There is an IPv4-in-IPv4 tunnel between web1 and web2. Routing between different ASes is implemented by using BGP. All routers must be able to reach any IP addresses in the network.

Internal routing within AS1 is implemented by using OSPF. All router interfaces belong to area 1.0.0.0/8 (backbone).

There is an IPv4-in-IPv4 tunnel between pc and as1r1. The tunnel is used exclusively for sending traffic from pc to web1 (and is not used in the opposite direction).

In-tunnel routing is implemented statically (in addition to any other existing routing mechanisms).

**Goals:**
- All routers must be able to reach any IP addresses in the network.
- Traffic from AS5 to AS1 and from AS1 to AS5 must preferably flow along the paths in Figure 1.
- pc must be able to access the web page served by server.com using the links browser.
- pc must communicate with web1 by using the tunnel.

**Commands for Configuring Tunnels**

- ip tunnel add tunname mode ipip remote remTunnelIP local locIP ttl 20
- ip link set tunname up
- ip addr add locTunnelIP peer remTunnelIP dev tunname

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

- Remember to configure a default route on the end hosts.
- None of the routers announce the default route (0.0.0.0/0) or apply filters.
- All peering LANs are announced in BGP. AS1, AS4, and AS5 also announce their own subnet (in gray).
- as2r1, as3r1, as4r1, and as5r1 apply preferences to direct traffic between AS1 and AS5 as indicated in Figure 1.
- Internal routing within AS1 is implemented by using OSPF. All router interfaces belong to area 1.0.0.0/8 (backbone).
- web1 and web2 are web servers running Apache. They just serve a default web page.
- ns is the local name server within AS5; ns-root is the root name server; ns-com is the authority for com. The only requested name is server.com, which resolves to both web servers, implementing a DNS-based load balancing policy.
- The tunnel is used exclusively for sending traffic from pc to web1 (and is not used in the opposite direction).
- In-tunnel routing is implemented statically (in addition to any other existing routing mechanisms).