

# kathara lab

bgp: multi-homed

<b>Version</b>	1.0
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<b>Description</b>	configuration of a multi-homed network with backup and load sharing; kathara version of a netkit lab

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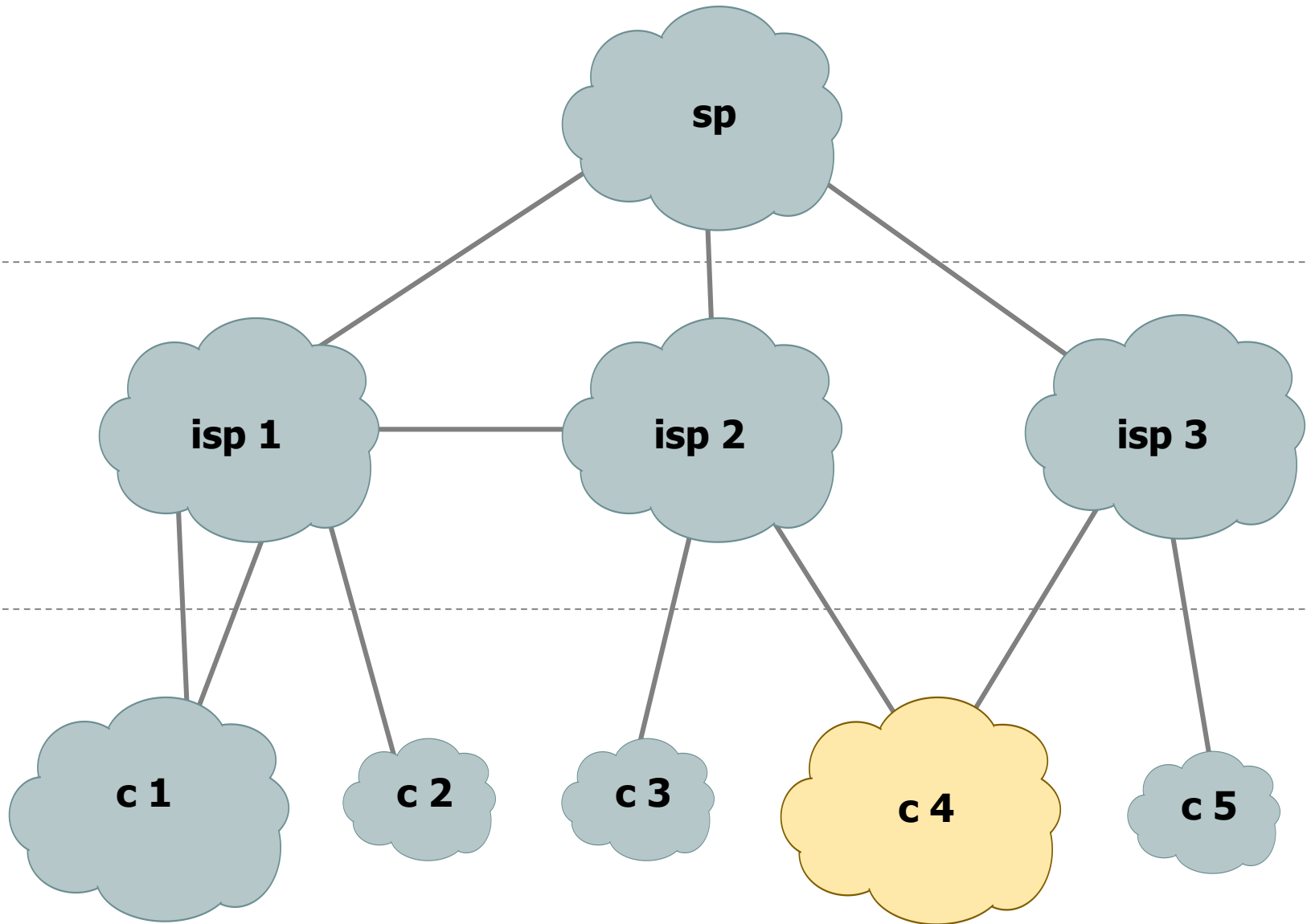
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# multi-homed network

