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netkit lab

bgp: stub-as

Version	2.0
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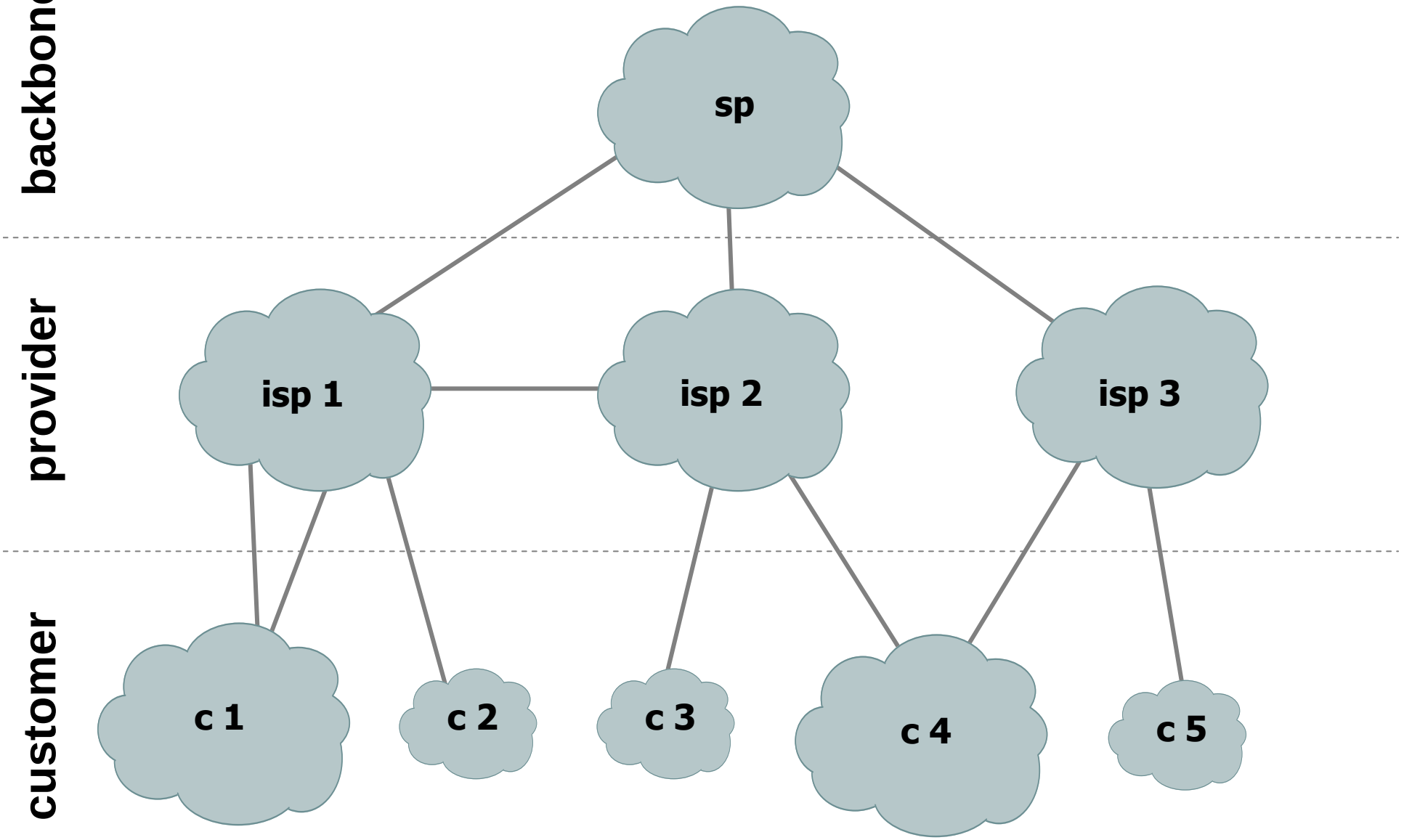
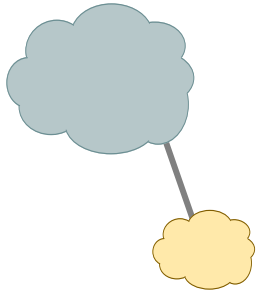
Description	architecture of a stub network

