

kathara lab

bgp: stub-as with frr

Version	1.0
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Description	architecture of a stub network; kathara version of a netkit lab

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preconditions

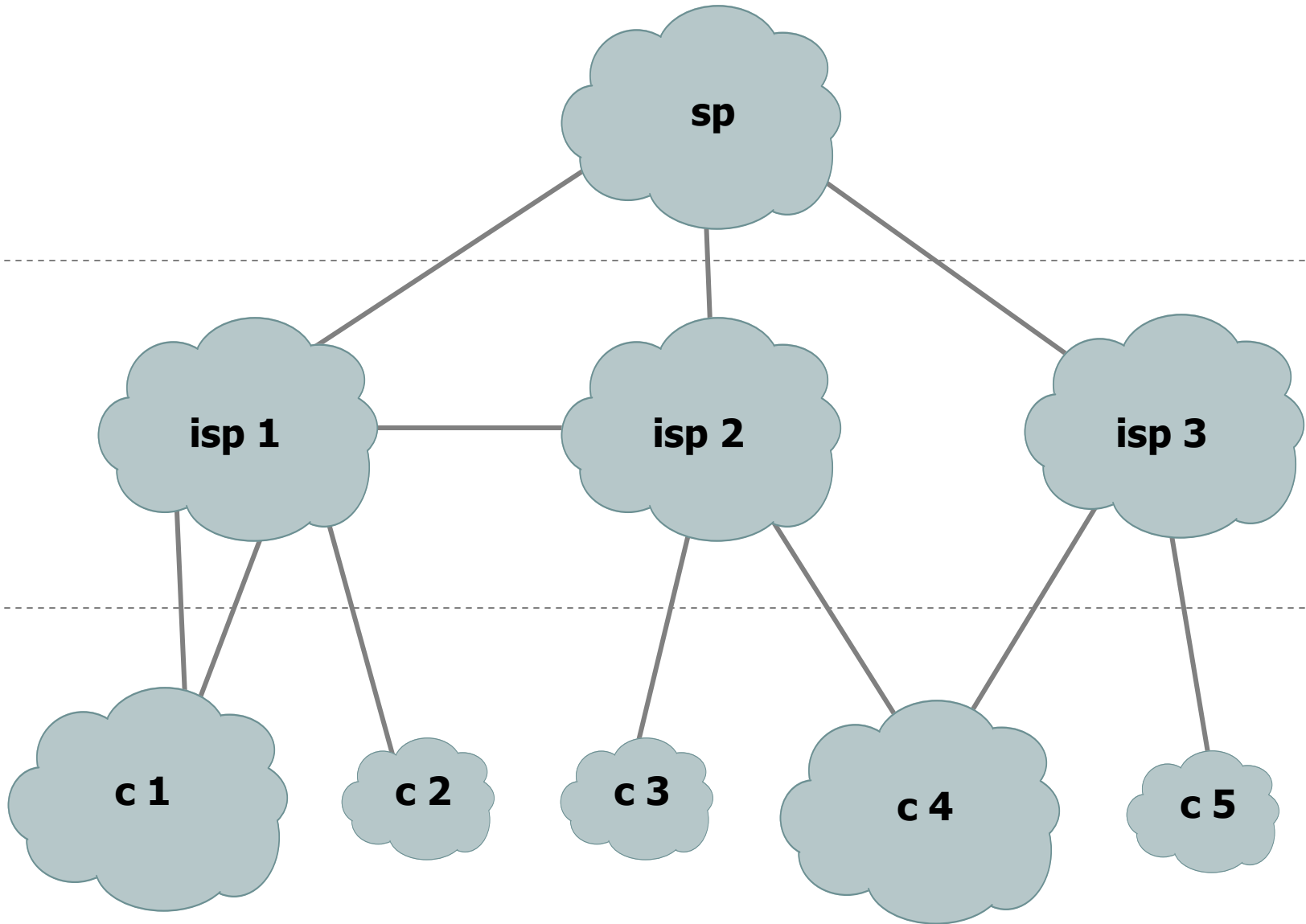
- for this lab we assume you have chosen “kathara/frr” as the default image of your Kathará installation
 - execute “kathara settings”
 - select “choose default image”
 - select “kathara/frr”
 - exit from the settings procedure