backbone

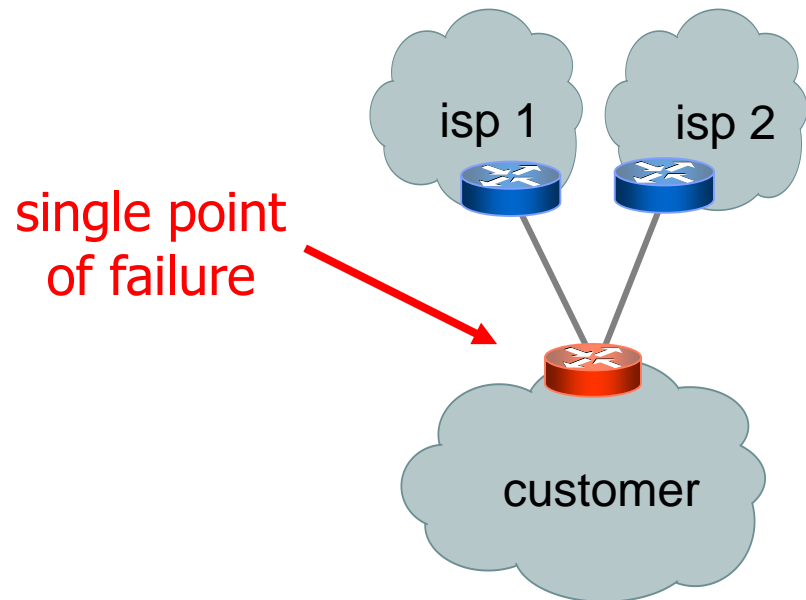
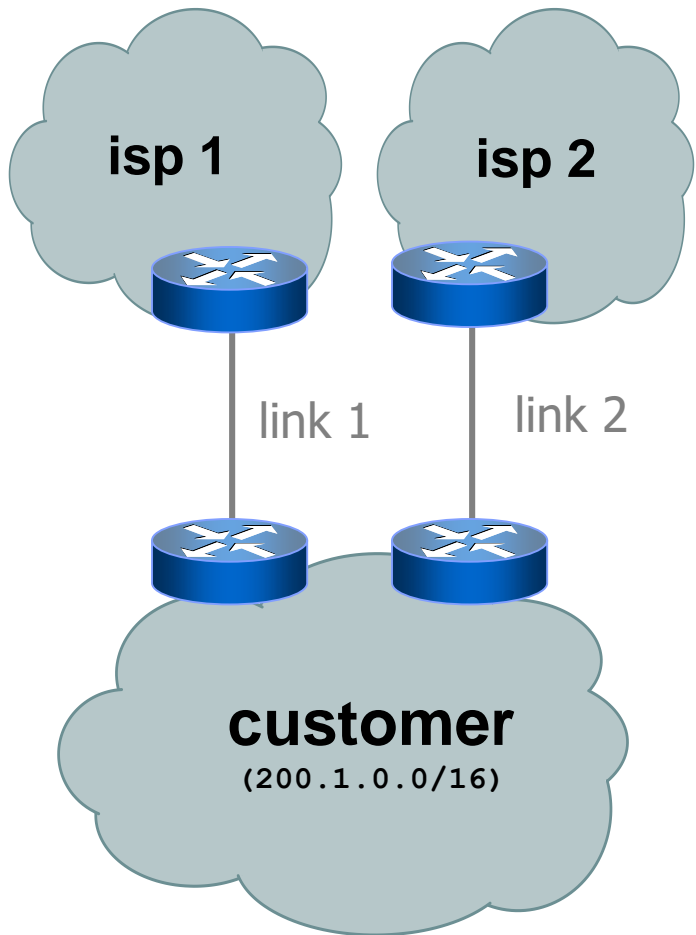
provider

