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ITS 4750: Internet Engineering – Homework 3 Friday November 11th

Executive Brief

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

IPV4 Private Network Address	IPV6 Private Network Address	IPV4 WAN Network Address	IPV6 WAN Network Address
172.18.128.0/17	2610:00a8:483f:5100::/56	132.235.201.128/27	2610:a8:483a::/48

Location	Network Address IPv4	Useable IPv4 Range	Network Address IPv6		ethernet	IPv4 Address	IPv6 Address
Internet	132.235.201.128/27	132.235.201.129 – 132.235.201.158	2610:a8:483a::/48				
Cloud					e1	132.235.201.158	2610:a8:483a::1
US1					e0	132.235.201.129	2610:a8:483a::2

Location	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Address	IPv6 Address
US 1	172.18.192.0/18	172.18.192.1 – 172.18.255.254	2610:00a8:483f:5100::/64	ethernet	IPv4 Address	IPv6 Address
US1 to Japan	172.18.192.64/26	172.18.192.65 – 172.18.192.126	2610:00a8:483f:5100:0001::/64	e1	172.18.192.126	2610:00a8:483f:5100:0001::1
US1 to US2	172.18.192.32/27	172.18.192.33 – 172.18.192.62	2610:00a8:483f:5100:0002::/64	e3	172.18.192.62	2610:00a8:483f:5100:0002::1
US1 Subdivisions	**Network Address IPv4**	**Useable IPv4 Range**	**Network Address IPv6**	ethernet	IPv4 Gateway	IPv6 Gateway
Sales	172.18.219.192/26	172.18.219.193 – 172.18.219.254	2610:00a8:483f:5100:0005::/64	e5	172.18.219.254	2610:00a8:483f:5100:0005::1
Technical	172.18.240.0/20	172.18.240.1 – 172.18.255.254	2610:00a8:483f:5100:0006::/64	e6	172.18.255.254	2610:00a8:483f:5100:0006::1
Support	172.18.220.0/23	172.18.220.1 – 172.18.221.254	2610:00a8:483f:5100:0007::/64	e7	172.18.221.254	2610:00a8:483f:5100:0007::1
Local Management	172.18.222.0/23	172.18.222.1 – 172.18.223.254	2610:00a8:483f:5100:0008::/64	e8	172.18.223.254	2610:00a8:483f:5100:0008::1
Wireless	172.18.224.0/20	172.18.224.1 – 172.18.239.254	2610:00a8:483f:5100:0009::/64	e9	172.18.239.254	2610:00a8:483f:5100:0009::1
Publically Accessible Servers	172.18.219.128/26	172.18.219.129 – 172.18.219.190	2610:00a8:483f:5100:0010::/64	e10	172.18.219.190	2610:00a8:483f:5100:0010::1