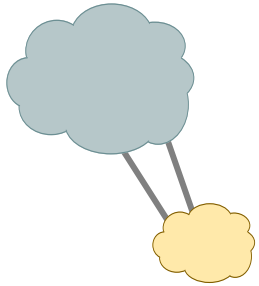
a small internet



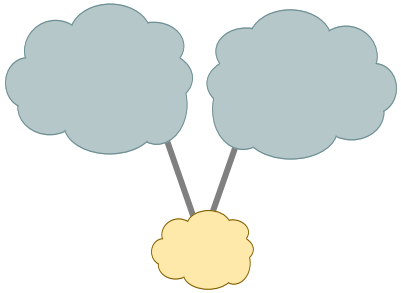
customer classification



- stub networks
  - one link to a single isp

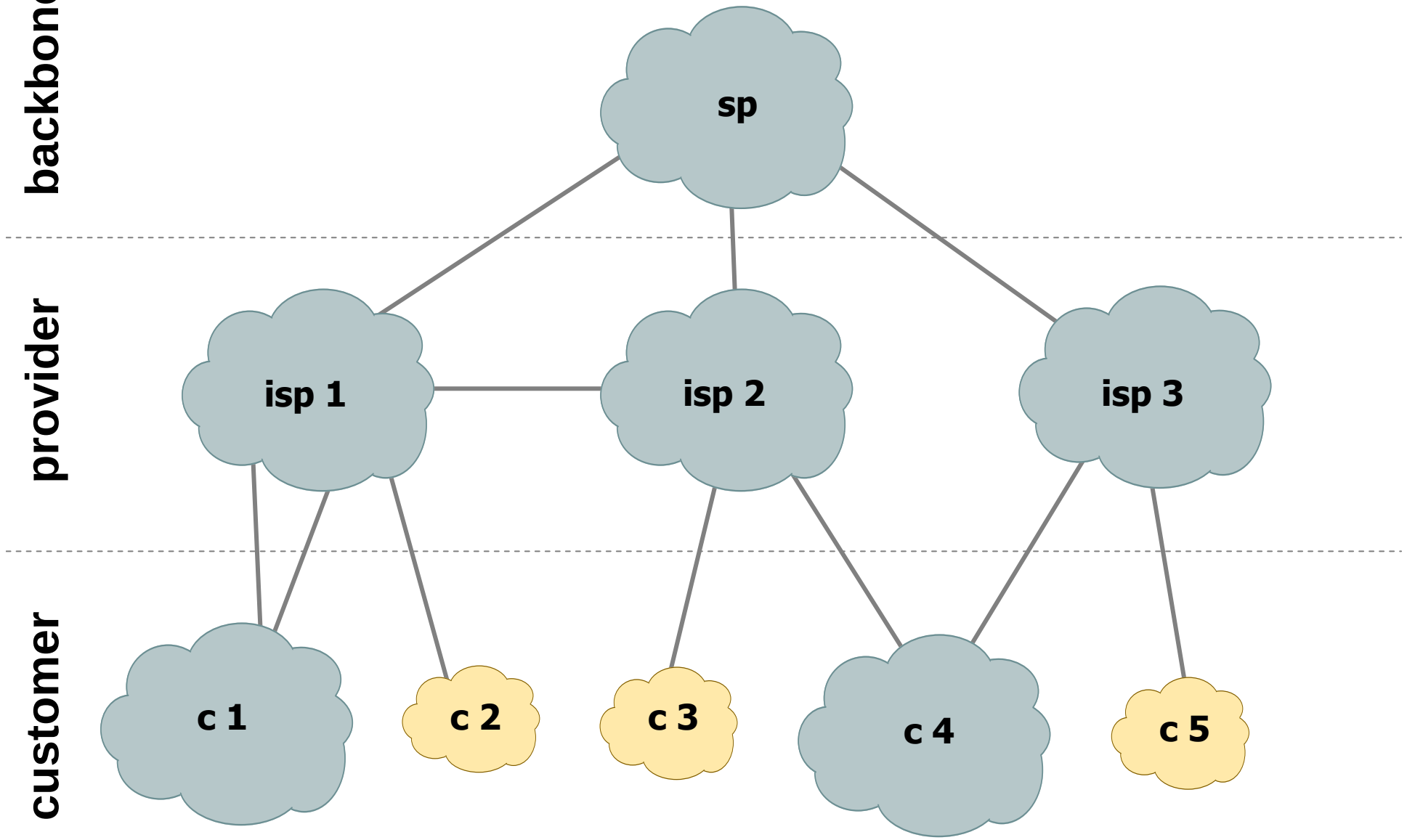


- multi-homed stub network
  - two or more links to the same isp
  - purposes: backup or load sharing