customer



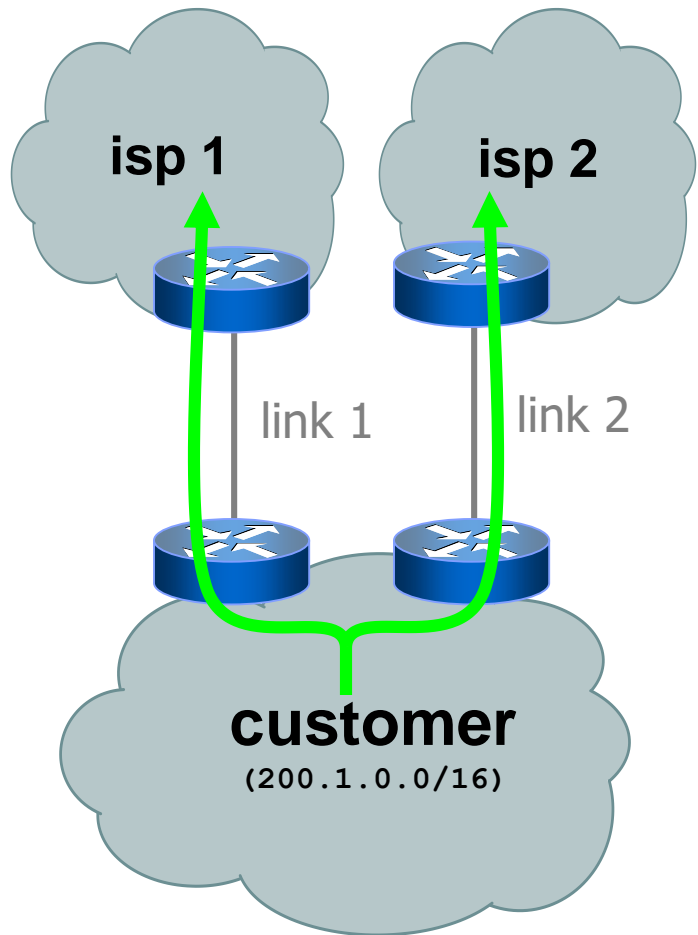
# multi-homed network

- two links to two different providers
- generally two routers are involved in order to avoid single points of failures

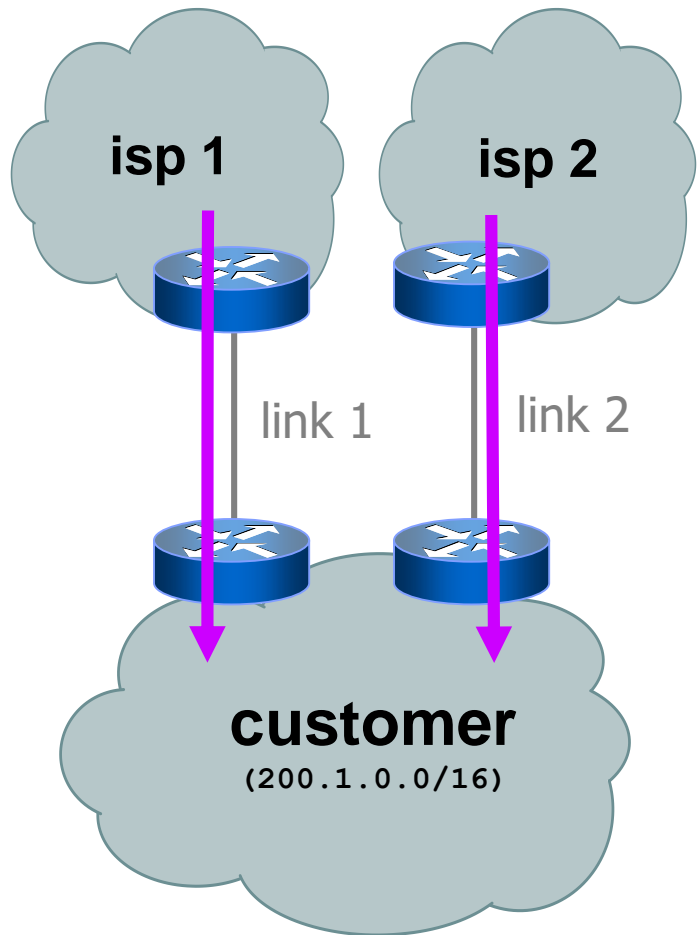


# degrees of freedom

- an outbound packet may be sent through one of the two links in order to reach the internet