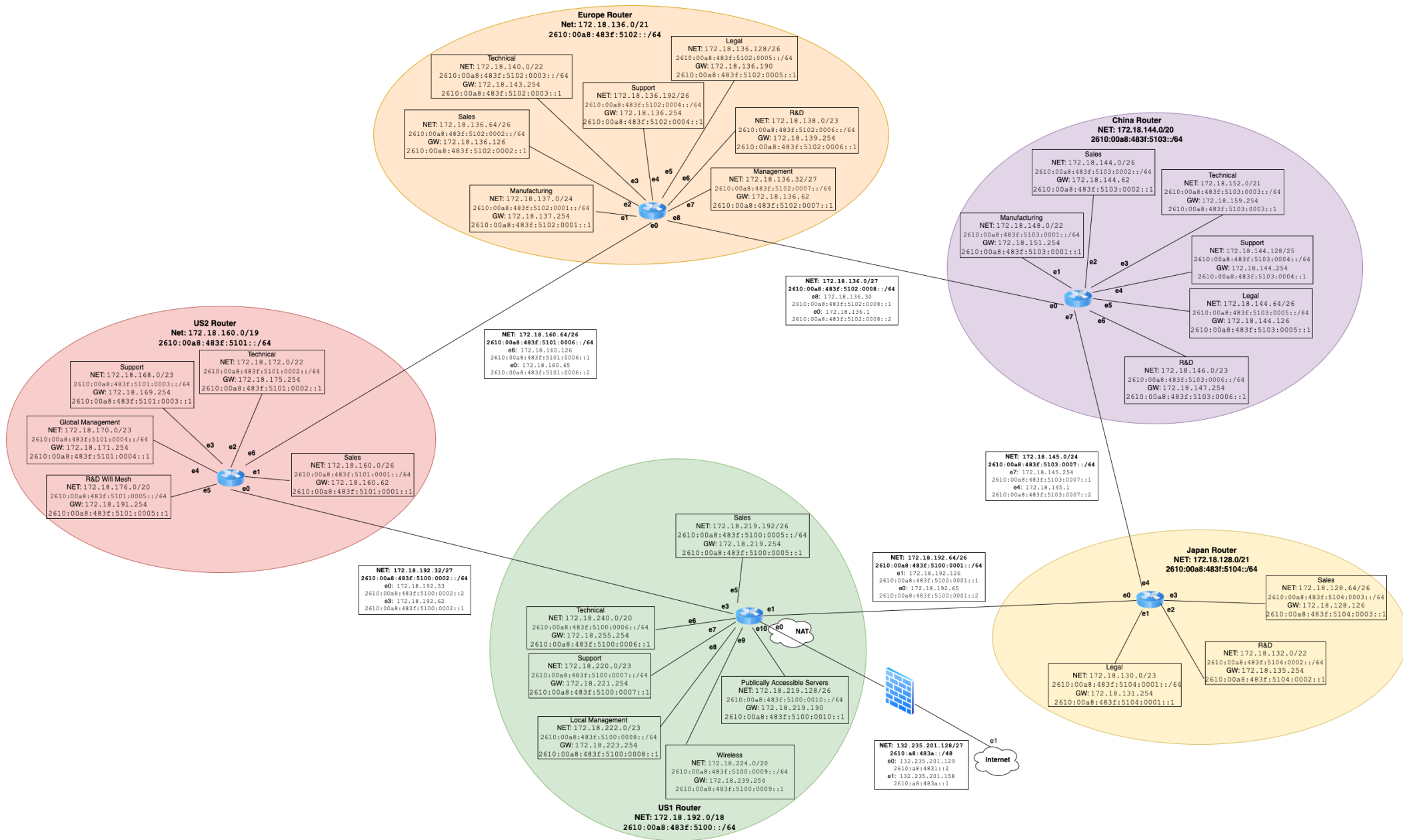| Location	Network Address IPv4	Useable IPv4 Range	Network Address IPv6			
US 2	**172.18.160.0/19**	**172.18.160.1 – 172.18.191.254**	**2610:00a8:483f:5101::/64**	ethernet	IPv4 Address	IPv6 Address
US2 to EUROPE	172.18.160.64/26	172.18.160.65 – 172.18.160.126	2610:00a8:483f:5101:0006::/64	e6	172.18.160.126	2610:00a8:483f:5101:0006::1
US2 to US1	172.18.192.32/27	172.18.192.33 – 172.18.192.62	2610:00a8:483f:5100:0002::/64	e0	172.18.192.33	2610:00a8:483f:5100:0002::2
US2 Subdivisions	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Address	IPv6 Gateway
Sales	172.18.160.0/26	172.18.160.1 – 172.18.160.62	2610:00a8:483f:5101:0001::/64	e1	172.18.160.62	2610:00a8:483f:5101:0001::1
Technical	172.18.172.0/22	172.18.172.1 – 172.18.175.254	2610:00a8:483f:5101:0002::/64	e2	172.18.175.254	2610:00a8:483f:5101:0002::1
Support	172.18.168.0/23	172.18.168.1 – 172.18.169.254	2610:00a8:483f:5101:0003::/64	e3	172.18.169.254	2610:00a8:483f:5101:0003::1
Global Management	172.18.170.0/23	172.18.170.1 – 172.18.171.254	2610:00a8:483f:5101:0004::/64	e4	172.18.171.254	2610:00a8:483f:5101:0004::1
R&D Wifi Mesh	172.18.176.0/20	172.18.176.1 – 172.18.191.254	2610:00a8:483f:5101:0005::/64	e5	172.18.191.254	2610:00a8:483f:5101:0005::1

