Volume No:1, Issue No:1 (June-2015)

International Journal of Research in Advanced Computer Science Engineering

A Peer Reviewed Open Access International Journal

www.ijracse.com

Implementation of Industry-Standard Routing Information Protocol (RIP) in Communication Networks

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ABSTRACT:

The proposed project aims on implementation of industry- standard routing information protocol (RIP) in communication networks. This rip module is built on the LINUX network services module and is IETF (internet engineering task force) compliant. An extensive set of features are supported with this RIP protocol .This is basically a control-plane software module and can integrate into a range of network processor environments. RIP become associated with transmission control/internet protocol (TCP/IP).This project is aimed to develop a rip protocol (routing information protocol)for a network processor router that has been used in local area network(LAN)to connect to broad band network .RIP takes care of dynamic routing off packets from local area network(LAN) to internet. RIP protocol works on the basis of distance vector algorithm developed by bellman-ford.Distance vector algorithm mainly explains about how to count the weight of the links directly connected to it and saves the information to its table.it handles to send route information to its neighbour routers and receive the routing table of each of its neighbors.

This project is implemented in' C' language .It uses GCC compiler to convert 'C 'code into assembly code .after converting we run the code as executable in shell of LINUX system just like system call interface and look at the packets in ethereal or WIRESHARK by using hub and a personal computer.A protocol standard is often intended to allow multiple implementations to interoperate, and multiple implementation choices and many engineering details usually make a formal protocol specification difficult. Lack of formal protocol specification has two important results, as has been shown in the IETF standard development process the correctness of the protocol is not easy to be proven; the protocol may be ambiguous in some aspects, leaving rooms for implementation bugs and even for attacks. Even worse, the bugs and ambiguities are identified in an ad hoc way, and there has not been any systematic way to identify bugs and ambiguities in existing protocols. In this work, we present a formal specification for the Routing Information Protocol (RIP). In Section 2, we will give a formal specification of the minimal requirements for a RIP router in order to guarantee that RIP will converge after a network topology change. By analyzing the RIP standards, we only specify those requirements that must be satisfied, while leaving room for any implementation choices allowed. Then in Section 3, we will present another formal specification of RIP by Finite State Machine. Using FSMs, we are able to find two ambiguities in the RIP standard.

Keywords:

BGP, Split horizon, Interior gateway protocol, routing by rumor, counting to Infinity, Broadcast updates.

AIM OF THIS PROJECT:

Routing protocols use several timers that determine such variables as the frequency of routing updates, the length of time before a route becomes invalid, and other parameters. You can adjust these timers to tune routing protocol performance to better suit your internetwork needs. You can make the following timer adjustments:• The rate (time in seconds between updates) at which routing updates are sent• The interval of time (in seconds) after which a route is declared invalid• The interval (in seconds) during which routing information regarding better paths is suppressed .The amount of time (in seconds) that must pass before a route is removed from the routing table .The amount of time for which routing updates will be postponed It also is possible to tune the IP routing support in the software to enable faster convergence of the various IP routing algorithms, and, hence, quicker fallback to redundant routers.

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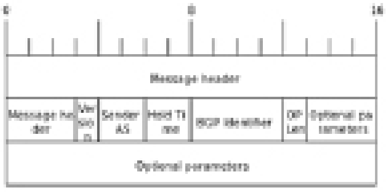
The total effect is to minimize disruptions to end users of the network in situations where quick recovery is essential. In addition, an address family can have explicitly specified timers that apply to that address-family (or VRF) only. The timers' basic command must be specified for an address family or the system defaults for the timer's basic command are used regardless of what is configured for RIP routing. The VRF does not inherit the timer values from the base RIP configuration. The VRF will always use the system default timers unless explicitly changed using the timer's basic command.



igure1: Parameters for message format

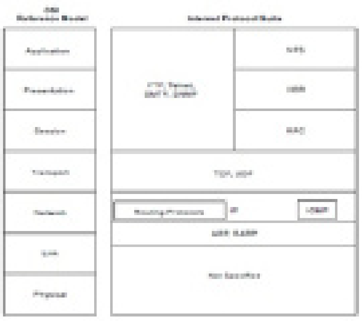


Figure2: IP packet format

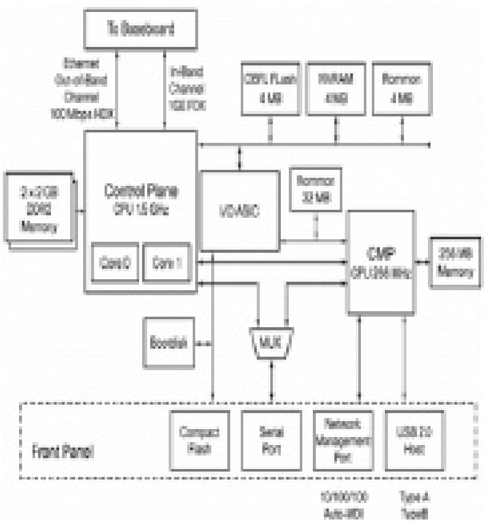


Figure 3: Message format for routing protocol

Explanation of algorithm:

Autonomous systems: The definition of an autonomous system (AS) is integral to understanding the function and scope of a routing protocol. An AS is defined as a logical portion of a larger IP network. An AS normally consists of an internetwork within an organization. It is administered by a single management authority. An AS can connect to other autonomous systems managed by the same organization. Alternatively, it can connect to other public or private networks. Some routing protocols are used to determine routing paths within an AS. Others are used to interconnect a set of autonomous systems:

• Interior Gateway Protocols (IGPs): Interior Gateway Protocols allow routers to exchange information within an AS. Examples of these protocols are Open Short Path First (OSPF) and Routing Information Protocol (RIP).

• Exterior Gateway Protocols (EGPs): Exterior Gateway Protocols allow the exchange of summary information between autonomous systems. An example of this type of routing protocol is Border Gateway Protocol (BGP).

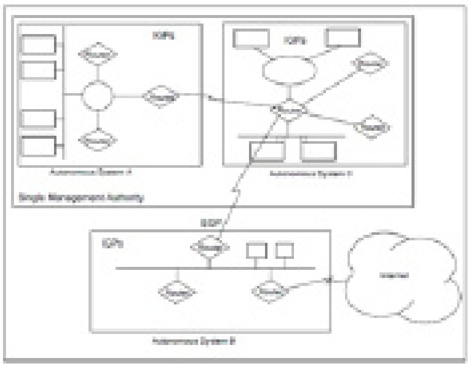


Figure 4: Types of IP routing and IP routing algorithms

Routing algorithms build and maintain the IP routing table on a device. There are two primary methods used to build the routing table:

• Static routing: Static routing uses pre-programmed definitions representing paths through the network.

• Dynamic routing: Dynamic routing algorithms allow routers to automatically discover and maintain awareness of the paths through the network.

This automatic discovery can use a number of currently available dynamic routing protocols. The difference between these protocols is the way they discover and calculate new routes to destination networks. They can be classified into four broad categories:

• Distance vector

In DV algorithms, each router has to follow these steps:

1.It counts the weight of the links directly connected to it and saves the information to its table.

2.In a specific period of time, it send its table to its neighbour routers (not to all routers) and receive the routing table of each of its neighbor's.

3.Based on the information in its neighbor's routing tables, it updates its own.

CONCLUSION:

The protocol depends upon counting to infinity to resolve certain unusual situations. As described earlier (Vector-Distance), the resolution of a loop would require either much time (if the frequency of updates was limited) or much bandwidth (if updates were sent whenever changes were detected). As the size of the routing domain grows, the instability of the vector-distance algorithm in the face of changing topology becomes apparent. RIP specifies mechanisms to minimize the problems with counting to infinity (these are described below) which allows RIP to be used for larger routing domains, but eventually RIP will be unable to cope. There is no fixed upper limit, but the practical maximum depends upon the frequency of changes to the topology, the details of the network topology itself, and what is deemed as an acceptable maximum time for the routing topology to stabilize.

FUTURE SCOPE:

RIP VERSION 2

Due to the deficiencies of the original RIP specification, RIP version 2 (RIPv2) was developed in 1993 and last standardized in 1998. It included the ability to carry subnet information, thus supporting Classless Inter-Domain Routing (CIDR).

To maintain backward compatibility, the hop count limit of 15 remained. RIPv2 has facilities to fully interoperate with the earlier specification if all Must Be Zero protocol fields in the RIPv1 messages are properly specified. In addition, a compatibility switch feature allows fine-grained interoperability adjustment .In an effort to avoid unnecessary load on hosts that do not participate in routing, RIPv2 multicasts the entire routing table to all adjacent routers at the address 224.0.0.9, as opposed to RIPv1 which uses broadcast. Unicast addressing is still allowed for special applications (MD5) authentication for RIP introduced in 1997. RIPv2 is Internet Standard STD56 (which is RFC 2453 .Route tags were also added in RIP version 2. This functionality allows for routes to be distinguished from internal routes to external redistributed routes from EGP protocols.

RIPNG: RIPng (RIP next generation), defined in RFC 2080, is an extension of RIPv2 for support of IPv6, the next generation Internet Protocol. The main differences between RIPv2 and RIPng are Support of IPv6 networking While RIPv2 supports RIPv1 updates authentication, RIPng does not. IPv6 routers were, at the time, supposed to use IPsec for authentication.RIPv2 allows attaching arbitrary tags to routes, RIPng does not RIP v2 encodes the next-hop into each route entries, RIPng specific encoding of the next hop for a set of route RIPng sends updates on UDP port 521 using the multicast group FF02::9.

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