



Available time: 150 minutes.

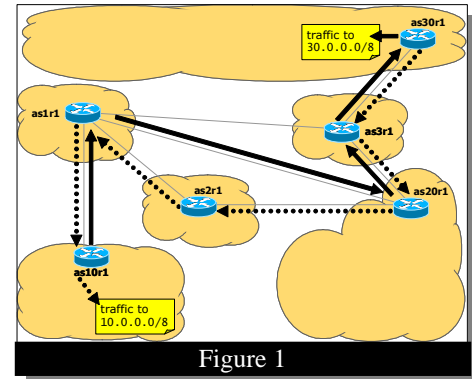
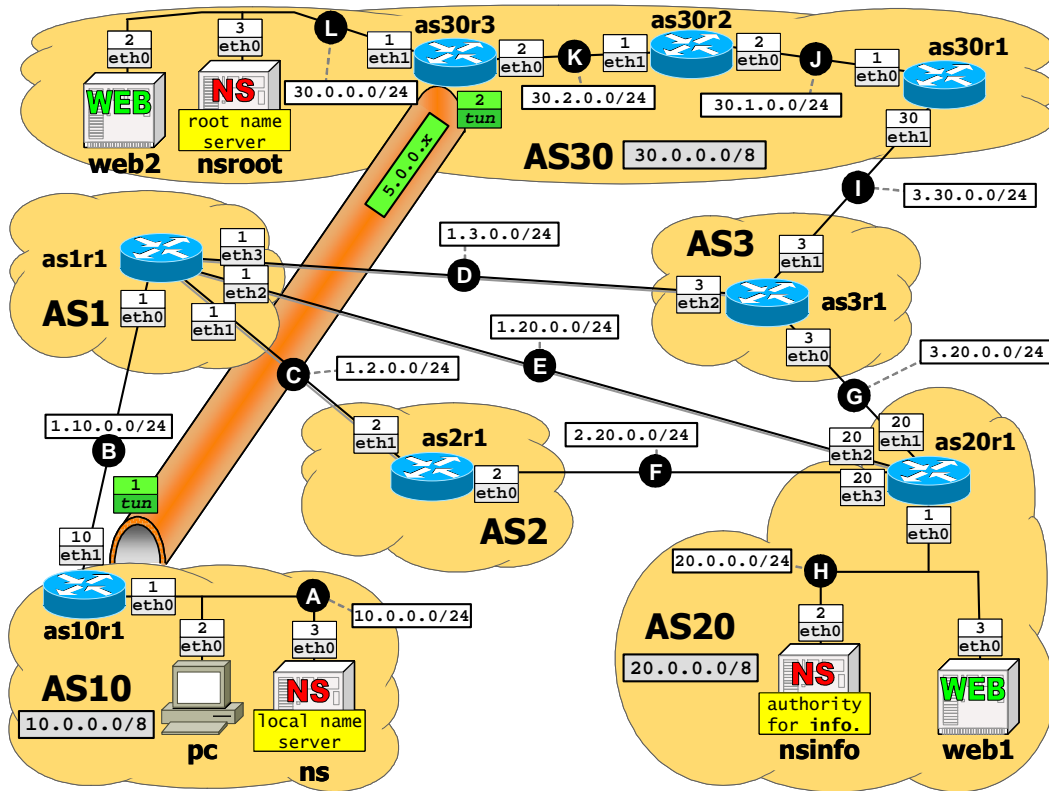


Figure 1

TUNNEL SETUP COMMANDS

- ip tunnel add *tunnelName* mode ipip remote *remIP* local *locIP* ttl 20
- ip link set *tunnelName* up
- ip addr add *localTunnelIP* peer *remoteTunnelIP* dev *tunnelName*

Warning: do not use an interface on subnet 30.0.0.0/24, which is reached through the tunnel, as one of the tunnel's endpoints (*remIP*, *locIP*).

Using Netkit, implement the network depicted in the figure and described below (you can use the following items as a checklist).

- Every host has a statically configured default route.
- Routing between different Autonomous Systems is implemented by using BGP.
 - No routers announce the default route (0.0.0.0/0) or apply filters.
 - All peering LANs are announced in BGP. AS10, AS20, and AS30 also announce their own subnets (in gray).
 - as1r1, as2r1, as3r1, and as20r1 apply preferences to direct traffic between AS10 and AS30 as indicated in Figure 1.
- Internal routing within AS30 is implemented by using OSPF. All router interfaces belong to area 0.0.0.0 (backbone).
- web1 and web2 are web servers that host a default web page.
- ns is local name server for AS10; nsroot is root name server; nsinfo is authoritative name server for info. The only relevant name is web.info, which is associated with the IP addresses of both web servers, realizing a load balancing policy.
- An IPv4-in-IPv4 tunnel is established between as10r1 and as30r3.
 - The tunnel is used as a “shortcut” solely for traffic directed to 30.0.0.2.
 - Routing towards the tunnel is implemented statically.

Goals:

- All routers, as well as the pc, must be able to reach every IP address on the network.
- Traffic from AS10 to AS30 and from AS30 to AS10 must preferably follow the paths in Figure 1.
- pc must be able to access the web page hosted by web.info by using the links web browser.
- pc must be able to reach host 30.0.0.2 through the tunnel, and every other IP address using plain IP routing.