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# RIP: Routing Information Protocol

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## Abstract

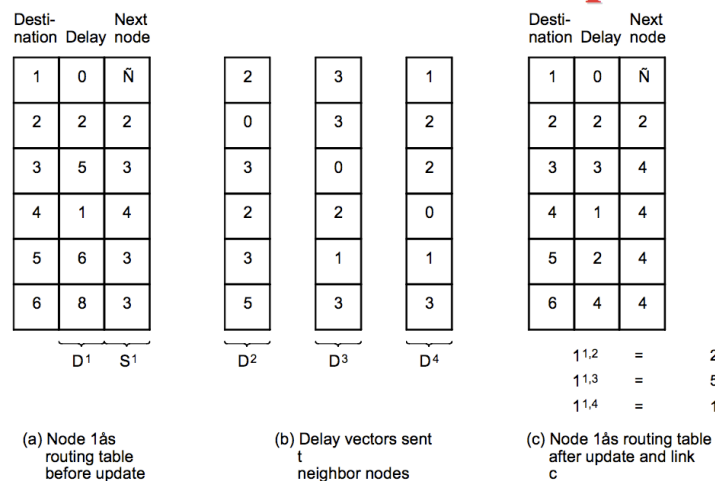
RIP, short for Routing Information Protocol, currently has two implementations (RIPv1 and RIPv2). Version two is much preferred over version one for security and compatibility reasons. RIP is a routing protocol, which means that its purpose is to be a traffic cop on a network, directing traffic through the best possible path. RIPv2 is built into almost all modern routing devices, even if it isn't turned on by default. Many routers have upgraded to RIPv2 at this point, if not something even more robust (such as OSPF or IS-IS) (Routing Information Protocol, 2008). However, RIP is still perfectly usable on small to medium sized networks, and may be preferred by some administrators due to the relative ease of configuration and wide availability.

The algorithm that RIP uses was originally setup in 1969 as the original routing protocol on ARPANET (Routing Information Protocol, 2008). The first time the name RIP was given was as part of Xerox Network Systems (XNS for short) (Cisco Systems, Inc., 2006).

RIPv1 has been phased out in most networks for two primary reasons: (1) it does not support CIDR addressing (less important on small networks) and (2) it uses plain-text for authentication which is very insecure and is almost as bad as having no authentication at all (which should be an important deciding factor for any administrator). RIPv2 solves these issues by adding support for classless routing and encryption on passwords. Also, generally of less importance, RIPv1 uses broadcast to send its updates, rather than multicast. What this means is that every host on the network receives the RIP updates and has to process the packet to see if it is something that it is interested in. RIPv2 solves this problem by using multicast to do its updates (Schluting, 2006). This is still worth mentioning as a deciding factor especially on larger networks with hundreds of hosts because it may slow down your network, depending on how large and how frequent updates are.

RIP uses distance vector routing to determine the best path. Distance vector routing advertises routes based on vectors that it creates using distance and direction. Distance is a metric (hop count), and direction is the next hop. (Doyle, 2001) The vector table is built using the number of hops and the cost associated with those hops to assign each path a value. The table below shows an example of how a distance vector table might look (Jain).

## Distance-Vector Example



(Jain)

Most distance vector routing protocols keep all this information up to date by broadcasting their entire routing table to their neighbors periodically (Doyle, 2001). The time frame for broadcasts is usually changeable by the network administrator as a configuration option. On networks that frequently change or where routing devices are often down, the broadcast delay should be set fairly low, whereas on networks where things don't change very often, such as a small/home office, this setting could be set much higher.

Because RIP talks to all of its neighbors, and often it does so frequently, it has to have something to regulate performance. RIP uses timers to make this process more efficient and allows it to draw on less network resources. Generally RIP broadcasts its entire routing table every 30 seconds, plus some small amount of time based on when the timer was reset. This helps prevent congestion, as if every routing device on the network were

to broadcast at the same time - depending on the size and speed of your network - it could bring your network down.

Another problem you encounter with routing is infinite loops. An infinite loop might look something like this (with a packet starting at router A):

A -> B -> C -> D -> B -> C -> D -> B [and so on]

As you can see, router D has an incorrect route setup, and is sending packets back to router B where they have already been. Router B forwards them back on to C, which sends them back to D, and so on. If a lot of packets end up stuck in a loop like this, it could cause enough overhead to crash one or more of the routers. To help prevent this, RIP uses a maximum hop count of 15. Any packet that takes more than 15 hops is considered undeliverable. (Cisco Systems, Inc., 2006) The problem with doing that is that some legitimate routes may be longer than 15 hops. This is especially true with networks that span more than one country or physically adjacent location. In these cases a different routing protocol may have to be used.

In summary, RIPv2 is a much stronger protocol than its little brother RIPv1, and as a result RIPv1 has been phased out of most networks. RIPv2 is still commonly used however, and RIPv1 is one of the most widely supported protocols. As with everything it has its limitations, but it is still a viable routing protocol option.

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