a small internet

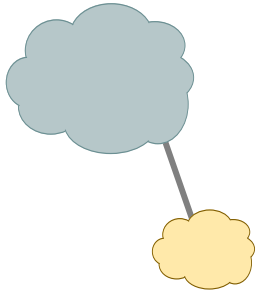
backbone

provider

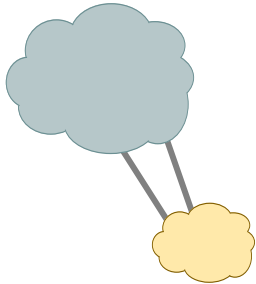
customer



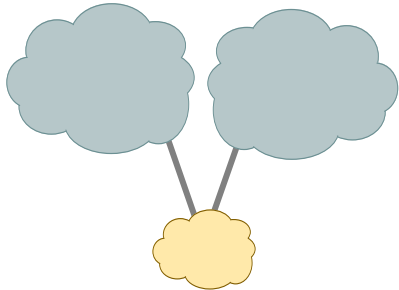
customer classification



- 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



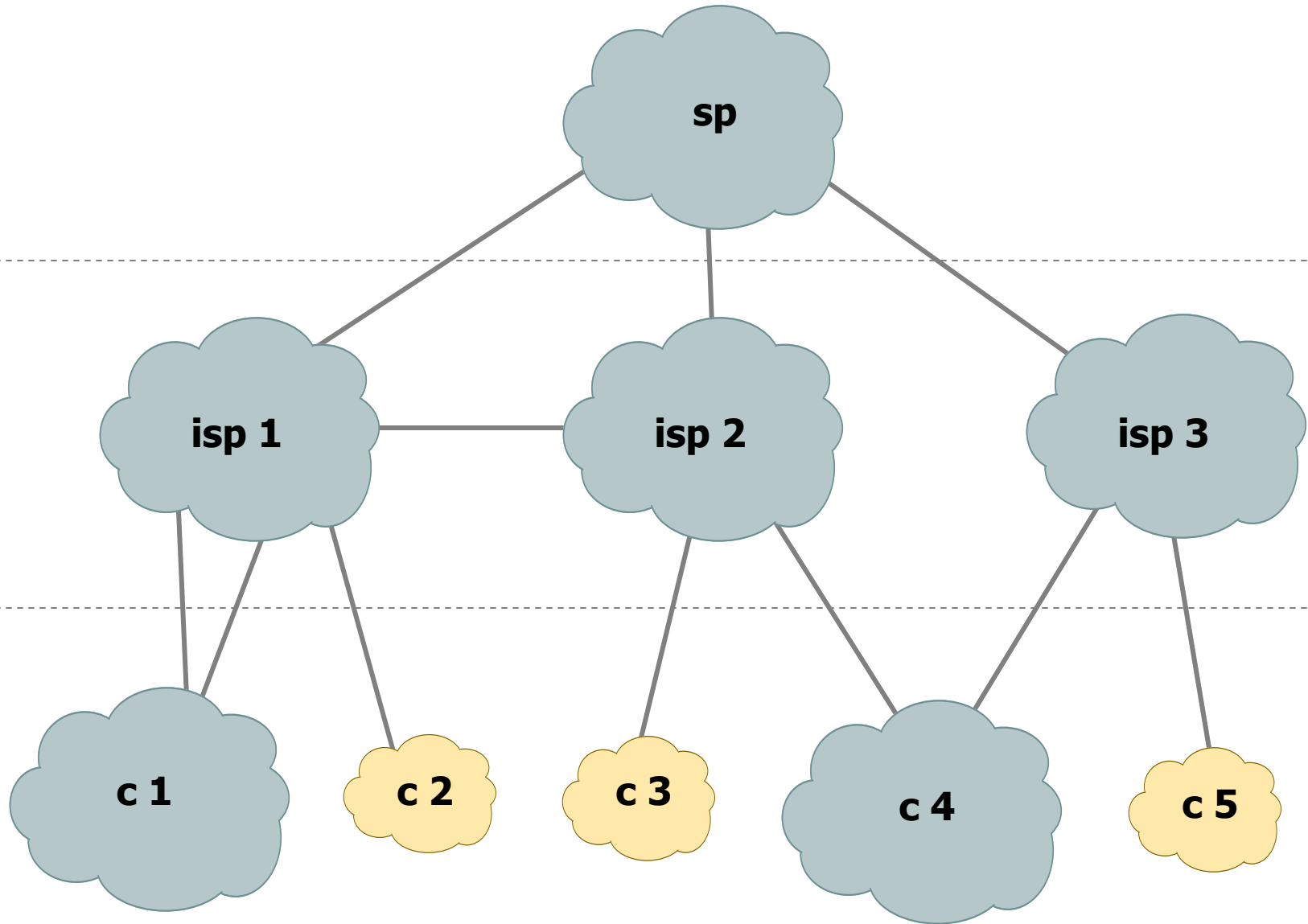
- multi-homed network
 - two or more links to different isps
 - purposes: backup or load sharing

