5101::2

***VLAN 100***

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.224.0/23 range 0 start 172.18.224.1

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.224.0/23 range 0 stop 172.18.225.253

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.224.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.224.0/23 default-router 172.18.225.254

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.224.0/23 lease 120

***VLAN 200***

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.226.0/23 range 0 start 172.18.226.1

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.226.0/23 range 0 stop 172.18.227.253

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.226.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.226.0/23 default-router 172.18.227.254

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.226.0/23 lease 120

***VLAN 300***

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.228.0/23 range 0 start 172.18.228.1

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.228.0/23 range 0 stop 172.18.229.253

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.228.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.228.0/23 default-router 172.18.229.254

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.228.0/23 lease 120

***VLAN 400***

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.230.0/23 range 0 start 172.18.230.1

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.230.0/23 range 0 stop 172.18.231.253

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.230.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.230.0/23 default-router 172.18.231.254

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.230.0/23 lease 120

***set dhcpv4 - R&D Wifi Mesh US2***

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.232.0/21 range 0 start 172.18.232.1

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.232.0/21 range 0 stop - 172.18.239.253

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.232.0/21 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.232.0/21 default-router 172.18.239.254

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.232.0/21 lease 120

***VPN - US2 to Europe***

set interfaces openvpn vtun3 local-address 192.168.0.222 subnet-mask 255.255.255.224

set interfaces openvpn vtun3 local-host 172.18.159.254

set interfaces openvpn vtun3 local-port 1195

set interfaces openvpn vtun3 mode site-to-site

set interfaces openvpn vtun3 remote-address 192.168.0.193

set interfaces openvpn vtun3 remote-host 172.18.152.1

set interfaces openvpn vtun3 remote-port 1195

set interfaces openvpn vtun3 shared-secret-key-file /config/auth/openvpn-3.key

set interfaces openvpn vtun3 protocol udp

set interfaces openvpn vtun3 persistent-tunnel

***VPN - US2 to US1***

set interfaces openvpn vtun2 local-address 192.168.0.225 subnet-mask 255.255.255.224

set interfaces openvpn vtun2 local-host 172.18.160.1

set interfaces openvpn vtun2 local-port 1195

set interfaces openvpn vtun2 mode site-to-site

set interfaces openvpn vtun2 remote-address 192.168.0.254

set interfaces openvpn vtun2 remote-host 172.18.175.254

set interfaces openvpn vtun2 remote-port 1195

set interfaces openvpn vtun2 shared-secret-key-file /config/auth/openvpn-2.key

set interfaces openvpn vtun2 protocol udp

set interfaces openvpn vtun2 persistent-tunnel

***ALL ROUTER OSPF CONFIG***

set protocols ospf area 0 network 172.18.128.0/17

set protocols ospf log-adjacency-changes

set protocols ospf redistribute connected metric-type 2

set protocols ospf redistribute connected route-map CONNECT

set policy route-map CONNECT rule 10 action permit

set policy route-map CONNECT rule 10 match interface lo

## 5. European configuration

**European Config**

set system host-name European

set interfaces ethernet eth0 address 172.18.152.1/21

set interfaces ethernet eth0 address 2610:a8:483f:5101::2/64

set interfaces ethernet eth0 description E-Line2

set interfaces ethernet eth1 address 172.18.143.254/21

set interfaces ethernet eth1 address 2610:a8:483f:5103::1/64

set interfaces ethernet eth1 description E-Line1

set interfaces ethernet eth2 address 172.18.151.254/21

set interfaces ethernet eth2 address 2610:a8:483f:5102::1/64

set interfaces ethernet eth2 description E-Line5

set protocols static route 0.0.0.0/0 next-hop 172.18.159.254

set protocols static route6 ::/0 next-hop 2610:a8:483f:5101::1

set system name-server 100.70.81.2

set system name-server 2610:a8:483f:5110::4

set interfaces ethernet eth3 vif 100 address 172.18.209.254/23

set interfaces ethernet eth3 vif 200 address 172.18.211.254/23

set interfaces ethernet eth3 vif 300 address 172.18.223.254/22

set interfaces ethernet eth3 vif 400 address 172.18.213.254/23

set interfaces ethernet eth3 vif 500 address 172.18.215.254/23

set interfaces ethernet eth3 vif 600 address 172.18.217.254/23

set interfaces ethernet eth3 vif 700 address 172.18.219.254/23

set protocols static route6 2610:a8:483f:5109::/64 next-hop 2610:a8:483f:5103::2

set protocols static route6 2610:a8:483f:5108::/64 next-hop 2610:a8:483f:5103::2

**VLAN 100**

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.208.0/23 range 0 start 172.18.208.1