Location	Network Address IPv4	Useable IPv4 Range	Network Address IPv6			
EUROPE	**172.18.136.0/21**	**172.18.136.1 – 172.18.143.254**	**2610:00a8:483f:5102::/64**	ethernet	IPv4 Address	IPv6 Address
Europe to CHINA	172.18.136.0/27	172.18.136.1 – 172.18.136.30	2610:a8:483f:5102:0008::/64	e8	172.18.136.30	2610:00a8:483f:5102:0008::1
Europe to US2	172.18.160.64/26	172.18.160.65 – 172.18.160.126	2610:a8:483f:5101:0006::/64	e0	172.18.160.65	2610:00a8:483f:5101:0006::2
EUROPE Subdivisions	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Gateway	IPv6 Gateway
Manufacturing	172.18.137.0/24	172.18.137.1 – 172.18.137.254	2610:00a8:483f:5102:0001::/64	e1	172.18.137.254	2610:00a8:483f:5102:0001::1
Sales	172.18.136.64/26	172.18.136.65 – 172.18.136.126	2610:00a8:483f:5102:0002::/64	e2	172.18.136.126	2610:00a8:483f:5102:0002::1
Technical	172.18.140.0/22	172.18.140.1 – 172.18.143.254	2610:00a8:483f:5102:0003::/64	e3	172.18.143.254	2610:00a8:483f:5102:0003::1
Support	172.18.136.192/26	172.18.136.193 – 172.18.136.254	2610:00a8:483f:5102:0004::/64	e4	172.18.136.254	2610:00a8:483f:5102:0004::1
Legal	172.18.136.128/26	172.18.136.129 – 172.18.136.190	2610:00a8:483f:5102:0005::/64	e5	172.18.136.190	2610:00a8:483f:5102:0005::1
R&D	172.18.138.0/23	172.18.138.1 – 172.18.139.254	2610:00a8:483f:5102:0006::/64	e6	172.18.139.254	2610:00a8:483f:5102:0006::1
Management	172.18.136.32/27	172.18.136.33 – 172.18.136.62	2610:00a8:483f:5102:0007::/64	e7	172.18.136.62	2610:00a8:483f:5102:0007::1

CHINA

Location	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Address	IPv6 Address
CHINA	172.18.144.0/20	172.18.144.1 – 172.18.159.254	2610:00a8:483f:5103::/64	ethernet	IPv4 Address	IPv6 Address
CHINA to JAPAN	172.18.145.0/24	172.18.145.1 – 172.18.145.254	2610:00a8:483f:5103:0007::/64	e7	172.18.145.254	2610:00a8:483f:5103:0007::1
China to EUROPE	172.18.136.0/27	172.18.136.1 – 172.18.136.30	2610:00a8:483f:5102:0008::/64	e0	172.18.136.1	2610:00a8:483f:5102:0008::2
CHINA Subdivisions	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Gateway	IPv6 Gateway
Manufacturing	172.18.148.0/22	172.18.148.1 – 172.18.151.254	2610:00a8:483f:5103:0001::/64	e1	172.18.151.254	2610:00a8:483f:5103:0001::1
Sales	172.18.144.0/26	172.18.144.1 – 172.18.144.62	2610:00a8:483f:5103:0002::/64	e2	172.18.144.62	2610:00a8:483f:5103:0002::1
Technical	172.18.152.0/21	172.18.152.1 – 172.18.159.254	2610:00a8:483f:5103:0003::/64	e3	172.18.159.254	2610:00a8:483f:5103:0003::1
Support	172.18.144.128/25	172.18.144.129 – 172.18.144.254	2610:00a8:483f:5103:0004::/64	e4	172.18.144.254	2610:00a8:483f:5103:0004::1
Legal	172.18.144.64/26	172.18.144.65 – 172.18.144.126	2610:00a8:483f:5103:0005::/64	e5	172.18.144.126	2610:00a8:483f:5103:0005::1
R&D	172.18.146.0/23	172.18.146.1 – 172.18.147.254	2610:00a8:483f:5103:0006::/64	e6	172.18.147.254	2610:00a8:483f:5103:0006::1