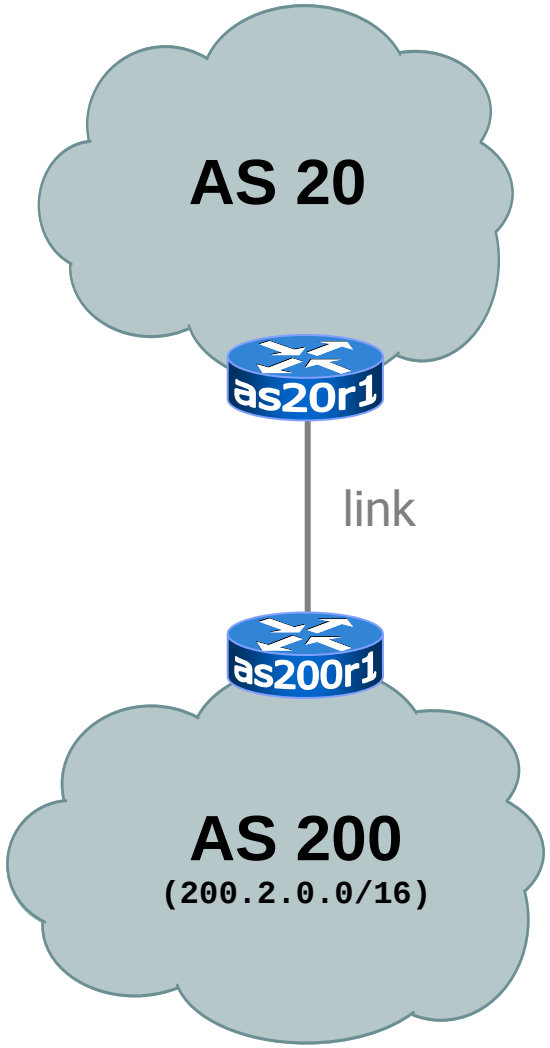


- multi-homed network
  - two or more links to different isps
  - purposes: backup or load sharing