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.208.0/23 range 0 stop 172.18.209.253

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.208.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.208.0/23 default-router 172.18.209.254

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.208.0/23 lease 120

**VLAN 200**

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.210.0/23 range 0 start 172.18.210.1

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.210.0/23 range 0 stop 172.18.211.253

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.210.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.210.0/23 default-router 172.18.211.254

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.210.0/23 lease 120

**VLAN 300**

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.220.0/22 range 0 start 172.18.220.1

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.220.0/22 range 0 stop 172.18.223.253

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.220.0/22 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.220.0/22 default-router 172.18.223.254

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.220.0/22 lease 120

**VLAN 400**

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.212.0/23 range 0 start 172.18.212.1

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.212.0/23 range 0 stop 172.18.213.253

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.212.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.212.0/23 default-router 172.18.213.254

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.212.0/23 lease 120

**VLAN 500**

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.214.0/23 range 0 start 172.18.214.1

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.214.0/23 range 0 stop 172.18.215.253

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.214.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.214.0/23 default-router 172.18.215.254

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.214.0/23 lease 120

**VLAN 600**

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.216.0/23 range 0 start 172.18.216.1

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.216.0/23 range 0 stop 172.18.217.253

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.216.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.216.0/23 default-router 172.18.217.254

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.216.0/23 lease 120

**VLAN 700**

set service dhcp-server shared-network-name LAN-POOL7 subnet 172.18.218.0/23 range 0 start 172.18.218.1

set service dhcp-server shared-network-name LAN-POOL7 subnet 172.18.218.0/23 range 0 stop 172.18.219.253

set service dhcp-server shared-network-name LAN-POOL7 subnet 172.18.218.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL7 subnet 172.18.218.0/23 default-router 172.18.219.254

set service dhcp-server shared-network-name LAN-POOL7 subnet 172.18.218.0/23 lease 120

***VPN - Europe to Ireland***

set interfaces openvpn vtun1 local-address 192.168.0.126 subnet-mask 255.255.255.128

set interfaces openvpn vtun1 local-host 172.18.151.254

set interfaces openvpn vtun1 local-port 1195

set interfaces openvpn vtun1 mode site-to-site

set interfaces openvpn vtun1 remote-address 192.168.0.1

set interfaces openvpn vtun1 remote-host 172.18.144.1

set interfaces openvpn vtun1 remote-port 1195

set interfaces openvpn vtun1 shared-secret-key-file /config/auth/openvpn-1.key

set interfaces openvpn vtun1 protocol udp

set interfaces openvpn vtun1 persistent-tunnel

***VPN - Europe to China***

set interfaces openvpn vtun2 local-address 192.168.0.158 subnet-mask 255.255.255.224

set interfaces openvpn vtun2 local-host 172.18.143.254

set interfaces openvpn vtun2 local-port 1195

set interfaces openvpn vtun2 mode site-to-site

```
set interfaces openvpn vtun2 remote-address 192.168.0.129
set interfaces openvpn vtun2 remote-host 172.18.136.1
set interfaces openvpn vtun2 remote-port 1195
set interfaces openvpn vtun2 shared-secret-key-file /config/auth/openvpn-2.key
set interfaces openvpn vtun2 protocol udp
set interfaces openvpn vtun2 persistent-tunnel
```