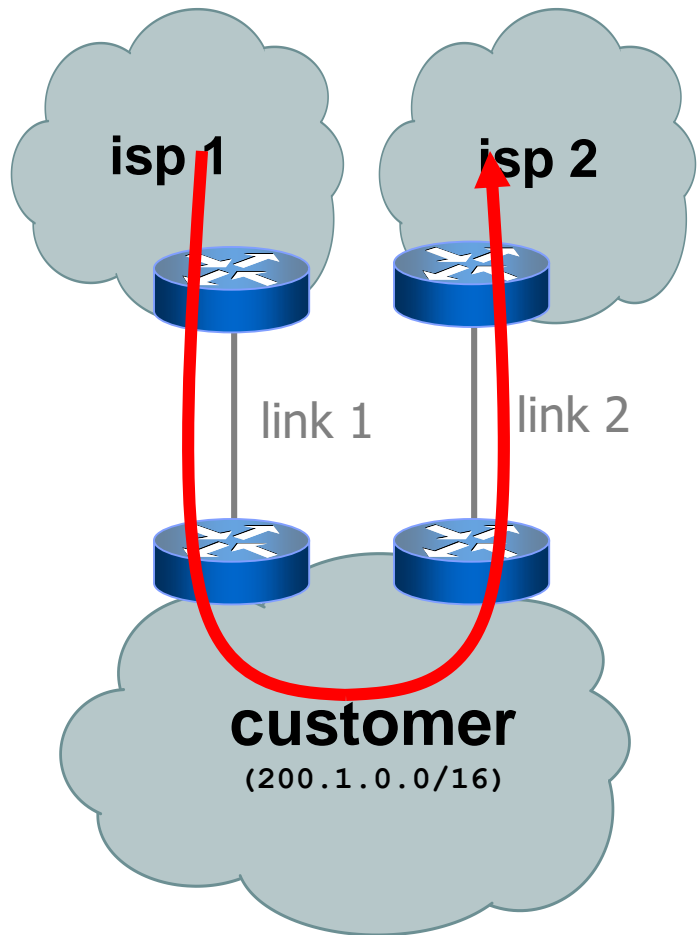


# degrees of freedom



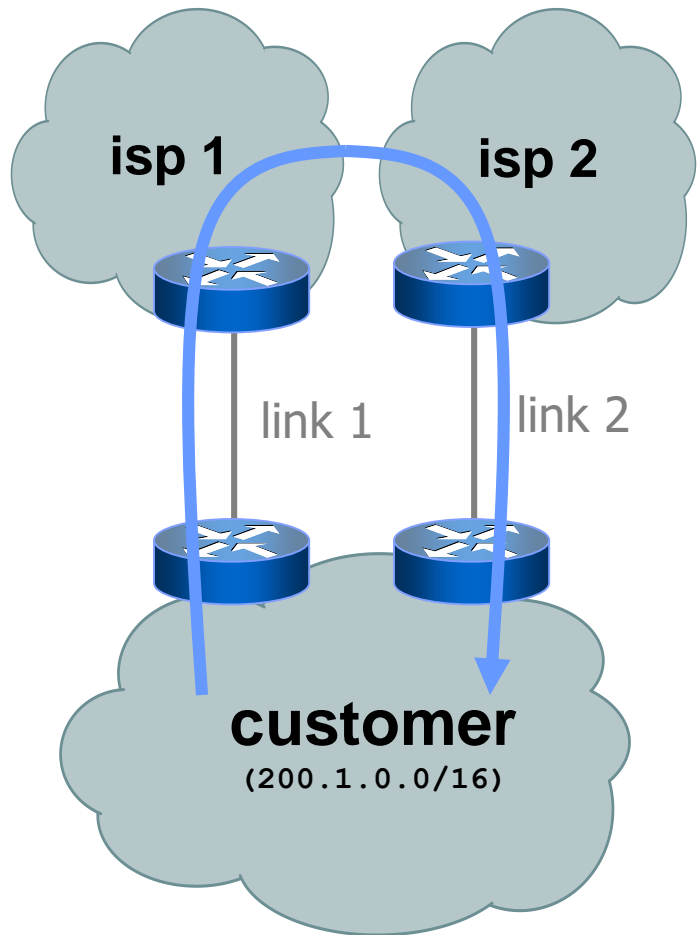
- an outbound packet may be sent through one of the two links in order to reach the internet
- an inbound packet may use any of the two links in order to reach the network

# degrees of freedom



- an outbound packet may be sent through one of the two links in order to reach the internet
- an inbound packet may use any of the two links in order to reach the network
- an internet packet may traverse link 1 and link 2 (or vice versa)