JAPAN

Location	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Address	IPv6 Address
JAPAN	172.18.128.0/21	172.18.128.1 – 172.18.135.254	2610:00a8:483f:5104::/64	ethernet	IPv4 Address	IPv6 Address
Japan to CHINA	172.18.145.0/24	172.18.145.1 – 172.18.145.254	2610:00a8:483f:5103:0007::/64	e4	172.18.145.1	2610:00a8:483f:5103:0007::2
Japan to US1	172.18.192.64/26	172.18.192.65 – 172.18.192.126	2610:00a8:483f:5100:0001::/64	e0	172.18.192.65	2610:00a8:483f:5100:0001::2
JAPAN Subdivisions	Network Address IPv4	Useable IPv4 Range	Network Address IPv6	ethernet	IPv4 Gateway	IPv6 Gateway
Legal	172.18.130.0/23	172.18.130.1 – 172.18.131.254	2610:00a8:483f:5104:0001::/64	e1	172.18.131.254	2610:00a8:483f:5104:0001::1
R&D	172.18.132.0/22	172.18.132.1 – 172.18.135.254	2610:00a8:483f:5104:0002::/64	e2	172.18.135.254	2610:00a8:483f:5104:0002::1
Sales	172.18.128.64/26	172.18.128.65 – 172.18.128.126	2610:00a8:483f:5104:0003::/64	e3	172.18.128.126	2610:00a8:483f:5104:0003::1

Location	Network Address IPv4	Useable IPv4 Range
US 1 Unused	172.18.192.128/25	172.18.192.129 – 172.18.192.254
	172.18.193.0/24	172.18.193.1 – 172.18.193.254
	172.18.194.0/23	172.18.194.1 – 172.18.195.254
	172.18.196.0/22	172.18.196.1 – 172.18.199.254
	172.18.200.0/21	172.18.200.1 – 172.18.207.254
	172.18.208.0/21	172.18.208.1 – 172.18.215.254
	172.18.216.0/23	172.18.216.1 – 172.18.217.254
	172.18.218.0/24	172.18.218.1 – 172.18.218.254
	172.18.219.0/25	172.18.219.1 – 172.18.219.126

Location	Network Address IPv4	Useable IPv4 Range
US 2 Unused	172.18.160.64/26	172.18.160.65 – 172.18.160.126
	172.18.160.128/25	172.18.160.129 – 172.18.160.254
	172.18.161.0/24	172.18.161.1 – 172.18.161.254
	172.18.162.0/23	172.18.162.1 – 172.18.163.254
	172.18.164.0/22	172.18.164.1 – 172.18.167.254

Location	Network Address IPv4	Useable IPv4 Range
Japan Unused	172.18.128.0/26	172.18.128.1 – 172.18.128.62
	172.18.128.128/25	172.18.128.129 – 172.18.128.254
	172.18.129.0/24	172.18.129.1 – 172.18.129.254

2. Network Diagram from Draw.io

Europe Router
Net: 172.18.136.0/21
2610:00a8:483f:5102::/64

Technical
NET: 172.18.140.0/22
2610:00a8:483f:5102:0003::/64
GW: 172.18.143.254
2610:00a8:483f:5102:0003::1

Legal
NET: 172.18.136.128/26
2610:00a8:483f:5102:0005::/64
GW: 172.18.136.190
2610:00a8:483f:5102:0005::1

