Chapter 15
Router Discovery

15.1 Router Discovery Overview

The Router Discovery Protocol is an IETF standard protocol, RFC 1256, used to inform hosts of the existence of routers. It is intended to be used instead of having hosts wiretap routing protocols, such as RIP. It is used in place of, or in addition to, statically-configured default routes in hosts. RFC 1256 can be found at:
http://ietf.org/rfc/rfc1256.txt

The protocol is split into two portions: the `server` portion, which runs on routers, and the `client` portion, which runs on hosts. GateD treats these much like two separate protocols, only one of which can be enabled at a time.

15.1.1 The Router Discovery Server

The router discovery server runs on routers and announces their existence to hosts. It announces the routers' existence by periodically multicasting or broadcasting a router advertisement from each interface on which it is enabled. These router advertisements contain a list of all the routers' addresses on a given interface, and the preferences indicate which address or addresses are a better choice for use as a default route.

Initially, these router advertisements occur every few seconds, then fall back to every few minutes. In addition, a host can send a router solicitation to which the router will respond with a unicast router advertisement (unless a multicast or broadcast advertisement is due momentarily).

Each router advertisement contains an advertisement `lifetime` field indicating for how long the advertised addresses are valid. This lifetime is configured such that another router advertisement will be sent before the lifetime has expired. A lifetime of zero is used to indicate that one or more addresses are no longer valid.

On systems supporting IP multicasting, the router advertisements are, by default, sent to the all-hosts multicast address `224.0.0.1`. However, the use of `broadcast` can be specified. When router advertisements are being sent to the all-hosts multicast address, or an interface is configured for the limited-broadcast address `255.255.255.255`, all IP addresses configured on the physical interface are included in the router advertisement. When the router advertisements are being sent to a net or subnet broadcast, only the address associated with that net or subnet is included.

A host listens for router advertisements via the all-hosts multicast address (`224.0.0.1`) if IP multicasting is available and enabled, or on the interface's broadcast address. When starting

up, or when reconfigured, a host can send a few router solicitations to the all-routers multicast address, **224.0.0.2**, or the interface's broadcast address.

When a router advertisement with non-zero lifetime is received, the host installs a default route to each of the advertised addresses. If the preference is ineligible, or the address is not on an attached interface, the route is marked unusable but retained. If the preference is usable, the metric is set as a function of the preference such that the route with the best preference is used. If more than one address with the same preference is received, the one with the lowest IP address will be used. These default routes are not exportable to other protocols.

When a router advertisement with a zero lifetime is received, the host deletes all routes with next-hop addresses learned from that interface of the sending router. In addition, any routes learned from ICMP redirects pointing to these addresses will be deleted. The same will happen when a router advertisement is not received to refresh these routes before the lifetime expires.

15.1.2 The Router Discovery Client

The router discovery client is provided for historical purposes only. It is an untested feature of GateD and will likely be deprecated in the future.

15.2 Router Discovery Syntax

```
routerdiscovery server ( on | off ) [ {
traceoptions trace_options ;
interface phys_interface_list
    [ maxadvinterval max_time ]
    [ minadvinterval min_time ]
    [ lifetime life_time ]
    ;
address interface_list
    [ advertise | ignore ]
    [ broadcast | multicast ]
    [ ineligible | preference preference ]
    ;
} ] ;


routerdiscovery client ( on | off ) [ {
    traceoptions trace_options ;
    preference preference ;
    interface phys_interface_list
        [ enable | disable ]
        [ multicast | broadcast ]
        [ quiet | solicit ]
        ;
} ] ;
```

15.3 Router Discovery Defaults

```
routerdiscovery server off  [ {
    interface all
        ( maxadvinterval 00:10:00
        minadvinterval .75*max_time
        lifetime 3*max_time )
        ;
    address interface_list
    advertise
    multicast
    preference 0
        ;
} ] ;


routerdiscovery client off  [ {
    preference 0 ;
    interface all enable
        enable
        multicast
        ;
} ] ;
```

15.4 Router Discovery Examples

15.4.1 Example 1

The following example runs router discovery on the interface fxp0, sending solicitations to the multicast address.

```
routerdiscovery client on {
        interface fxp0 enable multicast solicit;
};
```

15.4.2 Example 2

The following example runs the router discovery server on interface fxp0 sending advertisements no more often than once every minute, and no less often than once every 6 minutes. All routers that it advertises out interface fxp0 will be advertised with a lifetime of 10 minutes.

```
routerdiscovery server on {
        interface fxp0 minadvinterval 1:00 maxadvinterval 6:00
```

```
                    lifetime 10:00;
    }
```