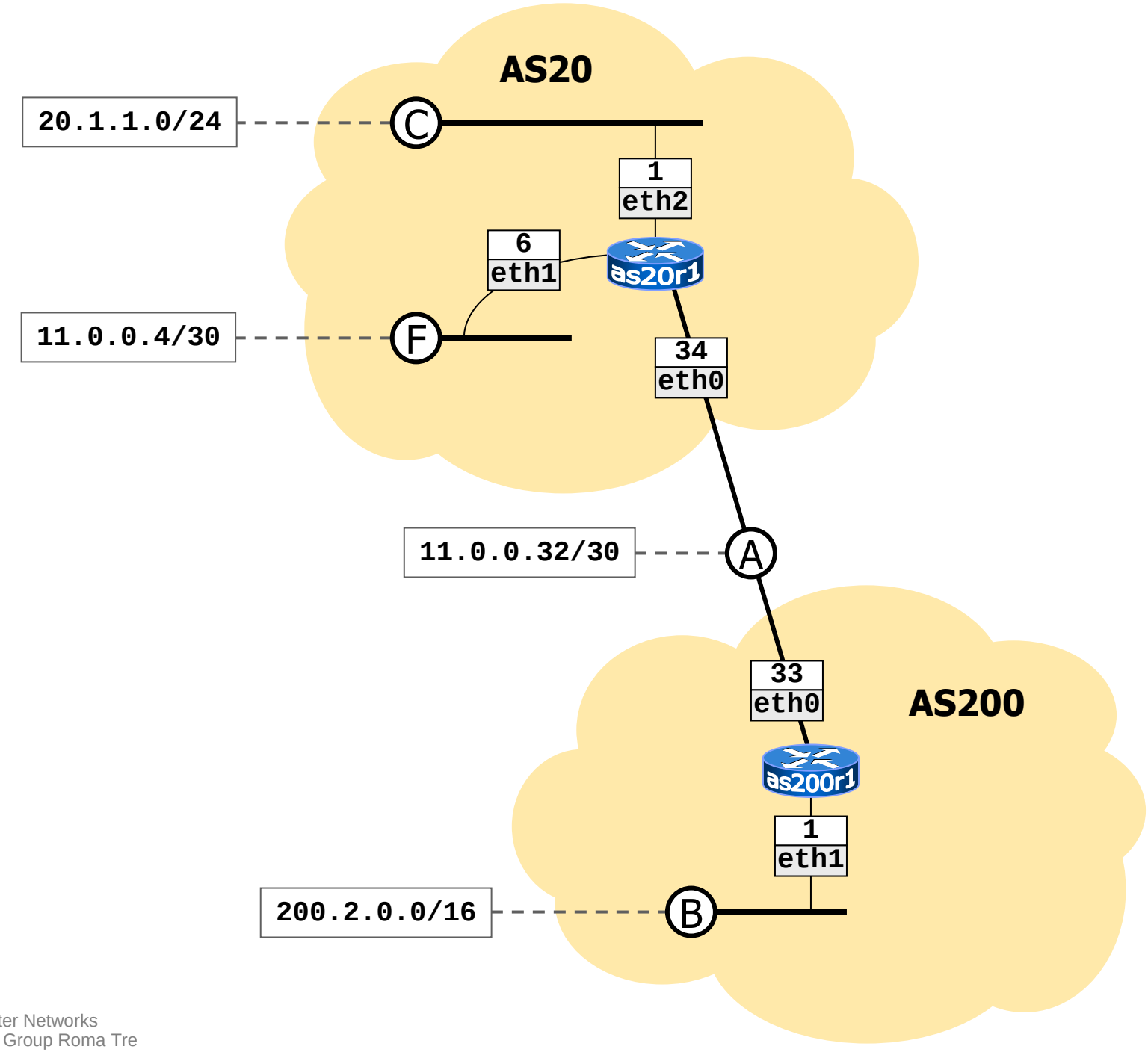
stub networks



stub network architecture



- one of the customer routers is chosen to be the default gateway
- the router is attached to a single router of the isp with a link (possibily more than one)
- a single peering in which as200 announces its route and accepts the default is enough

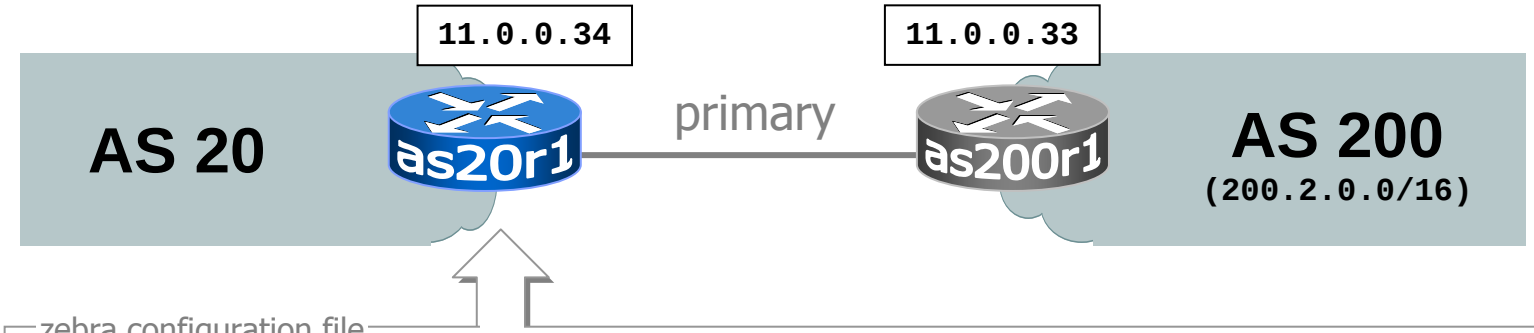


router as200r1 configuration

zebra configuration file

```
! router as200r1 (customer side)
!
router bgp 200
network 200.2.0.0/16
neighbor 11.0.0.34 remote-as 20
neighbor 11.0.0.34 description Router as20r1
```