Support
NET: 172.18.136.192/26
2610:00a8:483f:5102:0004::/64
GW: 172.18.136.254
2610:00a8:483f:5102:0004::1

Sales
NET: 172.18.136.64/26
2610:00a8:483f:5102:0002::/64
GW: 172.18.136.126
2610:00a8:483f:5102:0002::1

R&D
NET: 172.18.138.0/23
2610:00a8:483f:5102:0006::/64
GW: 172.18.139.254
2610:00a8:483f:5102:0006::1

Management
NET: 172.18.136.32/27
2610:00a8:483f:5102:0007::/64
GW: 172.18.136.62
2610:00a8:483f:5102:0007::1

Manufacturing
NET: 172.18.137.0/24
2610:00a8:483f:5102:0001::/64
GW: 172.18.137.254
2610:00a8:483f:5102:0001::1

e3 e5 e6
e2 e4 e7
e1 e0 e8

China Router
NET: 172.18.144.0/20
2610:00a8:483f:5103::/64

Sales
NET: 172.18.144.0/26
2610:00a8:483f:5103:0002::/64
GW: 172.18.144.62
2610:00a8:483f:5103:0002::1

Technical
NET: 172.18.152.0/21
2610:00a8:483f:5103:0003::/64
GW: 172.18.159.254
2610:00a8:483f:5103:0003::1

Manufacturing
NET: 172.18.148.0/22
2610:00a8:483f:5103:0001::/64
GW: 172.18.151.254
2610:00a8:483f:5103:0001::1

Support
NET: 172.18.144.128/25
2610:00a8:483f:5103:0004::/64
GW: 172.18.144.254
2610:00a8:483f:5103:0004::1

Legal
NET: 172.18.144.64/26
2610:00a8:483f:5103:0005::/64
GW: 172.18.144.126
2610:00a8:483f:5103:0005::1

R&D
NET: 172.18.146.0/23
2610:00a8:483f:5103:0006::/64
GW: 172.18.147.254
2610:00a8:483f:5103:0006::1

e2 e3
e1 e4
e0 e5
e7 e6

NET: 172.18.136.0/27
2610:00a8:483f:5102:0008::/64
e8: 172.18.136.30
2610:00a8:483f:5102:0008::1
e0: 172.18.136.1
2610:00a8:483f:5102:0008::2

NET: 172.18.160.64/26
2610:00a8:483f:5101:0006::/64
e6: 172.18.160.126
2610:00a8:483f:5101:0006::1
e0: 172.18.160.65
2610:00a8:483f:5101:0006::2

US2 Router
Net: 172.18.160.0/19
2610:00a8:483f:5101::/64

Technical
NET: 172.18.172.0/22
2610:00a8:483f:5101:0002::/64
GW: 172.18.175.254
2610:00a8:483f:5101:0002::1

Support
NET: 172.18.168.0/23
2610:00a8:483f:5101:0003::/64
GW: 172.18.169.254
2610:00a8:483f:5101:0003::1

Global Management
NET: 172.18.170.0/23
2610:00a8:483f:5101:0004::/64
GW: 172.18.171.254
2610:00a8:483f:5101:0004::1

R&D Wifi Mesh
NET: 172.18.176.0/20
2610:00a8:483f:5101:0005::/64
GW: 172.18.191.254
2610:00a8:483f:5101:0005::1

Sales
NET: 172.18.160.0/26
2610:00a8:483f:5101:0001::/64
GW: 172.18.160.62
2610:00a8:483f:5101:0001::1

e3 e2 e6
e4 e1
e5 e0

NET: 172.18.145.0/24
2610:00a8:483f:5103:0007::/64
e7: 172.18.145.254
2610:00a8:483f:5103:0007::1
e4: 172.18.145.1
2610:00a8:483f:5103:0007::2

NET: 172.18.192.32/27
2610:00a8:483f:5100:0002::/64
e0: 172.18.192.33
2610:00a8:483f:5100:0002::2
e3: 172.18.192.62
2610:00a8:483f:5100:0002::1