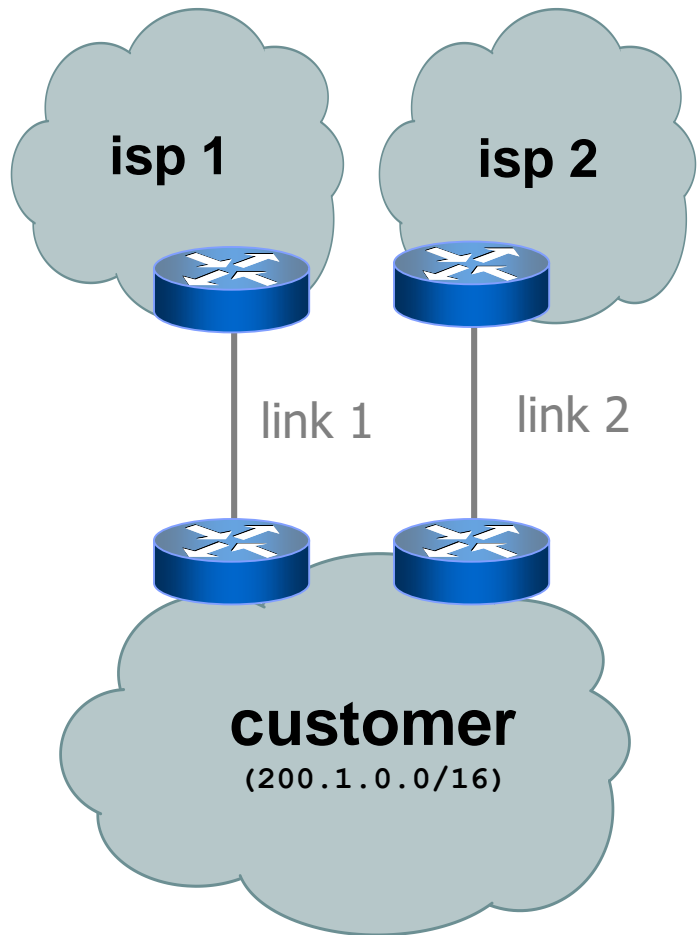
# degrees of freedom



- an outbound packet may be sent through one of the two links in order to reach the internet
- an inbound packet may use any of the two links in order to reach the network
- an internet packet may traverse link 1 and link 2 (or vice versa)
- a local packet may traverse link 1 and link 2 (or vice versa)