stub networks

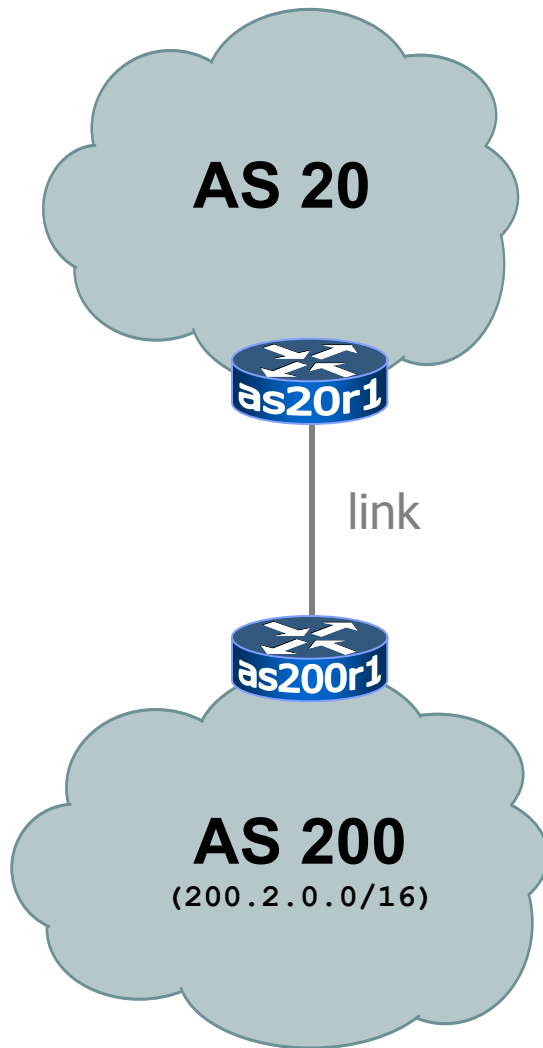
backbone

provider

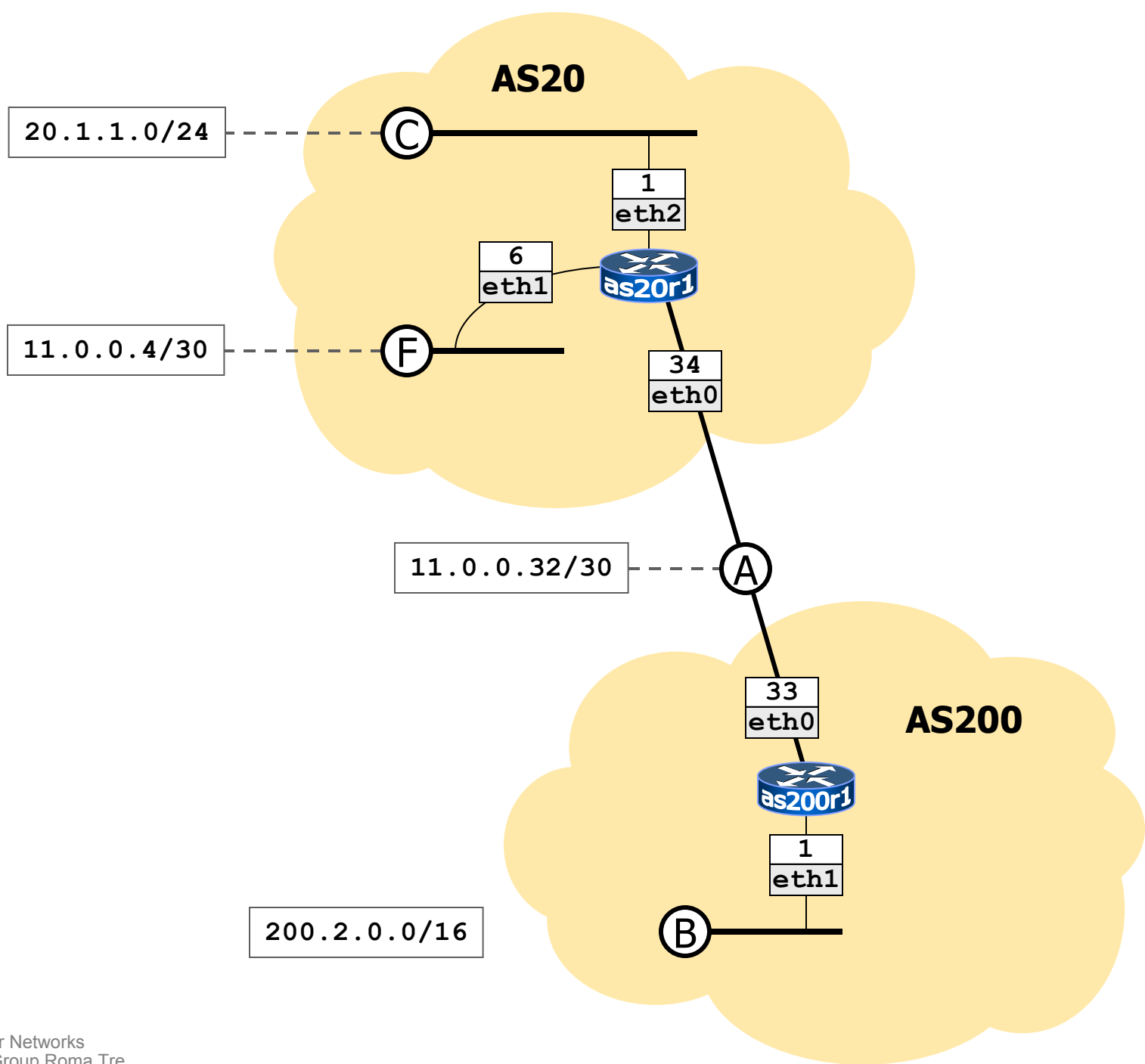
customer



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 (possibly more than one)
- a single peering in which as200 announces its route and accepts the default is enough