router as20r1 configuration



zebra configuration file

```
! router as20r1 (isp side)
router bgp 20
network 20.1.1.0/24
network 0.0.0.0/0
neighbor 11.0.0.33 remote-as 200
neighbor 11.0.0.33 description Router as200r1
neighbor 11.0.0.33 default-originate
neighbor 11.0.0.33 prefix-list customerIn in
neighbor 11.0.0.33 prefix-list defaultOut out
!
ip prefix-list customerIn permit 200.2.0.0/16
ip prefix-list defaultOut permit 0.0.0.0/0
```

about **`default-originate`**

- in zebra, using **`network 0.0.0.0/0`** is enough to
  - place a default route in the local bgp routing table
  - announce it
- using **`default-originate`** for a specific neighbor
  - does not place a default route in the local bgp routing table
  - announces the default route to that neighbor, regardless of the presence of **`network 0.0.0.0/0`** in the local router configuration

about **`default-originate`**

- **`network 0.0.0.0/0`** may be used at the top of the isp hierarchy to originate the default route
- **`network 0.0.0.0/0`** should **not** be used at intermediate levels of the hierarchy
  - otherwise, routers would prefer the locally originated default route and remove the one offered by their upstream from the forwarding table
- using **`default-originate`** makes the default route appear as if it were originated by the upstream, even if it is not

default-originate and **route-maps**

- a default route originated with **network 0.0.0.0/0** is handled like any other route
  - **route-maps** used with a specific neighbor are applied to the default route as well
- a default route originated with **default-originate** is processed by a different **route-map**:

command syntax

```
neighbor <neighbor-ip> default-originate route-map
   <r-map-name> in
```

command syntax

```
neighbor <neighbor-ip> default-originate route-map
   <r-map-name> out
```

stub as: lab

- start the lab

host machine

```
user@localhost:~$ cd netkit-lab_bgp-stub-as
user@localhost:~/netkit-lab_bgp-stub-as$ lstart
```

- check the bgpd configuration file

as20r1

```
as20r1:~# less /etc/zebra/bgpd.conf
```

- check the bgpd log file

as20r1

```
as20r1:~# less /var/log/zebra/bgpd.log
```

stub as: lab

- check the routing table of as20r1

as20r1

```
as20r1:~# route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
11.0.0.32       *               255.255.255.252 U     0      0        0 eth0
11.0.0.4        *               255.255.255.252 U     0      0        0 eth1
20.1.1.0        *               255.255.255.0   U     0      0        0 eth2
200.2.0.0       11.0.0.33       255.255.0.0     UG    0      0        0 eth0
as20r1:~# telnet localhost zebra
.....
User Access Verification

Password: zebra
Router> show ip route
Codes: K - kernel route, C - connected, S - static, R - RIP, O - OSPF,
       B - BGP, > - selected route, * - FIB route

C>* 11.0.0.4/30 is directly connected, eth1
C>* 11.0.0.32/30 is directly connected, eth0
C>* 20.1.1.0/24 is directly connected, eth2
C>* 127.0.0.0/8 is directly connected, lo
B>* 200.2.0.0/16 [20/0] via 11.0.0.33, eth0, 00:03:22
Router>
```

stub as: lab

- check the bgpd cli (command line interface)

as20r1

```
as20r1:~# telnet localhost bgpd
.....
User Access Verification

Password: zebra
bgpd> show ip bgp neighbors
BGP neighbor is 11.0.0.33, remote AS 200, local AS 20, external link
 Description: Router as200r1
  BGP version 4, remote router ID 200.2.0.1
  BGP state = Established, up for 00:00:24
  Last read 00:00:23, hold time is 180, keepalive interval is 60 seconds
.....
bgpd> show ip bgp
BGP table version is 0, local router ID is 20.1.1.1
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
*> 20.1.1.0/24      0.0.0.0                  0         32768 i
*> 200.2.0.0/16     11.0.0.33                0             0 200 i

Total number of prefixes 3
bgpd>
```

stub as: lab

- perform several pings on the routers
- terminate the lab