# desired policy: loadsharing

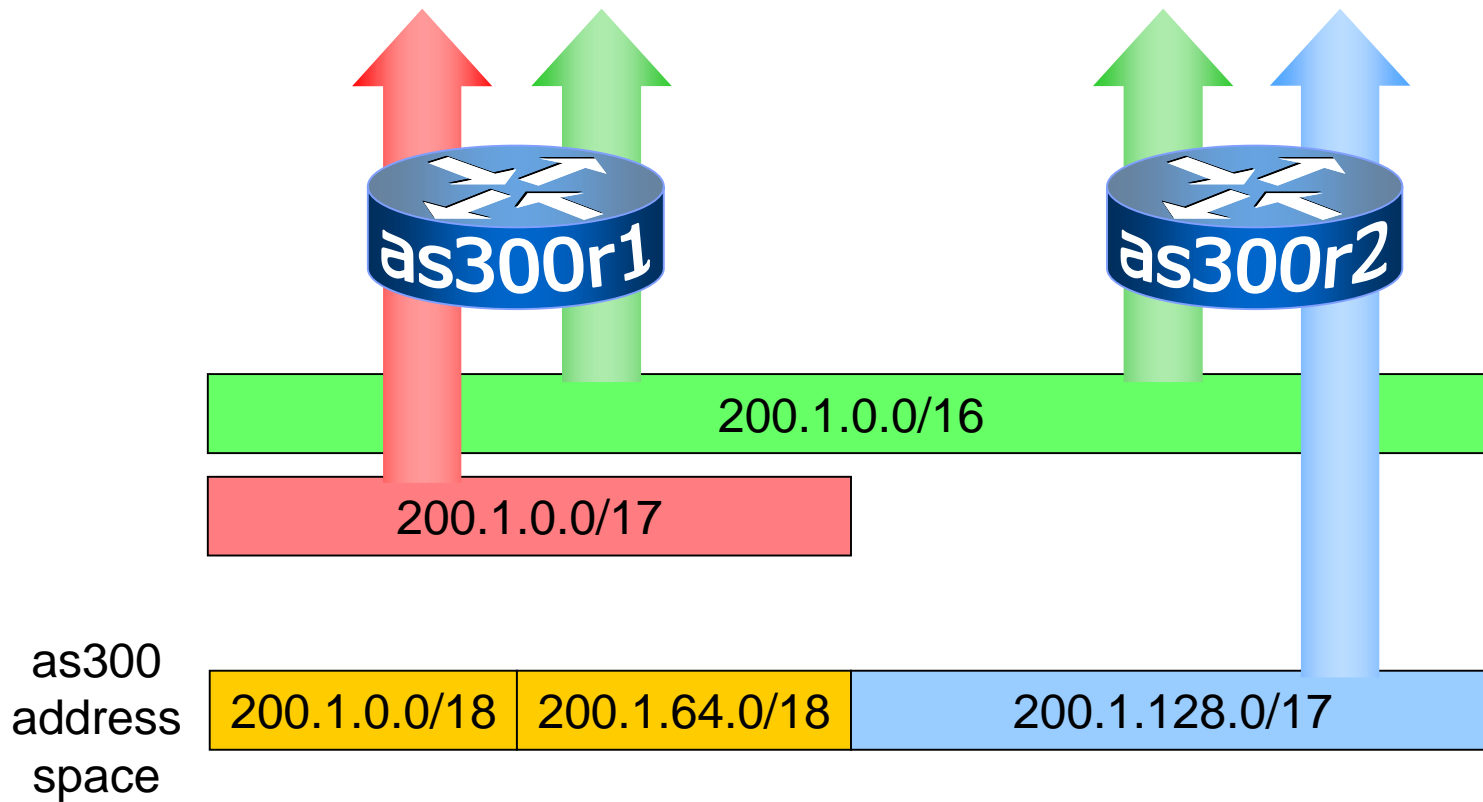


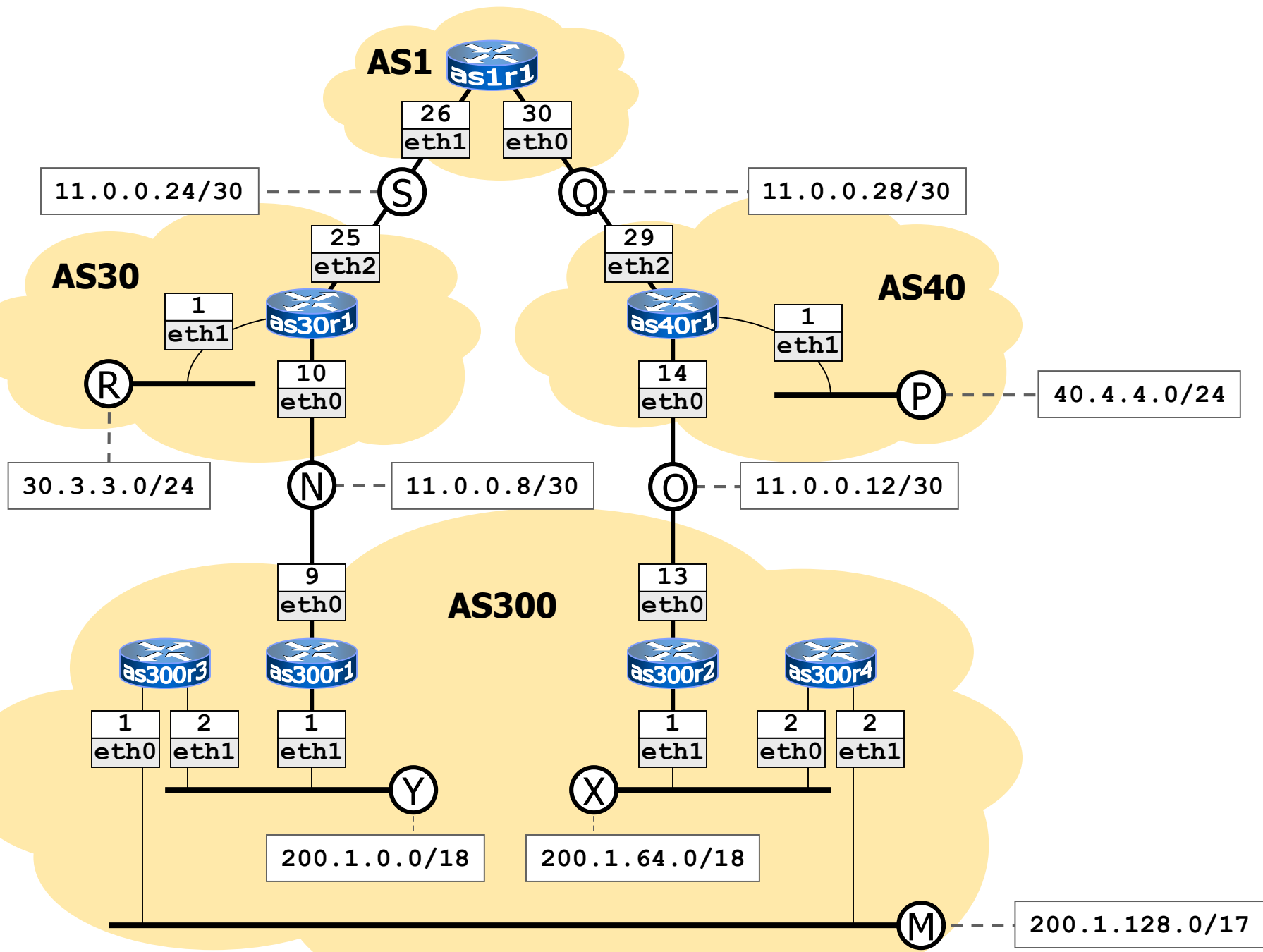
- rule out transit flows
- outbound traffic:
  - half of the internal hosts use link 1
  - the other half uses link 2
- inbound traffic:
  - use link 1 when going to half the internal hosts
  - use link 2 when going to the other half