Sales
NET: 172.18.219.192/26
2610:00a8:483f:5100:0005::/64
GW: 172.18.219.254
2610:00a8:483f:5100:0005::1

NET: 172.18.192.64/26
2610:00a8:483f:5100:0001::/64
e1: 172.18.192.126
2610:00a8:483f:5100:0001::1
e0: 172.18.192.65
2610:00a8:483f:5100:0001::2

Technical
NET: 172.18.240.0/20
2610:00a8:483f:5100:0006::/64
GW: 172.18.255.254
2610:00a8:483f:5100:0006::1

Support
NET: 172.18.220.0/23
2610:00a8:483f:5100:0007::/64
GW: 172.18.221.254
2610:00a8:483f:5100:0007::1

Local Management
NET: 172.18.222.0/23
2610:00a8:483f:5100:0008::/64
GW: 172.18.223.254
2610:00a8:483f:5100:0008::1

Publically Accessible Servers
NET: 172.18.219.128/26
2610:00a8:483f:5100:0010::/64
GW: 172.18.219.190
2610:00a8:483f:5100:0010::1

Wireless
NET: 172.18.224.0/20
2610:00a8:483f:5100:0009::/64
GW: 172.18.239.254
2610:00a8:483f:5100:0009::1

e5
e3 e1
e6 e10 e0 NAT
e7
e8 e9

US1 Router
NET: 172.18.192.0/18
2610:00a8:483f:5100::/64

Japan Router
NET: 172.18.128.0/21
2610:00a8:483f:5104::/64

Sales
NET: 172.18.128.64/26
2610:00a8:483f:5104:0003::/64
GW: 172.18.128.126
2610:00a8:483f:5104:0003::1

R&D
NET: 172.18.132.0/22
2610:00a8:483f:5104:0002::/64
GW: 172.18.135.254
2610:00a8:483f:5104:0002::1

Legal
NET: 172.18.130.0/23
2610:00a8:483f:5104:0001::/64
GW: 172.18.131.254
2610:00a8:483f:5104:0001::1

e4 e3
e0
e1 e2

NET: 132.235.201.128/27
2610:a8:483a::/48
e0: 132.235.201.129
2610:a8:4831::2
e1: 132.235.201.158
2610:a8:483a::1

e1
Internet

3. VyOS route configuration (i.e the "set protocols static" commands).

IPv4

US 1 Router

```
set protocols static route 0.0.0.0/0 next-hop 132.235.201.158
set protocols static route 172.18.160.64/26 next-hop 172.18.192.33
set protocols static route 172.18.136.0/27 next-hop 172.18.192.33
set protocols static route 172.18.145.0/24 next-hop 172.18.192.33
set protocols static route 172.18.192.64/26 next-hop 172.18.192.33
```

US2 Router
```
set protocols static route 172.18.160.0/19 next-hop 172.18.192.33
```

Europe Router
```
set protocols static route 172.18.136.0/21 next-hop 172.18.192.33
```

China Router
```
set protocols static route 172.18.144.0/20 next-hop 172.18.192.33
```

Japan Router
```
set protocols static route 172.18.128.0/21 next-hop 172.18.192.33
```

US 2 Router

```
set protocols static route 0.0.0.0/0 next-hop 172.18.192.62
set protocols static route 172.18.136.0/27 next-hop 172.18.160.65
set protocols static route 172.18.145.0/24 next-hop 172.18.160.65
set protocols static route 172.18.192.64/26 next-hop 172.18.160.65
```

Europe Router
```
set protocols static route 172.18.136.0/21 next-hop 172.18.160.65
```

China Router
```
set protocols static route 172.18.144.0/20 next-hop 172.18.160.65
```

Japan Router
```
set protocols static route 172.18.128.0/21 next-hop 172.18.160.65
```

