ICN – Examination date: 13-02-2013 “Rocks”

Available time: 120 minutes.

Figure 1

**IP**

- For each interface, only the last byte of the IPv4 or IPv6 address is specified.
- All network nodes are IPv4-only, except `ipv6host`, which is IPv6-only, and `as10r1 as20r1`, and `webserver`, which are dual stack.
- Relevant nodes must be enabled to act as IPv6 routers by using the command specified in the box alongside.
- IPv6 routing is implemented statically.

**IGP and BGP**

- `AS20`'s internal network runs RIP.
- Peering LANs and networks internal to each AS (in gray) must be announced in BGP.
- Suitable BGP policies must be implemented to direct traffic as indicated in Figure 1.
- No router announces 0/0 nor applies customer-provider policies or configuration settings that discard announcements.
- Routers must not announce any IPv6 subnets, neither in RIP nor in BGP.

**USEFUL COMMANDS** (parts in square brackets are optional):

- Assign the IPv6 address `ipv6addr/mask` to interface `interface`:
  
  ```bash
  ifconfig interface up
  ifconfig interface add ipv6addr/mask
  ```

- Enable a network node to act as an IPv6 router:
  
  ```bash
  echo 1 >>/proc/sys/net/ipv6/conf/all/forwarding
  ```

- Add a static route towards `ipv6addr/[mask]`:
  
  ```bash
  route -A inet6 add ipv6addr/[mask] [gw nexthop] [dev interface]
  ```

- Display the IPv6 routing table (different from the IPv4 table):
  
  ```bash
  ip -6 route or alternatively, route -A inet6
  ```

- Set up an IPv6 tunnel named `tunnelName` between `ipv4LocalAddr` and `ipv4RemoteAddr` (note: the same setup must be performed at both the endpoints):
  
  ```bash
  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 that only resolve names to IPv4 addresses. `ns1` is root. `ns3` is the authority for `com`. `ns2` is the authority for `web.com`.
- `webserver` is a web server running Apache, and serving a single page `http://www.web.com/`.

**Goals**

- `ipv4host` must be able to display the web page offered by `webserver` by using this command: `links http://www.web.com/`.
- `ipv6host` be able to display the web page offered by `webserver` by using this command:
  
  ```bash
  echo -e "GET / HTTP/1.0\n" | nc6 2001::2:80.
  ```