# using bgp for loadsharing

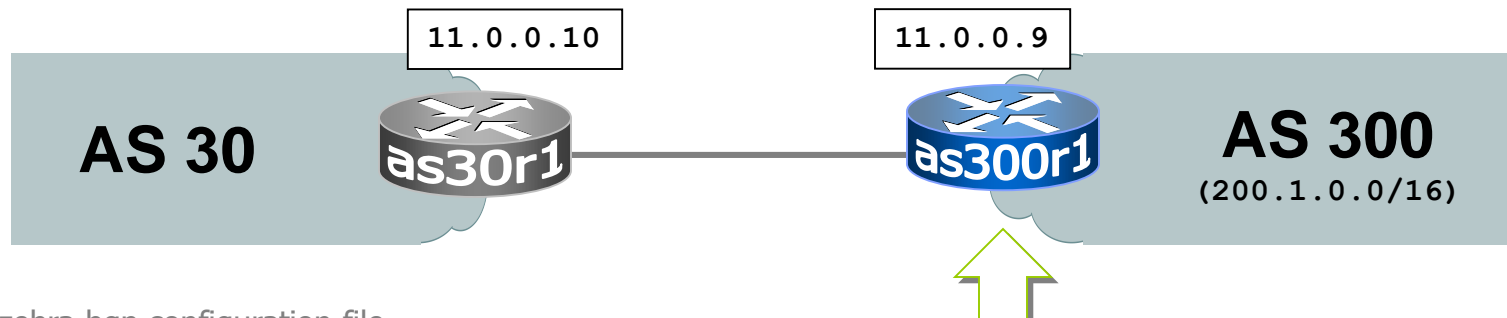
- announce /16 aggregate on each link
- split /16 and announce as two /17s, one on each link
  - rough loadsharing on inbound traffic
  - assumes equal circuit capacity and even spread of traffic across address block
- vary the split until “perfect” loadsharing achieved
- accept the default from upstream
  - basic outbound loadsharing by nearest exit (⇒ no local preference)
  - okay in first approximation as most customer traffic is inbound

# using bgp for loadsharing





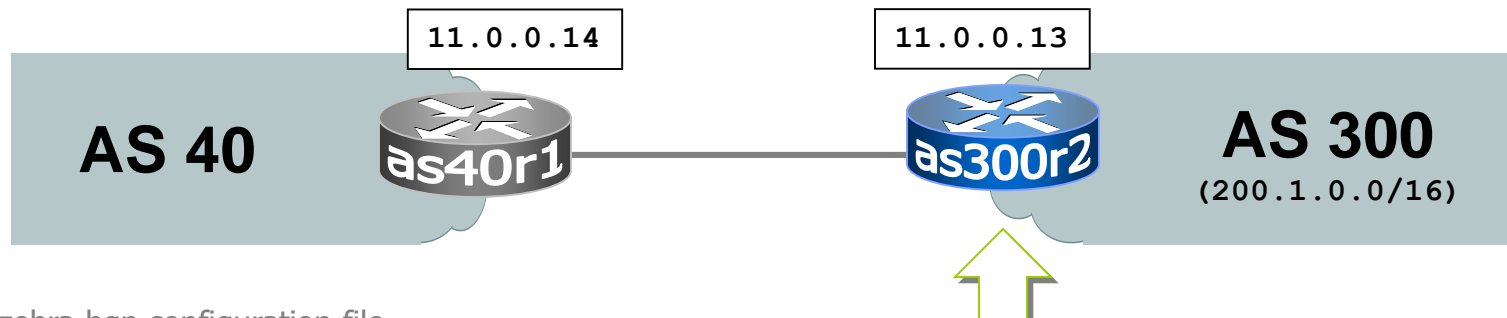
# router as300r1 configuration



zebra bgp configuration file

```
router bgp 300
network 200.1.0.0/16
network 200.1.0.0/17
!
neighbor 11.0.0.10 remote-as 30
neighbor 11.0.0.10 description Router as30r1
neighbor 11.0.0.10 prefix-list mineOutOnly out
neighbor 11.0.0.10 prefix-list defaultIn in
!
ip prefix-list mineOutOnly permit 200.1.0.0/16
ip prefix-list mineOutOnly permit 200.1.0.0/17
ip prefix-list defaultIn permit 0.0.0.0/0
```

