RIP Version 2 Protocol Analysis

Status of this Memo

Abstract

   As required by Routing Protocol Criteria (RFC 1264), this report
   documents the key features of the RIP-2 protocol and the current
   implementation experience. This report is a prerequisite to
   advancing RIP-2 on the standards track.

Acknowledgements

   The RIP-2 protocol owes much to those who participated in the RIP-2
   working group. A special thanks goes to Fred Baker, for his help on
   the MIB, and to Jeffrey Honig, for all his comments.

1. Protocol Documents

   The RIP-2 applicability statement is defined in RFC 1722 [1].

   The RIP-2 protocol description is defined in RFC 1723 [2]. This memo
   obsoletes RFC 1388, which specifies an update to the "Routing
   Information Protocol" RFC 1058 (STD 34).

   The RIP-2 MIB description is defined in RFC 1724 [3]. This memo
   obsoletes RFC 1389.

2. Key Features

   While RIP-2 shares the same basic algorithms as RIP-1, it supports
   several new features. They are: external route tags, subnet masks,
   next hop addresses, and authentication.

   The significant change from RFC 1388 is the removal of the domain
   field. There was no clear agreement as to how the field would be
   used, so it was determined to leave the field reserved for future
   expansion.

2.1 External Route Tags

   The route tag field may be used to propagate information acquired
   from an EGP. The definition of the contents of this field are beyond
   the scope of this protocol. However, it may be used, for example, to
   propagate an EGP AS number.

2.2 Subnet Masks

   Inclusion of subnet masks was the original intent of opening the RIP
   protocol for improvement. Subnet mask information makes RIP more
   useful in a variety of environments and allows the use of variable
   subnet masks on the network. Subnet masks are also necessary for
   implementation of "classless" addressing, as the CIDR work proposes.

2.3 Next Hop Addresses

   Support for next hop addresses allows for optimization of routes in
   an environment which uses multiple routing protocols. For example,
   if RIP-2 were being run on a network along with another IGP, and one
   router ran both protocols, then that router could indicate to the
   other RIP-2 routers that a better next hop than itself exists for a
   given destination.

2.4 Authentication

   One significant improvement RIP-2 offers over RIP-1, is the addition
   of an authentication mechanism. Essentially, it is the same
   extensible mechanism provided by OSPF. Currently, only a plain-text
   password is defined for authentication. However, more sophisticated
   authentication schemes can easily be incorporated as they are
   defined.

2.5 Multicasting

   RIP-2 packets may be multicast instead of being broadcast. The use
   of an IP multicast address reduces the load on hosts which do not
   support routing protocols. It also allows RIP-2 routers to share
   information which RIP-1 routers cannot hear. This is useful since a
   RIP-1 router may misinterpret route information because it cannot
   apply the supplied subnet mask.

3. RIP-2 MIB

   The MIB for RIP-2 allows for monitoring and control of RIP's
   operation within the router. In addition to global and per-interface
   counters and controls, there are per-peer counters which provide the
   status of RIP-2 "neighbors".

   The MIB was modified to deprecate the domain, which was removed from
   the protocol. It has also been converted into version 2 format.

4. Implementations

   Currently, there are three complete implementations of RIP-2: GATED,
   written by Jeffrey Honig at Cornell University; Xylogics's Annex
   Communication server; and an implementation for NOS, written by Jeff
   White. The GATED implementation is available by anonymous FTP from
   gated.cornell.edu as pub/gated/gated-alpha.tar.Z. The implementation
   for NOS is available by anonymous FTP from ucsd.edu as
   /hamradio/packet/tcpip/incoming/rip2.zip.

   Additionally, Midnight Networks has produced a test suite which
   verifies an implementation's conformance to RFC 1388 implemented over
   RFC 1058.

   The author has conducted interoperability testing between the GATED
   and Xylogics implementations and found no incompatibilities. This
   testing includes verification of protection provided by the
   authentication mechanism described in section 2.4.

5. Operational experience

   Xylogics has been running RIP-2 on its production systems for five
   months. The topology includes seven subnets in a class B address and
   various, unregistered class C addresses used for dial-up access. Six
   systems, in conjunction with three routers from other vendors and
   dozens of host systems, operate on those subnets.

   The only problem which has appeared is the reaction of some routers
   to Version 2 RIP packets. Contrary to RFC 1058, these routers
   discard Version 2 packets rather than ignoring the fields not defined
   for Version 1.

6. References

   [1] Malkin, G., "RIP Version 2 Protocol Applicability Statement", RFC
       1722, Xylogics, Inc., November 1994.

   [2] Malkin, G., "RIP Version 2 - Carrying Additional Information",
       RFC 1723, Xylogics, Inc., November 1994.

   [3] Malkin, G., and F. Baker, "RIP Version 2 MIB Extension", RFC
       1724, Xylogics, Inc., Cisco Systems, November 1994.

7. Security Considerations

    Security issues are discussed in sections 2.4 and 4.

8. Author's Address

    Gary Scott Malkin
    Xylogics, Inc.
    53 Third Avenue
    Burlington, MA 01803

    Phone: (617) 272-8140
    EMail: gmalkin@Xylogics.COM