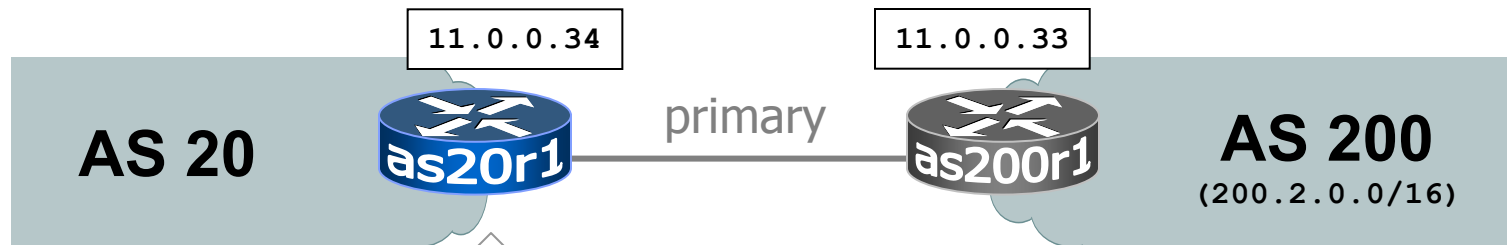
router as200r1 configuration



— frr configuration file —

```
! router as200r1 (customer side)
!
router bgp 200
no bgp ebgp-requires-policy
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



— frr configuration file —

```
! router as20r1 (isp side)
router bgp 20
no bgp ebgp-requires-policy
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
!
network 20.1.1.0/24
network 0.0.0.0/0
!
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—

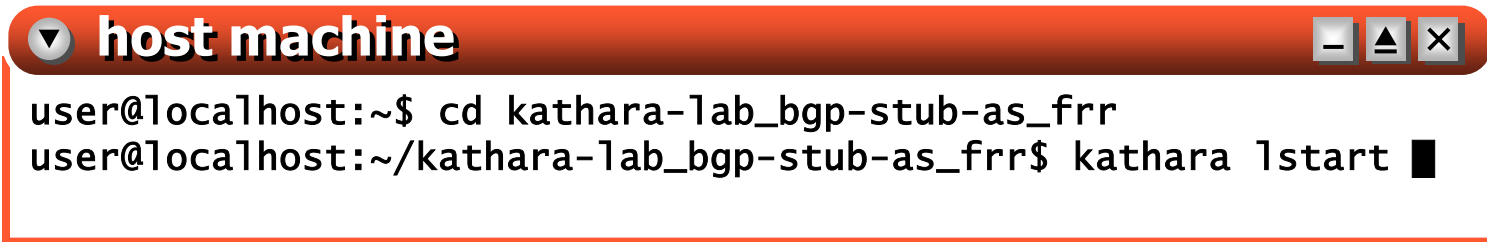
```
neighbor <neighbor-ip> default-originate route-map  
    <r-map-name> in
```

—command syntax—

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

stub as: lab

- start the lab



```
▼ host machine
user@localhost:~$ cd kathara-lab_bgp-stub-as_frr
user@localhost:~/kathara-lab_bgp-stub-as_frr$ kathara 1start █
```

- check the frr configuration file



```
▼ as20r1
as20r1:~# less /etc/frr/frr.conf █
```