# router as300r2 configuration



zebra bgp configuration file

```
router bgp 300
network 200.1.0.0/16
network 200.1.128.0/17
!
neighbor 11.0.0.14 remote-as 40
neighbor 11.0.0.14 description Router as40r1
neighbor 11.0.0.14 prefix-list mineOutOnly out
neighbor 11.0.0.14 prefix-list defaultIn in
!
ip prefix-list mineOutOnly permit 200.1.0.0/16
ip prefix-list mineOutOnly permit 200.1.128.0/17
ip prefix-list defaultIn permit 0.0.0.0/0
```

# loadsharing

## ■ experiment loadsharing

as1r1

```
as1r1:~# traceroute 200.1.0.2
traceroute to 200.1.0.2 (200.1.0.2), 64 hops max, 40 byte packets
 1  11.0.0.25 (11.0.0.25)  2 ms  2 ms  1 ms
 2  11.0.0.9 (11.0.0.9)   1 ms  2 ms  1 ms
 3  200.1.0.2 (200.1.0.2)  2 ms  3 ms  3 ms
as1r1:~# traceroute 200.1.128.2
traceroute to 200.1.128.2 (200.1.128.2), 64 hops max, 40 byte packets
 1  11.0.0.29 (11.0.0.29)  1 ms  2 ms  1 ms
 2  11.0.0.13 (11.0.0.13)  3 ms  2 ms  3 ms
 3  200.1.128.2 (200.1.128.2) 12 ms  3 ms  2 ms
as1r1:~# █
```

## ■ check the rip routing inside as300

# backup

- experiment backup
  - crash collision domain 0 as follows:

```
as300r2
as300r2:~# telnet localhost bgpd
.....
User Access Verification

Password: zebra
bgpd> enable
Password:
bgpd# configure terminal
bgpd(config)# router bgp 300
bgpd(config-router)# neighbor 11.0.0.14 shutdown
bgpd(config-router)# quit
bgpd(config)# quit
bgpd# quit
Connection closed by foreign host.
as300r2:~# route
Kernel IP routing table
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface
11.0.0.12        *               255.255.255.252  U      0      0      0 eth0
200.1.0.0        200.1.64.2     255.255.192.0   UG      3      0      0 eth1
200.1.64.0       *               255.255.192.0   U      0      0      0 eth1
200.1.128.0      200.1.64.2     255.255.128.0   UG      2      0      0 eth1
default         200.1.64.2     0.0.0.0         UG      4      0      0 eth1
```



# backup

## ■ check the routing table of as1r1

as1r1

```
bgpd> show ip bgp
BGP table version is 0, local router ID is 11.0.0.30
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal
Origin codes: i - IGP, e - EGP, ? - incomplete
```

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 0.0.0.0	0.0.0.0	0		32768	i
*> 11.0.0.8/30	11.0.0.25	0		0	30 i
*> 11.0.0.12/30	11.0.0.29	0		0	40 i
*> 11.0.0.24/30	0.0.0.0	0		32768	i
*> 11.0.0.28/30	0.0.0.0	0		32768	i
*> 30.3.3.0/24	11.0.0.25	0		0	30 i
*> 40.4.4.0/24	11.0.0.29	0		0	40 i
*> 200.1.0.0/16	11.0.0.25			0	30 300 i
*> 200.1.0.0/17	11.0.0.25			0	30 300 i

Total number of prefixes 9

```
bgpd> quit
```

Connection closed by foreign host.

```
as1r1:~# traceroute 200.1.128.2
```

traceroute to 200.1.128.2 (200.1.128.2), 64 hops max, 40 byte packets

1	11.0.0.25 (11.0.0.25)	3 ms	2 ms	1 ms
2	11.0.0.9 (11.0.0.9)	3 ms	2 ms	1 ms
3	200.1.0.2 (200.1.0.2)	13 ms	3 ms	2 ms
4	200.1.128.2 (200.1.128.2)	14 ms	3 ms	4 ms