Figure 1

IP

- Only the last byte of the address is specified next to the interfaces.
- All the nodes are IPv4-only, except **ipv6-web**, which is IPv6-only, and **as1r1**, **as2r1** and **client**, which are dual stack.
- **Nodes that act as IPv6 routers must be enabled to do so by using the command specified in the box alongside.**
- IPv6 routing is implemented statically.

IGP and BGP

- **AS1**'s internal network runs RIP.
- BGP peering LANs and networks internal to each AS (indicated in gray) must be announced in BGP.
- BGP policies must be such that <u>traffic</u> is routed as specified in Figure 1.
- No routers announce the default route **0/0**, apply customer-provider policies, or filter BGP announcements.
- IPv6 subnets must not be announced by any routers, either in RIP or in BGP.

USEFUL COMMANDS (parts in square brackets are optional):

- To assign the IPv6 address **ipv6addr/mask** to interface **interface**:
  ```
  ifconfig interface up
  ifconfig interface add ipv6addr/mask
  ```
- To enable a network node to behave as an IPv6 router:
  ```
  echo 1 >/proc/sys/net/ipv6/conf/all/forwarding
  ```
- To add a static route towards **ipv6addr[/mask]**:
  ```
  route -A inet6 add ipv6addr[/mask] [gw nexthop] [dev interface]
  ```
- To display the IPv6 routing table (which is different from the IPv4 one):
  ```
  ip -6 route or, alternatively, route -A inet6
  ```
- To set up an IPv6-in-IPv4 tunnel called **tunnelName** between **ipv4LocalAddr** and **ipv4RemoteAddr** (note: the same configuration must be applied to both endpoints):
  ```
  ip tunnel add tunnelName mode sit remote ipv4RemoteAddr local
      ipv4LocalAddr ttl 10
  ifconfig tunnelName up
  ifconfig tunnelName add ipv6LocalAddr
  route -A inet6 add ipv6RemoteAddr dev tunnelName
  ```

Services

- **ns1**, **ns2**, **ns3**, and **ns4** are name servers. **ns1** is the local name server for **client**, **ns2** is root, **ns3** is authority for **com**, **ns4** is authority for **site.com**.
- **The configuration of ns4 must include the following DNS record**:
  ```
  ipv6.site.com.  IN  AAAA  2001:f::2
  ```
- **Add this line at the beginning of file /etc/bind/named.conf on ns1**:
  ```
  options { allow-recursion { any; }; };
  ```
- **ipv4-web** and **ipv6-web** run Apache and, respectively, serve **http://ipv4.site.com/** and **http://ipv6.site.com/**.

Goals

- **client** must be able to display the web page served by **ipv4-web** using this command: **lynx http://ipv4.site.com/**
- **client** must be able to display the web page served by **ipv6-web** using this command: **lynx http://ipv6.site.com/**