***VPN - Europe to US2***

```
set interfaces openvpn vtun3 local-address 192.168.0.193 subnet-mask 255.255.255.224
set interfaces openvpn vtun3 local-host 172.18.152.1
set interfaces openvpn vtun3 local-port 1195
set interfaces openvpn vtun3 mode site-to-site
set interfaces openvpn vtun3 remote-address 192.168.0.222
set interfaces openvpn vtun3 remote-host 172.18.159.254
set interfaces openvpn vtun3 remote-port 1195
set interfaces openvpn vtun3 shared-secret-key-file /config/auth/openvpn-3.key
set interfaces openvpn vtun3 protocol udp
set interfaces openvpn vtun3 persistent-tunnel
```

***ALL ROUTER OSPF CONFIG***

```
set protocols ospf area 0 network 172.18.128.0/17
set protocols ospf log-adjacency-changes
set protocols ospf redistribute connected metric-type 2
set protocols ospf redistribute connected route-map CONNECT
set policy route-map CONNECT rule 10 action permit
set policy route-map CONNECT rule 10 match interface lo
```

## 6. China configuration

**China Config**

```
set system host-name China
```

set interfaces ethernet eth0 address 172.18.136.1/21

set interfaces ethernet eth0 address 2610:a8:483f:5103::2/64

set interfaces ethernet eth0 description E-Line1

set interfaces ethernet eth1 address 172.18.128.1/21

set interfaces ethernet eth1 address 2610:a8:483f:5104::2/64

set interfaces ethernet eth1 description E-Line4

set interfaces ethernet eth3 vif 100 address 172.18.207.254/22

set interfaces ethernet eth3 vif 200 address 172.18.193.254/23

set interfaces ethernet eth3 vif 300 address 172.18.203.254/22

set interfaces ethernet eth3 vif 400 address 172.18.195.254/23

set interfaces ethernet eth3 vif 500 address 172.18.197.254/23

set interfaces ethernet eth2 address 172.18.199.254/23

set interfaces ethernet eth2 description R&D

set interfaces ethernet eth2 address 2610:a8:483f:5108::1/64

set protocols static route6 ::/0 next-hop 2610:a8:483f:5103::1

set system name-server 100.70.81.2

set system name-server 2610:a8:483f:5110::4

set service router-advert interface eth2 prefix 2610:a8:483f:5108::/64

set service router-advert interface eth2 name-server 2610:a8:483f:5110::4

***VLAN 100***

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.204.0/22 range 0 start 172.18.204.1

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.204.0/22 range 0 stop 172.18.207.253

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.204.0/22 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.204.0/22 default-router 172.18.207.254

set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.204.0/22 lease 120

***VLAN 200***

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.192.0/23 range 0 start 172.18.192.1

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.192.0/23 range 0 stop 172.18.193.253

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.192.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.192.0/23 default-router 172.18.193.254

set service dhcp-server shared-network-name LAN-POOL2 subnet 172.18.192.0/23 lease 120

***VLAN 300***

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.200.0/22 range 0 start 172.18.200.1

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.200.0/22 range 0 stop 172.18.203.253

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.200.0/22 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.200.0/22 default-router 172.18.203.254

set service dhcp-server shared-network-name LAN-POOL3 subnet 172.18.200.0/22 lease 120

***VLAN 400***

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.194.0/23 range 0 start 172.18.194.1

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.194.0/23 range 0 stop 172.18.195.253

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.194.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.194.0/23 default-router 172.18.195.254

set service dhcp-server shared-network-name LAN-POOL4 subnet 172.18.194.0/23 lease 120

***VLAN 500***

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.196.0/23 range 0 start 172.18.196.1

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.196.0/23 range 0 stop 172.18.197.253

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.196.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.196.0/23 default-router 172.18.197.254

set service dhcp-server shared-network-name LAN-POOL5 subnet 172.18.196.0/23 lease 120

***set dhcpv4 - R&D China***

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.198.0/23 range 0 start 172.18.198.1

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.198.0/23 range 0 stop 172.18.199.253

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.198.0/23 name-server 100.70.81.2

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.198.0/23 default-router 172.18.199.254

set service dhcp-server shared-network-name LAN-POOL6 subnet 172.18.198.0/23 lease 120

