Election of the Designated Router in OSPF

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Network view:

```
1.1.1.1
p = 1
192.168.0.0/24

2.2.2.2
p = 1
```

- **Priority value**
- **Interface Dummy0 (loopback) address**
- **Interface EthX address**
----- Basic configuration ----- 

1. Boot up two virtual routers

   # vstart name --eth0=A --new

2. On each virtual router configure the lo (127.0.0.1, if it is not configured), dummy0 and eth0 interfaces

   # ifconfig ...

   (NOTE: all necessary information can be found in the ifconfig manual)

3. On each virtual router check the zebra.conf and ospfd.conf files

   # vim /etc/zebra/zebra.conf
   # vim /etc/zebra/ospfd.conf

   Make sure that the following lines are not marked as comments (they must not be preceded by an exclamation mark):

   hostname <any name>
   password <any password>

   (NOTE: If you cannot find these lines you should add them.)
   (NOTE: If you cannot find the ospfd.conf file you should create it.)

4. On each virtual router make sure that the appropriate daemons will be loaded when Zebra starts (in /etc/zebra/daemons only zebra and ospfd should be enabled).

5. Start Zebra on all routers by issuing the command:

   # /etc/init.d/zebra start
----- Configuring OSPF ----- 

1. On each virtual router, connect to zebra and configure the special loopback address called \textit{dummy0}.

Commands:
\texttt{telnet → enable → configure terminal → interface dummy0}

Enter the \texttt{no shutdown} command (and the address if you have not set it before with the \texttt{ipconfig} command).

\textbf{Question 1: Why should we enable a special loopback address for OSPF?}

2. On each virtual router, connect to ospfd and change the hello-interval to 5 and the dead-interval to 20 on the \texttt{eth0} interface.

\textbf{Question 2: What are these intervals used for? Why are we changing them to lower values?}

3. On each virtual router, while connected to ospfd configure the router-id (set it to the value assigned to \texttt{eth0}) and add the 192.168.0.0 network.

\begin{verbatim}
ospfd > enable
ospfd # configure terminal
ospfd(config) # router ospf
ospfd(config-router) # ospf router-id x.x.x.x
ospfd(config-router) # network x.x.x/x area 0
ospfd(config-router) # write
ospfd(config-router) # end
\end{verbatim}

4. On each virtual router, check the running system information using different \texttt{show ip ospf} commands:

\begin{verbatim}
ospfd # show ip ospf 
\end{verbatim}

\textbf{Question 3: Which router was chosen as the Designated Router? Why? What is the status of the other router?}
----- Choosing the Designated Router ----- 

1. On the router that was chosen as DR we need to change its router-id to the one assigned to the dummy0 interface. To do this first disable ospf and then configure it again (this time using the dummy0 address as the router-id):

ospfd > enable
ospfd # configure terminal
ospfd(config) # no router ospf
ospfd(config) # router ospf
ospfd(config-router) # ospf router-id x.x.x.x
ospfd(config-router) # network x.x.x/x area 0
ospfd(config-router) # end

Question 4: Why do we need to disable and then enable ospf? Which router was chosen as the Designated Router? Why? What is the status of the other router?

2. On the router which is currently the DR change the priority to zero.

Question 5: What is the state of that router now? Why?

3. Change the priority values on both routers so that they are different than zero (NOTE: go to the interface configuration). Choose them so that the router with the lower router-id has the higher priority value. In order to observe the changes disable and set up ospf as shown above.

Question 6: What is more important when choosing the DR – router-id or priority?
----- Optional tasks -----  

1. Change the network type on `eth0` to point-to-point.  

**Question 7:** Is a DR selected? Why?  

2. Change the network type back to broadcast. Add a third virtual router to the environment, also connected to the same broadcast domain. Observe how the DR election algorithm works for three routers.  

**Question 8:** Does the observed algorithm differ from the one in the RFC?  

3. Create a completely new scenario with three routers connected in series.  

**Question 9:** Can a router be a DR on one interface and not a DR on another?