Europe Router

```
set protocols static route 0.0.0.0/0 next-hop 172.18.160.126
set protocols static route 172.18.145.0/24 next-hop 172.18.136.1
set protocols static route 172.18.192.64/26 next-hop 172.18.136.1
```

China Router
```
set protocols static route 172.18.144.0/20 next-hop 172.18.136.1
```

Japan Router
```
set protocols static route 172.18.128.0/21 next-hop 172.18.136.1
```

China Router

```
set protocols static route 0.0.0.0/0 next-hop 172.18.136.30
set protocols static route 172.18.192.64/26 next-hop 172.18.145.1
```

```
set protocols static route 172.18.128.0/21 next-hop 172.18.145.1
```

Japan Router
```
set protocols static route 0.0.0.0/0 next-hop 172.18.145.254
```

IPv6
US 1 Router
```
set protocols static route6 ::/0 next-hop 2610:a8:483a::1
set protocols static route6 2610:00a8:483f:5101:0006::/64 next-hop 2610:00a8:483f:5100:0002::2
set protocols static route6 2610:00a8:483f:5102:0008::/64 next-hop 2610:00a8:483f:5100:0002::2
set protocols static route6 2610:00a8:483f:5103:0007::/64 next-hop 2610:00a8:483f:5100:0002::2
set protocols static route6 2610:00a8:483f:5100:0001::/64 next-hop 2610:00a8:483f:5100:0002::2
```

US2 Router
```
set protocols static route6 2610:00a8:483f:5101::/64 next-hop 2610:00a8:483f:5100:0002::2
```

Europe Router
```
set protocols static route6 2610:00a8:483f:5102::/64 next-hop 2610:00a8:483f:5100:0002::2
```

China Router
```
set protocols static route6 2610:00a8:483f:5103::/64 next-hop 2610:00a8:483f:5100:0002::2
```

Japan Router
```
set protocols static route6 2610:00a8:483f:5104::/64 next-hop 2610:00a8:483f:5100:0002::2
```

US 2 Router
```
set protocols static route6 ::/0 next-hop 2610:00a8:483f:5100:0002::1
set protocols static route6 2610:00a8:483f:5102:0008::/64 next-hop 2610:00a8:483f:5101:0006::2
set protocols static route6 2610:00a8:483f:5103:0007::/64 next-hop 2610:00a8:483f:5101:0006::2
set protocols static route6 2610:00a8:483f:5100:0001::/64 next-hop 2610:00a8:483f:5101:0006::2
```

Europe Router
```
set protocols static route6 2610:00a8:483f:5102::/64 next-hop 2610:00a8:483f:5101:0006::2
```

China Router
```
set protocols static route6 2610:00a8:483f:5103::/64 next-hop 2610:00a8:483f:5101:0006::2
```

Japan Router
```
set protocols static route6 2610:00a8:483f:5104::/64 next-hop 2610:00a8:483f:5101:0006::2
```

Europe Router
```
set protocols static route6 ::/0 next-hop 2610:00a8:483f:5101:0006::1
set protocols static route6 2610:00a8:483f:5103:0007::/64 next-hop 2610:00a8:483f:5102:0008::2
set protocols static route6 2610:00a8:483f:5100:0001::/64 next-hop 2610:00a8:483f:5102:0008::2
```

China Router
```
set protocols static route6 2610:00a8:483f:5103::/64 next-hop 2610:00a8:483f:5102:0008::2
```

Japan Router

```
set protocols static route6 2610:00a8:483f:5104::/64 next-hop 2610:00a8:483f:5102:0008::2
```

China Router
```
set protocols static route6 ::/0 next-hop 2610:00a8:483f:5102:0008::1
set protocols static route6 2610:00a8:483f:5100:0001::/64 next-hop 2610:00a8:483f:5103:0007::2
```

Japan Router
```
set protocols static route6 2610:00a8:483f:5104::/64 next-hop 2610:00a8:483f:5103:0007::2
```

Japan Router
```
set protocols static route6 ::/0 next-hop 2610:00a8:483f:5103:0007::1
```