***VPN - China to Europe***

set interfaces openvpn vtun2 local-address 192.168.0.129 subnet-mask 255.255.255.224

set interfaces openvpn vtun2 local-host 172.18.136.1

set interfaces openvpn vtun2 local-port 1195

set interfaces openvpn vtun2 mode site-to-site

set interfaces openvpn vtun2 remote-address 192.168.0.158

set interfaces openvpn vtun2 remote-host 172.18.143.254

set interfaces openvpn vtun2 remote-port 1195

set interfaces openvpn vtun2 shared-secret-key-file /config/auth/openvpn-2.key

set interfaces openvpn vtun2 protocol udp

set interfaces openvpn vtun2 persistent-tunnel

***VPN - China to US1***

set interfaces openvpn vtun1 local-address 192.168.0.161 subnet-mask 255.255.255.224

set interfaces openvpn vtun1 local-host 172.18.128.1

set interfaces openvpn vtun1 local-port 1195

set interfaces openvpn vtun1 mode site-to-site

set interfaces openvpn vtun1 remote-address 192.168.0.190

set interfaces openvpn vtun1 remote-host 172.18.135.254

set interfaces openvpn vtun1 remote-port 1195

set interfaces openvpn vtun1 shared-secret-key-file /config/auth/openvpn-1.key

set interfaces openvpn vtun1 protocol udp

set interfaces openvpn vtun1 persistent-tunnel

***ALL ROUTER OSPF CONFIG***

```
set protocols ospf area 0 network 172.18.128.0/17
set protocols ospf log-adjacency-changes
set protocols ospf redistribute connected metric-type 2
set protocols ospf redistribute connected route-map CONNECT
set policy route-map CONNECT rule 10 action permit
set policy route-map CONNECT rule 10 match interface lo
```

## 7. Ireland configuration

**Ireland Config**

```
set system host-name Ireland
set interfaces ethernet eth0 address 172.18.144.1/21
set interfaces ethernet eth0 address 2610:a8:483f:5102::2/64
set interfaces ethernet eth0 description E-Line5
set interfaces ethernet eth3 vif 100 address 172.18.191.254/20
set interfaces ethernet eth3 vif 100 address 2610:a8:483f:5109::1/64
set protocols static route6 ::/0 next-hop 2610:a8:483f:5102::1
set system name-server 100.70.81.2
set system name-server 2610:a8:483f:5110::4
```

***VLAN 100***

```
set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.176.0/20 range 0 start 172.18.176.1
set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.176.0/20 range 0 stop 172.18.191.253
set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.176.0/20 name-server 100.70.81.2
set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.176.0/20 default-router 172.18.191.254
set service dhcp-server shared-network-name LAN-POOL1 subnet 172.18.176.0/20 lease 120
```

***VPN - Ireland***

```
set interfaces openvpn vtun1 local-address 192.168.0.1 subnet-mask 255.255.255.128
```

set interfaces openvpn vtun1 local-host 172.18.144.1

set interfaces openvpn vtun1 local-port 1195

set interfaces openvpn vtun1 mode site-to-site

set interfaces openvpn vtun1 remote-address 192.168.0.126

set interfaces openvpn vtun1 remote-host 172.18.151.254

set interfaces openvpn vtun1 remote-port 1195

set interfaces openvpn vtun1 shared-secret-key-file /config/auth/openvpn-1.key

set interfaces openvpn vtun1 protocol udp

set interfaces openvpn vtun1 persistent-tunnel

***ALL ROUTER OSPF CONFIG***

set protocols ospf area 0 network 172.18.128.0/17

set protocols ospf log-adjacency-changes

set protocols ospf redistribute connected metric-type 2

set protocols ospf redistribute connected route-map CONNECT

set policy route-map CONNECT rule 10 action permit

set policy route-map CONNECT rule 10 match interface lo

**GUI Configs - NAS**

sudo nmcli general hostname NAS

VLAN 100 in Ireland - DHCP

## 8. DMZ host configuration

**CLI Configs - HTTP**

sudo nmcli general hostname HTTP

sudo nmcli con mod "Wired connection 1" ipv4.addresses 100.70.81.1/24

sudo nmcli con mod "Wired connection 1" ipv4.gateway 100.70.81.254

sudo nmcli con mod "Wired connection 1" ipv4.dns  100.70.81.2

sudo nmcli con mod "Wired connection 1" ipv4.method manual

sudo nmcli con mod "Wired connection 1" ipv6.addresses 2610:a8:483f:5110::3

sudo nmcli con mod "Wired connection 1" ipv6.gateway 2610:a8:483f:5110::1

sudo nmcli connection modify "Wired connection 1" ipv6.dns 2610:a8:483f:5110::4

sudo nmcli con mod "Wired connection 1" ipv6.method manual

sudo nmcli connection down "Wired connection 1"

sudo nmcli connection up "Wired connection 1"