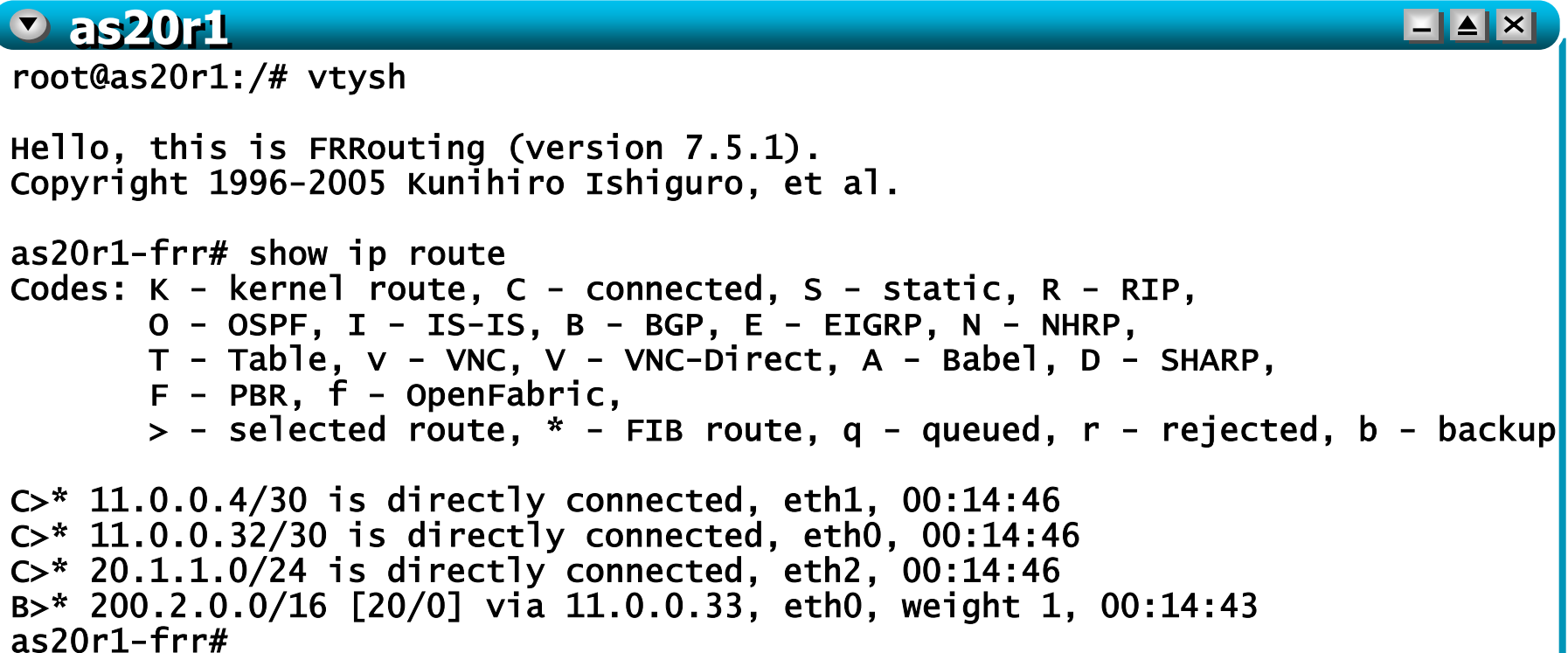
- check the frr log file



```
▼ as20r1
as20r1:~# less /var/log/frr/frr.log █
```

stub as: lab

- check the routing table of as20r1



```
as20r1
root@as20r1:/# vtysh

Hello, this is FRRouting (version 7.5.1).
Copyright 1996-2005 Kunihiro Ishiguro, et al.

as20r1-frr# show ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, E - EIGRP, N - NHRP,
       T - Table, v - VNC, V - VNC-Direct, A - Babel, D - SHARP,
       F - PBR, f - OpenFabric,
       > - selected route, * - FIB route, q - queued, r - rejected, b - backup

C>* 11.0.0.4/30 is directly connected, eth1, 00:14:46
C>* 11.0.0.32/30 is directly connected, eth0, 00:14:46
C>* 20.1.1.0/24 is directly connected, eth2, 00:14:46
B>* 200.2.0.0/16 [20/0] via 11.0.0.33, eth0, weight 1, 00:14:43
as20r1-frr#
```

stub as: lab

■ check the bgp status

▼ as20r1



```
as20r1-frr# show ip bgp neighbors
BGP neighbor is 11.0.0.33, remote AS 200, local AS 20, external link
  Description: Router as200r1
  Hostname: as200r1
  . . . . .
as20r1-frr# show ip bgp
BGP table version is 3, local router ID is 20.1.1.1, vrf id 0
Default local pref 100, local AS 20
Status codes:  s suppressed, d damped, h history, * valid, > best, = multipath,
                i internal, r RIB-failure, S Stale, R Removed
Nexthop codes: @NNN nexthop's vrf id, < announce-nh-self
Origin codes:  i - IGP, e - EGP, ? - incomplete
```

	Network	Next Hop	Metric	LocPrf	Weight	Path
*>	0.0.0.0/0	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

```
Displayed 3 routes and 3 total paths
as20r1-frr#
```


stub as: lab

- perform several pings on the routers
- terminate the lab



```
▼ host machine
user@localhost:~/kathara-lab_bgp-stub-as_frr$ kathara 1clean
```