**CLI Configs - DNS**

sudo nmcli general hostname DNS

sudo nmcli con mod "Wired connection 1" ipv4.addresses 100.70.81.2/24

sudo nmcli con mod "Wired connection 1" ipv4.gateway 100.70.81.254

sudo nmcli con mod "Wired connection 1" ipv4.dns 132.235.160.10, 132.235.160.11

sudo nmcli con mod "Wired connection 1" ipv4.method manual

sudo nmcli con mod "Wired connection 1" ipv6.addresses 2610:a8:483f:5110::4

sudo nmcli con mod "Wired connection 1" ipv6.gateway 2610:a8:483f:5110::1

sudo nmcli connection modify "Wired connection 1" ipv6.dns 2610:a8:4831:311::10, 2610:a8:4831:311::11

sudo nmcli con mod "Wired connection 1" ipv6.method manual

sudo nmcli connection down "Wired connection 1"

sudo nmcli connection up "Wired connection 1"

**GUI Configs - Bastion**

sudo nmcli general hostname DNS

IPv4 address: 100.70.81.5/24

IPv4 gateway: 100.70.81.254

IPv4 DNS server: 100.70.81.2

IPv6 address: 2610:a8:483f:5110::5

IPv6 gateway: 2610:a8:483f:5110::1

IPv6 DNS server: 2610:a8:483f:5110::4

**9.** PFE Routes

**Static Routes**

| | Network | Gateway | Interface | Description | Actions |
|---|---|---|---|---|---|
| ✓ | 172.18.128.0/17 | pfiUS1 - 100.70.81.253 | LAN | aggregate | |
| ✓ | 2610:a8:483f:51::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | aggregatev6 | |
| ✓ | 2610:a8:483f:5112::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | PFI-US1 | |
| ✓ | 2610:a8:483f:5111::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | admin | |
| ✓ | 2610:a8:483f:5105::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | US1 | |
| ✓ | 2610:a8:483f:5100::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | US1-US2 | |
| ✓ | 2610:a8:483f:5106::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | US2 | |
| ✓ | 2610:a8:483f:5101::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | US1-European | |
| ✓ | 2610:a8:483f:5107::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | EU | |
| ✓ | 2610:a8:483f:5103::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | EU-China | |
| ✓ | 2610:a8:483f:5108::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | China | |
| ✓ | 2610:a8:483f:5104::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | US1-China | |
| ✓ | 2610:a8:483f:5102::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | EU-Ireland | |
| ✓ | 2610:a8:483f:5109::/64 | Aggregate - 2610:00a8:483f:5110::2 | LAN | Ireland | |

+ Add

**10.** PFI Routes

Gateways | Static Routes | Gateway Groups

## Static Routes

| | Network | Gateway | Interface | Description | Actions |
|---|---|---|---|---|---|
| ✓ | 172.18.128.0/17 | v4 - 172.18.240.125 | OPT1 | v4 aggregate | |
| ✓ | 2610:a8:483f:51::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | v6 aggregate | |
| ✓ | 2610:a8:483f:5105::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | US1 | |
| ✓ | 2610:a8:483f:5100::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | US1-US2 | |
| ✓ | 2610:a8:483f:5106::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | US2 | |
| ✓ | 2610:a8:483f:5101::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | US2-EU | |
| ✓ | 2610:a8:483f:5107::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | EU | |
| ✓ | 2610:a8:483f:5103::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | EU-China | |
| ✓ | 2610:a8:483f:5108::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | China | |
| ✓ | 2610:a8:483f:5102::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | EU-Ireland | |
| ✓ | 2610:a8:483f:5109::/64 | v6 - 2610:a8:483f:5112::2 | OPT1 | Ireland | |